City Of Seattle

SUPPLEMENT

to the

1984 STANDARD SPECIFICATIONS

for

Road, Bridge, and Municipal

Construction

(Division 2 through 9)

1986 EDITION
1986
City of Seattle
SUPPLEMENT
to the
1984 STANDARD SPECIFICATIONS
for
Road, Bridge, and Municipal Construction
(Division 2 through 9)

Prepared By
SEATTLE ENGINEERING DEPARTMENT
Gary Zarker, Director

Examined and Approved by the
BOARD OF PUBLIC WORKS
October 31, 1986

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FOREWORD

The 1986 City of Seattle Supplement prepared by the Seattle Engineering Department for the Board of Public Works contains modifications to the 1984 Standard Specifications for Road, Bridge and Municipal Construction which was prepared jointly by the Washington State Department of Transportation and the American Public Works Association, Washington State Chapter. These 1984 WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction together with the 1986 City of Seattle Supplement and the Traffic Control Manual for Institreet Work constitute the 1986 City of Seattle Standard Specifications for Road, Bridge and Municipal Construction. These City of Seattle Standards shall be used with the City of Seattle Standard Plans, 1986 Edition.

For all public work projects administered by the Seattle Engineering Department or sponsored by other departments and agencies working within the jurisdiction of the Seattle Engineering Department, the 1985 Supplement contained herein; the 1984 Standard Specifications for Road, Bridge and Municipal Construction; the City of Seattle Standard Plans, 1986 Edition; the Traffic Control Manual for Institreet Work; the laws of the State of Washington; the charter and ordinances of the City of Seattle; and the Project Manual for the specific project shall constitute the contract for the project and shall be considered as a whole.

The City of Seattle Standard Specifications for Road, Bridge and Municipal Construction and the City of Seattle Standard Plans, 1986 Edition shall apply whenever any public or private work is performed within the street rights of way of the City of Seattle including work performed by private parties at their own expense under authority granted by ordinance of the City Council or permit of the Board of Public Works. All requirements of the City of Seattle Standard Specifications shall apply to such work in the same manner as though the work were being performed under Board of Public Works contract with the exception of those requirements or conditions pertaining to payment for the work performed or to withholding or receiving money due the Contractor. All matters relating to financing of such work shall be between the permittee and the Contractor, and the City shall not enter into such matters.

LA, Foreword
For the reader’s convenience the Table of Contents includes two page number columns. When a page number is listed in the "1984 WSDOT" column only (1) the specification requirements for that section title can only be found in the 1984 Standard Specifications for Road, Bridge, and Municipal Construction published by the Washington State Department of Transportation. When a page number is listed in the 1986 Supplement column only (2) the specification requirements for that section can only be found in the 1986 Supplement. When a page number is listed in both the "1984 WSDOT" and "1986 Supplement" column (3) specification requirements may be found in both the 1984 Standard Specifications for Road, Bridge and Municipal Construction and this 1986 Supplement (see example below).

Example:

### Section 2-02 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

<table>
<thead>
<tr>
<th>Indicates Condition</th>
<th>1984 WSDOT</th>
<th>1986 SUPPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) 2-02.1 Description</td>
<td>81</td>
<td>4</td>
</tr>
<tr>
<td>(2) 2-02.2 Materials</td>
<td>--</td>
<td>4</td>
</tr>
<tr>
<td>(3) 2-02.3 Construction Requirements</td>
<td>81</td>
<td>4</td>
</tr>
<tr>
<td>(3) 2-02.3(1) General Requirements</td>
<td>81</td>
<td>4</td>
</tr>
<tr>
<td>(1) 2-02.3(2) Removal of Bridges, Box Culverts, and Other Drainage Structures</td>
<td>81</td>
<td>--</td>
</tr>
</tbody>
</table>

Specification requirements included in this 1986 Supplement supersede the specification requirements found in the 1984 Standard Specification for Road, Bridge and Municipal Construction.

Specification requirements found in the Project Manual of a specific project supersede the specification requirements found in both the 1984 WSDOT Standard Specification and the 1986 Supplement.

### TABLE OF CONTENTS

#### DIVISION 2

#### EARTHWORK

<table>
<thead>
<tr>
<th>SECTION 2-01 CLEARING, GRUBBING, AND ROADSIDE CLEANUP</th>
<th>1984 WSDOT</th>
<th>1986 SUPPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-01.1 Description</td>
<td>77</td>
<td>1</td>
</tr>
<tr>
<td>2-01.2 Disposal</td>
<td>--</td>
<td>1</td>
</tr>
<tr>
<td>2-01.3 Construction Requirements</td>
<td>--</td>
<td>2</td>
</tr>
<tr>
<td>2-01.3(1) Clearing</td>
<td>--</td>
<td>2</td>
</tr>
<tr>
<td>2-01.3(2) Grubbing</td>
<td>--</td>
<td>2</td>
</tr>
<tr>
<td>2-01.3(3) Limits of Clearing and Grubbing</td>
<td>--</td>
<td>2</td>
</tr>
<tr>
<td>2-01.3(4) Roadside Cleanup</td>
<td>--</td>
<td>2</td>
</tr>
<tr>
<td>2-01.3(5) Protection of Existing Improvements</td>
<td>--</td>
<td>2</td>
</tr>
<tr>
<td>2-01.4 Measurement</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>2-01.5 Payment</td>
<td>--</td>
<td>3</td>
</tr>
</tbody>
</table>

1
<table>
<thead>
<tr>
<th>Section 2-02</th>
<th>Removal of Structures and Obstructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-02.1</td>
<td>Description</td>
</tr>
<tr>
<td>2-02.2</td>
<td>Materials</td>
</tr>
<tr>
<td>2-02.3</td>
<td>Construction Requirements</td>
</tr>
<tr>
<td>2-02.3(I)</td>
<td>General Requirements</td>
</tr>
<tr>
<td>2-02.3(II)</td>
<td>Removal of Bridges, Box Culverts and Other Drainage Structures</td>
</tr>
<tr>
<td>2-02.3(III)</td>
<td>Removal of Existing Street Improvements</td>
</tr>
<tr>
<td>2-02.3(III)A</td>
<td>Removal of Non-Rigid Pavement and Untreated Roadway Surfaces</td>
</tr>
<tr>
<td>2-02.3(III)B</td>
<td>Removal of Asphalt Overlay</td>
</tr>
<tr>
<td>2-02.3(III)C</td>
<td>Remove Erosion Control Device</td>
</tr>
<tr>
<td>2-02.3(III)D</td>
<td>Remove Catch Basin, Sandbox, Valve Chamber, Manhole or Inlet</td>
</tr>
<tr>
<td>2-02.3(III)E</td>
<td>Remove Curb and Curb and Gutter</td>
</tr>
<tr>
<td>2-02.3(III)F</td>
<td>Remove Sidewalk</td>
</tr>
<tr>
<td>2-02.3(III)G</td>
<td>Remove Electrical and Traffic Control Device</td>
</tr>
<tr>
<td>2-02.3(IV)</td>
<td>Abandon Catch Basin, Manhole or Inlet</td>
</tr>
<tr>
<td>2-02.3(V)</td>
<td>Abandon and Fill Pipe</td>
</tr>
<tr>
<td>2-02.3(VI)</td>
<td>Sawing and Line Drilling</td>
</tr>
<tr>
<td>2-02.3(VII)</td>
<td>Salvage</td>
</tr>
<tr>
<td>2-02.3(VII)A</td>
<td>General</td>
</tr>
<tr>
<td>2-02.3(VII)B</td>
<td>Water Mains and Appurtenances</td>
</tr>
<tr>
<td>2-02.3(VII)C</td>
<td>Illumination, Signals, and Electrical</td>
</tr>
<tr>
<td>2-02.3(VII)D</td>
<td>Reinstalling Salvaged Electrical Material</td>
</tr>
<tr>
<td>2-02.4</td>
<td>Street Saddles and Steel Plates</td>
</tr>
<tr>
<td>2-02.5</td>
<td>Measurement</td>
</tr>
<tr>
<td>2-02.6</td>
<td>Payment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2-03</th>
<th>Roadway Excavation and Embankment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-03.1</td>
<td>Description</td>
</tr>
<tr>
<td>2-03.1(I)</td>
<td>Classification</td>
</tr>
<tr>
<td>2-03.1(II)</td>
<td>Protection of Existing Improvements</td>
</tr>
<tr>
<td>2-03.2</td>
<td>Vacant</td>
</tr>
<tr>
<td>2-03.3</td>
<td>Construction Requirements</td>
</tr>
<tr>
<td>2-03.3(I)</td>
<td>Widening of Cuts</td>
</tr>
<tr>
<td>2-03.3(II)</td>
<td>Rock Cutt</td>
</tr>
<tr>
<td>2-03.3(III)</td>
<td>Excavation Below Grade</td>
</tr>
<tr>
<td>2-03.3(IV)</td>
<td>Sluicing</td>
</tr>
<tr>
<td>2-03.3(V)</td>
<td>Vacant</td>
</tr>
<tr>
<td>2-03.3(VI)</td>
<td>Deposit of Rock for State Use</td>
</tr>
<tr>
<td>2-03.3(VII)</td>
<td>Disposal of Surplus Material</td>
</tr>
<tr>
<td>2-03.3(VIII)</td>
<td>Wasting Material</td>
</tr>
<tr>
<td>2-03.3(X)</td>
<td>Roadway Ditches</td>
</tr>
<tr>
<td>2-03.3(XI)</td>
<td>Selected Materials</td>
</tr>
<tr>
<td>2-03.3(XII)</td>
<td>Slides</td>
</tr>
<tr>
<td>2-03.3(XIII)</td>
<td>Overbreak</td>
</tr>
<tr>
<td>2-03.3(XIV)</td>
<td>Borrow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2-04</th>
<th>Mains</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-04.1</td>
<td>Description</td>
</tr>
<tr>
<td>2-04.2</td>
<td>Construction Requirements</td>
</tr>
<tr>
<td>2-04.3</td>
<td>Measurement</td>
</tr>
<tr>
<td>2-04.4</td>
<td>Payment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2-05</th>
<th>Slope Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-05.1</td>
<td>Description</td>
</tr>
<tr>
<td>2-05.2</td>
<td>Construction Requirements</td>
</tr>
<tr>
<td>2-05.3</td>
<td>Measurement</td>
</tr>
<tr>
<td>2-05.4</td>
<td>Payment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2-06</th>
<th>Subgrade Preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-06.1</td>
<td>Description</td>
</tr>
<tr>
<td>2-06.2</td>
<td>Construction Requirements</td>
</tr>
<tr>
<td>2-06.3</td>
<td>Subgrade for Surfacing</td>
</tr>
<tr>
<td>2-06.4</td>
<td>Subgrade for Pavement</td>
</tr>
<tr>
<td>2-06.5</td>
<td>Subgrade Stabilization</td>
</tr>
<tr>
<td>2-06.6</td>
<td>Maintenance and Protection of Subgrade</td>
</tr>
<tr>
<td>2-06.7</td>
<td>Equipment</td>
</tr>
<tr>
<td>2-06.8</td>
<td>Measurement</td>
</tr>
<tr>
<td>2-06.9</td>
<td>Payment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2-07</th>
<th>Watering</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-07.1</td>
<td>Description</td>
</tr>
<tr>
<td>2-07.2</td>
<td>Source of Water Supply and Regulating Infrastructure</td>
</tr>
<tr>
<td>2-07.3</td>
<td>Construction Requirements</td>
</tr>
</tbody>
</table>
SECTION 2-09 STRUCTURE EXCAVATION

2-09.1 Description
2-09.3 Construction Requirements
2-09.3(1) Staking, Cross Sectioning and Inspection
2-09.3(2) Depth of Excavation
2-09.3(3) Removal of Unsuitable Base Material
2-09.3(4) Disposal of Excavated Material
2-09.3(5) Backfilling
2-09.3(6) Items to Remain
2-09.3(7) Classification of Structure Excavation
2-09.3(8) Structure Excavation
2-09.3(9) Preservation of Channel
2-09.3(10) Excavation in Open Pits
2-09.3(11) Preparation for Placing Foundation
2-09.3(12) Shoring, Cribbing and Cofferdam
2-09.3(13) Bearing Test
2-09.3(14) Dewatering
2-09.3(15) Construction Requirement for Trench (or other excavations) 4 ft or more in depth
2-09.4 Measurement
2-09.5 Payment

SECTION 2-10 DITCH AND CHANNEL EXCAVATION

2-10.1 Description
2-10.3 Construction Requirements
2-10.4 Measurement
2-10.5 Payment

SECTION 2-11 TRIMMING AND CLEANUP

2-11.1 Description
2-11.3 Construction Requirements
2-11.4 Measurement
2-11.5 Payment
### SECTION 4-04 BALLASTING AND CRUSHED SURFACING

| 4-04.1 | Description | 126 | 35 |
| 4-04.2 | Materials | 126 | 35 |
| 4-04.3 | Construction Requirements | 126 | 35 |
| 4-04.3(1) | Equipment | 126 | 35 |
| 4-04.3(2) | Subgrade | 126 | 35 |
| 4-04.3(3) | Mixing | 126 | 35 |
| 4-04.3(4) | Placement and Spreading | 126 | 35 |
| 4-04.3(5) | Shaping and Compaction | 126 | 35 |
| 4-04.3(6) | Keystone | 126 | 35 |
| 4-04.3(7) | Miscellaneous Requirements | 126 | 35 |
| 4-04.3(8) | Weather Limitations | 126 | 35 |
| 4-04.3(9) | Hauling | 126 | 35 |
| 4-04.3(10) | Hours of Work | 126 | 35 |
| 4-04.3(11) | Shoulder Ballast | 126 | 35 |
| 4-04.3(12) | Application of Dust Palliative | 126 | 35 |
| 4-04.3(13) | Maintenance Requirements and Correction of Surface Defects | 126 | 35 |
| 4-04.3(14) | Resurfacing of Oil Mat and Gravel Streets | 126 | 35 |
| 4-04.4 | Measurement | 126 | 35 |
| 4-04.5 | Payment | 126 | 35 |

### SECTION 4-05 VACANT

### SECTION 4-06 ASPHALT TREATED BASE

| 4-06.1 | Description | 131 | 39 |
| 4-06.2 | Materials | 131 | 39 |
| 4-06.3 | Construction Requirements | 131 | 39 |
| 4-06.3(1) | Asphalt Mixing Plant | 131 | 39 |
| 4-06.3(2) | Preparation of Aggregates | 131 | 39 |
| 4-06.3(3) | Heating of Asphalt Material | 131 | 39 |
| 4-06.3(4) | Mixing | 131 | 39 |
| 4-06.3(5) | Hauling Equipment | 131 | 39 |
| 4-06.3(6) | Spreading and Finishing | 131 | 39 |
| 4-06.3(6A) | Subgrade Protection Course | 131 | 39 |
| 4-06.3(6B) | Finish Course | 131 | 39 |
| 4-06.3(7) | Density | 131 | 39 |
| 4-06.3(8) | Anti-Stripping Additive | 131 | 39 |
| 4-06.3(9) | Compaction | 131 | 39 |
| 4-06.3(10) | Measurement | 131 | 39 |
| 4-06.3(11) | Payment | 131 | 39 |

### SECTION 5-01 SUBSEALING

| 5-01.1 | Description | 134 | 39 |
| 5-01.2 | Mix Design | 134 | 39 |
| 5-01.3 | Construction Requirements | 134 | 39 |
| 5-01.3(1) | Equipment | 134 | 39 |
| 5-01.3(2) | Construction | 134 | 39 |
| 5-01.4 | Measurement | 134 | 39 |
| 5-01.5 | Payment | 134 | 39 |

### SECTION 5-02 BITUMINOUS SURFACE TREATMENT

| 5-02.1 | Description | 136 | 40 |
| 5-02.2 | Materials | 136 | 40 |
| 5-02.3 | Construction Requirements | 136 | 40 |
| 5-02.3(1) | Equipment | 136 | 40 |
| 5-02.3(2) | Preparation of Roadway Surface | 136 | 40 |
| 5-02.3(3A) | Untreated Surfaces | 136 | 40 |
| 5-02.3(3B) | Treated Surfaces | 136 | 40 |
| 5-02.3(3C) | Soil Residual Herbicide | 136 | 40 |
| 5-02.3(3D) | Application of Asphalt | 136 | 40 |
| 5-02.3(4) | Change in Grades of Asphalt | 136 | 40 |
| 5-02.3(5) | Application Method of Aggregates | 136 | 40 |
| 5-02.3(6) | Additional Asphalt and Aggregates | 136 | 40 |
| 5-02.3(7) | Patching and Correction of Defects | 136 | 40 |
| 5-02.3(8) | Progress of Work | 136 | 40 |
| 5-02.3(9) | Protection of Structures | 136 | 40 |
| 5-02.3(10) | Unfavorable Weather | 136 | 40 |
| 5-02.3(11) | Anti-Stripping Additive | 136 | 40 |
| 5-02.4 | Measurement | 136 | 40 |
| 5-02.5 | Payment | 136 | 40 |

### SECTION 5-03 COAL TAR PITCH EMULSION SEAL COATS

<p>| 5-03.1 | Description | 144 | 40 |
| 5-03.2 | Materials | 144 | 40 |
| 5-03.3 | Construction Requirements | 144 | 40 |
| 5-03.3(1) | Equipment | 144 | 40 |
| 5-03.3(2) | Surface Preparation | 144 | 40 |
| 5-03.3(3) | Coal Tar Pitch Emulsion Seal Type 1 | 144 | 40 |
| 5-03.3(4) | Coal Tar Pitch Emulsion Seal Type 2 | 144 | 40 |
| 5-03.4 | Weather Limitations | 144 | 40 |
| 5-03.5 | Measurement | 144 | 40 |
| 5-03.5(1) | Payment | 144 | 40 |</p>
<table>
<thead>
<tr>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSDOT</td>
<td>SUPPL</td>
</tr>
</tbody>
</table>

### 5-06.2(1)
Concrete Mixes Incorporating Fly Ash
--- 56

### 5-06.3
Construction Details
--- 56

### 5-06.3(2)
Consistency (Slump Requirements)
--- 57

### 5-06.3(3)
Equipment
--- 57

### 5-06.3(4)
Handling, Measuring and Batching Materials
--- 57

### 5-06.3(5)
Mixing Concrete
--- 57

### 5-06.3(5A)
Limitations of Mixing
--- 57

### 5-06.3(6)
Subgrade
--- 57

### 5-06.3(7)
Forms
--- 58

### 5-06.3(8)
Placing and Spreading Concrete
--- 58

### 5-06.3(8A)
Placing Concrete at Through Joints
--- 58

### 5-06.3(8B)
Placing Concrete with Reinforcing Steel or Wire Mesh
--- 59

### 5-06.3(8C)
Slip Form Construction
--- 59

### 5-06.3(9)
Compacting Concrete
--- 59

### 5-06.3(9A)
Internal Vibration
--- 60

### 5-06.3(9B)
Machine Compacting
--- 60

### 5-06.3(9C)
Combined Vibration and Machine Compacting
--- 60

### 5-06.3(9D)
Vibrating Screed Concrete Pavement Construction
--- 60

### 5-06.3(10)
Water
--- 61

### 5-06.3(11)
Joints
--- 61

### 5-06.3(11A)
Control Joint Slabs
--- 61

### 5-06.3(11B)
Control Joint Joints
--- 61

### 5-06.3(11C)
Through Joints
--- 62

### 5-06.3(11D)
Sealing Through Joints
--- 63

### 5-06.3(11E)
Construction Joints
--- 63

### 5-06.3(11F)
Transverse Joint Location
--- 63

### 5-06.3(11G)
Longitudinal Joint Location
--- 63

### 5-06.3(12)
Finishing Concrete
--- 64

### 5-06.3(12A)
Hand Finishing
--- 64

### 5-06.3(12B)
Machine Finishing
--- 64

### 5-06.3(12C)
Surface Smoothness
--- 64

### 5-06.3(12D)
Edging
--- 65

### 5-06.3(12E)
Final Finish
--- 65

### 5-06.3(13)
Curing
--- 65

#### 5-06.3(13A)
Curing Period
--- 65

#### 5-06.3(13B)
White Pigmented Curing Compound
--- 66

#### 5-06.3(13C)
White Polyethylene Sheet
--- 66

#### 5-06.3(13D)
Spiralling System
--- 66

#### 5-06.3(13E)
Waterproof Paper
--- 66

#### 5-06.3(13F)
Transparent Curing Compound
--- 66

#### 5-06.3(13G)
Reinforced Asphalt
--- 66

### 5-06.3(13H)
Curing in Hot Weather
--- 66

### 5-06.3(14)
Cold Weather Work
--- 66

### 5-06.3(15)
Concrete Pavement Construction
--- 67

### 5-06.3(16)
Barriers and Safeguards
--- 68

### 5-06.3(17)
Opening Pavements to Traffic
--- 68

### 5-06.3(18)
Cleanup
--- 68

### 5-06.3(19)
Concrete Concrete Alley, Alley Return, and Driveway
--- 68

### 5-06.3(19A)
Curb
--- 68

### 5-06.3(20)
Concrete Base Pavement
--- 68

### 5-06.3(21)
Extra Concrete for Alley Approach Ramp
--- 69

### 5-06.3(22)
Edge and Support Wall
--- 69

### 5-06.3(23)
Curb Wall
--- 69

### 5-06.3(24)
Concrete Underpinning
--- 69

### 5-06.3(25)
Steel Reinforcing Bars
--- 69

### 5-06.3(26)
Bridge Approach Slabs
--- 69

### 5-06.4
Measurement
--- 69

### 5-06.5
Payment
--- 70

### SECTION 5-07 - PAVEMENT PATCHING (New Section)
--- 72

#### 5-07.1
Description
--- 72

#### 5-07.2
Materials
--- 72

#### 5-07.3
Construction Requirements
--- 72

#### 5-07.3(1)
General
--- 72

#### 5-07.3(1A)
Temporary Pavement Patching
--- 72

#### 5-07.3(2)
Cement Concrete Patch
--- 73

#### 5-07.3(3)
Rigid Pavement Resurfaced with Asphalt Concrete
--- 73

#### 5-07.3(4)
Asphalt Concrete on Granular Base
--- 73

#### 5-07.3(5)
Unreated Roadway Surfaces
--- 73

#### 5-07.4
Measurement
--- 73

#### 5-07.5
Payment
--- 74

### DIVISION 6 STRUCTURES

#### SECTION 6-01 GENERAL REQUIREMENTS
--- 75

#### 6-01.1
Description
--- 187

#### 6-01.2
Foundation Data
--- 75

#### 6-01.3
Clearing the Site
--- 187

#### 6-01.4
Alignment and Grade
--- 187

#### 6-01.5
Erection Method
--- 75

#### 6-01.6
Vacant
--- 188

#### 6-01.7
Navigable Streams
--- 188

#### 6-01.8
Approaches to Navigable Spans
--- 188

#### 6-01.9
Vacant
--- 188

#### 6-01.10
Vacant
--- 188

#### 6-01.11
Rounded Plates
--- 188

#### 6-01.12
Final Cleaning Up
--- 188

#### 6-01.13
Architectural Features
--- 188

#### 6-01.14
Premolded Joint Filler
--- 188

#### 6-01.15
Normal Temperature and Dimensions
--- 189

#### SECTION 6-02 CONCRETE STRUCTURES
--- 76

#### 6-02.1
Description
--- 190

#### 6-02.2
Materials
--- 190

#### 6-02.3
Construction Requirements
--- 76
<table>
<thead>
<tr>
<th>1984 WSDOT</th>
<th>1986 SUPPL</th>
<th>1984 WSDOT</th>
<th>1986 SUPPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-02.3(1) Classification of Structural Concrete</td>
<td>190</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(1) Proportioning Materials</td>
<td>190</td>
<td>76</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(2)A Air-Entrained Concrete</td>
<td>192</td>
<td>76</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(2)B Water-Reducing Admixture</td>
<td>192</td>
<td>—</td>
<td>76</td>
</tr>
<tr>
<td>6-02.3(2)C Low Shrink Concrete</td>
<td>193</td>
<td>77</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(2)D Concrete Mix incorporating Fly Ash</td>
<td>—</td>
<td>76</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(2)E Non-Shrink Cement Sand GROUT</td>
<td>—</td>
<td>76</td>
<td>—</td>
</tr>
<tr>
<td>6-03.3(6)A Measuring Materials</td>
<td>193</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-03.3(6)B Mixing Concrete</td>
<td>193</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-03.3(6)C Machine Mixing</td>
<td>193</td>
<td>77</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(4)A Hand Mixing</td>
<td>194</td>
<td>77</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(4)B Ready-Mixed Concrete</td>
<td>194</td>
<td>—</td>
<td>77</td>
</tr>
<tr>
<td>6-02.3(5)A Consistency</td>
<td>—</td>
<td>—</td>
<td>77</td>
</tr>
<tr>
<td>6-02.3(5)B Finishing Concrete</td>
<td>—</td>
<td>—</td>
<td>77</td>
</tr>
<tr>
<td>6-02.3(5)C Weather and Temperature Limitations - Protection of Concrete</td>
<td>198</td>
<td>78</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(6)B Finishing Concrete in Water</td>
<td>200</td>
<td>79</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(6)C Dewatering Concrete Foundation Seals</td>
<td>202</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(6)D Point of Acceptance</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(7)A Concrete Exposed to Sea Water</td>
<td>203</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(7)B Concrete Exposed to Alkaline Soils or Water</td>
<td>203</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(9)A Vibration of Concrete</td>
<td>204</td>
<td>79</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(10)A Concrete Compressibility</td>
<td>204</td>
<td>79</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(10)B Roadway Slabs</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(11)A Gaging Concrete</td>
<td>—</td>
<td>—</td>
<td>80</td>
</tr>
<tr>
<td>6-02.3(11)B Gaging Bridge Approach Slabs</td>
<td>208</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(11)C Gaging and Finishing Concrete Traffic and Pedestrian Barriers</td>
<td>209</td>
<td>80</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(12)A Construction JOINTS</td>
<td>209</td>
<td>80</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(12)B Expansion JOINTS (Incl. Bridge Decks)</td>
<td>210</td>
<td>81</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(13)A Compression Seal</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(13)B General</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(13)C Preparation of Surfaces for Installation</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(14)A Finishing Concrete Surfaces</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(14)B Class 1 Surface Finish</td>
<td>211</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(14)C Class 2 Surface Finish</td>
<td>211</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(14)D Class 3 Surface Finish</td>
<td>212</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(15)A Date Numerals</td>
<td>212</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(15)B Nonpre-approved Falsework and Forming Plans</td>
<td>212</td>
<td>83</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(16)A Falsework and Forms</td>
<td>212</td>
<td>83</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(16)B Caps, Piling, Posts, and Mudsills</td>
<td>213</td>
<td>83</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(16)C Stringers, Beams, and Joists</td>
<td>216</td>
<td>84</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(17)A Bracing</td>
<td>215</td>
<td>84</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(17)B Face Forms</td>
<td>215</td>
<td>84</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(17)C Face Forms</td>
<td>216</td>
<td>84</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(17)D Forms on Steel Spans</td>
<td>216</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>6-02.3(17)E Forms on Steel Spans</td>
<td>218</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

6-02.3(17)H Finishing Machine Support System | 219 | — | — |
6-02.3(17)I Restricted Overhead Clearance Sign | 219 | — | — |
6-02.3(17)J Removal of Falsework and Forms | 219 | — | — |
6-02.3(17)K Placing Anchor Bolts | 221 | — | — |
6-02.3(17)L Elastomeric Bearing Pads | 221 | — | — |
6-02.3(17)M Expansion Shores and Plates | 221 | — | — |
6-02.3(17)N Drainage of Box Girder Cells | 222 | 84 | — |
6-02.3(17)O Drainage of Substructure | 222 | — | — |
6-02.3(17)P Opening to Traffic | 222 | — | — |
6-02.3(17)Q Reinforcement | — | — | — |
6-02.3(17)R Bending | 222 | — | — |
6-02.3(17)S Protection of Materials | 222 | — | — |
6-02.3(17)T Placing and Fastening | 223 | 84 | — |
6-02.3(17)U Splicing | 224 | — | — |
6-02.3(17)V Welding Reinforcing Steel | 225 | 84 | — |
6-02.3(17)W Mechanical Batt Splices | 227 | — | — |
6-02.3(17)X Job Control Tests | 228 | — | — |
6-02.3(17)Y Epoxy-Coated Steel Reinforcing Bar | 228 | — | — |
6-02.3(17)Z Prestressed Concrete Girder | 229 | 85 | — |
6-02.3(17)AA Tee Girder Flange Connection | 230 | 85 | — |
6-02.3(17)AB Protection of Exposed Reinforcement | 230 | — | — |
6-02.3(17)AC Casting and Shop Plans | 230 | 85 | — |
6-02.3(17)AD Tying | 231 | — | — |
6-02.3(17)AE Prestressing | 232 | — | — |
6-02.3(17)AF Finishing | 232 | — | — |
6-02.3(17)AG Holding and Storage | 233 | 85 | — |
6-02.3(17)AH Workmanship | 234 | 85 | — |
6-02.3(17)AI Horizontal Alignment | 234 | — | — |
6-02.3(17)AJ Shipping | 235 | 86 | — |
6-02.3(17)AK Strength | 235 | — | — |
6-02.3(17)AL Tee Girder Depth | 236 | — | — |
6-02.3(17)AM Camber | 236 | 87 | — |
6-02.3(17)AN Cast-In-Place Prestressed Concrete | 237 | — | — |
6-02.3(17)AO Shop Drawings | 237 | 87 | — |
6-02.3(17)AP Anchorage | 237 | 87 | — |
6-02.3(17)AQ Metal Conduit | 139 | — | — |
6-02.3(17)AR Prestressing | 239 | — | — |
6-02.3(17)AS Grouting | 239 | — | — |
6-02.3(17)AT Superstructure | — | 87 | — |
6-02.3(17)AU Bridge Drains | — | — | — |
6-02.3(17)AV Downspouts | — | — | — |
6-02.3(17)AW Drilling Holes in Concrete | — | — | — |
6-02.3(17)AX Epoxy in Drilled Holes | — | — | — |
6-02.3(17)AY Repair of Spalled and Deteriorated Concrete | — | — | — |
6-02.3(17)AZ Description | — | — | — |
6-02.3(17)BA Cleaning and Preparation | — | — | — |
6-02.3(17)BB Repairs | — | — | — |
6-02.3(17)BC Epoxy Injection of Concrete Crack | — | — | — |
6-02.3(17)BD General | — | — | — |
6-02.3(17)BE Guidelines | — | — | — |
<table>
<thead>
<tr>
<th>Section</th>
<th>1984 Code</th>
<th>1986 Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-02.3(33)C</td>
<td></td>
<td></td>
<td>Submittals</td>
</tr>
<tr>
<td>6-02.3(34)</td>
<td></td>
<td></td>
<td>Bonding New Concrete to Existing Concrete</td>
</tr>
<tr>
<td>6-02.4</td>
<td></td>
<td></td>
<td>Measurement</td>
</tr>
<tr>
<td>6-02.5</td>
<td></td>
<td></td>
<td>Payment</td>
</tr>
<tr>
<td>6-03</td>
<td></td>
<td></td>
<td>Steel Structures</td>
</tr>
<tr>
<td>6-03.1</td>
<td></td>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>6-03.2</td>
<td></td>
<td></td>
<td>Materials</td>
</tr>
<tr>
<td>6-03.3</td>
<td></td>
<td></td>
<td>Construction Requirements</td>
</tr>
<tr>
<td>6-03.3(1)</td>
<td></td>
<td></td>
<td>Notice of Rolling</td>
</tr>
<tr>
<td>6-03.3(2)</td>
<td></td>
<td></td>
<td>Facilities for Inspection</td>
</tr>
<tr>
<td>6-03.3(3)</td>
<td></td>
<td></td>
<td>Inspector’s Authority</td>
</tr>
<tr>
<td>6-03.3(4)</td>
<td></td>
<td></td>
<td>Rejections</td>
</tr>
<tr>
<td>6-03.3(5)</td>
<td></td>
<td></td>
<td>Mill Orders and Shipping Statements</td>
</tr>
<tr>
<td>6-03.3(6)</td>
<td></td>
<td></td>
<td>Weighing</td>
</tr>
<tr>
<td>6-03.3(7)</td>
<td></td>
<td></td>
<td>Loading and Unloading</td>
</tr>
<tr>
<td>6-03.3(8)</td>
<td></td>
<td></td>
<td>Shop Plans</td>
</tr>
<tr>
<td>6-03.3(9)</td>
<td></td>
<td></td>
<td>Substitutions</td>
</tr>
<tr>
<td>6-03.3(10)</td>
<td></td>
<td></td>
<td>Shop Storage of Materials</td>
</tr>
<tr>
<td>6-03.3(11)</td>
<td></td>
<td></td>
<td>Handling and Storing Materials</td>
</tr>
<tr>
<td>6-03.3(12)</td>
<td></td>
<td></td>
<td>Straightening Bent Material</td>
</tr>
<tr>
<td>6-03.3(13)</td>
<td></td>
<td></td>
<td>Workmanship and Finish</td>
</tr>
<tr>
<td>6-03.3(14)</td>
<td></td>
<td></td>
<td>Falsework</td>
</tr>
<tr>
<td>6-03.3(15)</td>
<td></td>
<td></td>
<td>Alignment and Camber</td>
</tr>
<tr>
<td>6-03.3(16)</td>
<td></td>
<td></td>
<td>High Strength Bolt Holes</td>
</tr>
<tr>
<td>6-03.3(16)A</td>
<td></td>
<td></td>
<td>Punched Holes</td>
</tr>
<tr>
<td>6-03.3(16)B</td>
<td></td>
<td></td>
<td>Drilled Holes</td>
</tr>
<tr>
<td>6-03.3(16)C</td>
<td></td>
<td></td>
<td>Sub-Punched and Reamed Holes</td>
</tr>
<tr>
<td>6-03.3(16)D</td>
<td></td>
<td></td>
<td>Reaming</td>
</tr>
<tr>
<td>6-03.3(16)E</td>
<td></td>
<td></td>
<td>Accuracy of Reamed and Drilled Holes</td>
</tr>
<tr>
<td>6-03.3(16)F</td>
<td></td>
<td></td>
<td>Drifting of Holes</td>
</tr>
<tr>
<td>6-03.3(17)</td>
<td></td>
<td></td>
<td>Shop Assembling</td>
</tr>
<tr>
<td>6-03.3(18)</td>
<td></td>
<td></td>
<td>Match Marking</td>
</tr>
<tr>
<td>6-03.3(19)</td>
<td></td>
<td></td>
<td>Sandblasting</td>
</tr>
<tr>
<td>6-03.3(20)</td>
<td></td>
<td></td>
<td>Shop Painting</td>
</tr>
<tr>
<td>6-03.3(20)A</td>
<td></td>
<td></td>
<td>Weather Conditions</td>
</tr>
<tr>
<td>6-03.3(20)B</td>
<td></td>
<td></td>
<td>Application</td>
</tr>
<tr>
<td>6-03.3(20)C</td>
<td></td>
<td></td>
<td>Painting</td>
</tr>
<tr>
<td>6-03.3(20)D</td>
<td></td>
<td></td>
<td>Erection Marks</td>
</tr>
<tr>
<td>6-03.3(20)E</td>
<td></td>
<td></td>
<td>Machine Finished Surfaces</td>
</tr>
<tr>
<td>6-03.3(21)</td>
<td></td>
<td></td>
<td>Edge Finishing</td>
</tr>
<tr>
<td>6-03.3(22)</td>
<td></td>
<td></td>
<td>Flanging Bearing Surfaces</td>
</tr>
<tr>
<td>6-03.3(23)</td>
<td></td>
<td></td>
<td>Abutting Joints</td>
</tr>
<tr>
<td>6-03.3(24)</td>
<td></td>
<td></td>
<td>End Connection Angles</td>
</tr>
<tr>
<td>6-03.3(25)</td>
<td></td>
<td></td>
<td>Built Members</td>
</tr>
<tr>
<td>6-03.3(26)</td>
<td></td>
<td></td>
<td>Hand Holes</td>
</tr>
<tr>
<td>6-03.3(27)</td>
<td></td>
<td></td>
<td>Lacing Bars</td>
</tr>
<tr>
<td>6-03.3(28)</td>
<td></td>
<td></td>
<td>Assembling and Bolting</td>
</tr>
<tr>
<td>6-03.3(29)</td>
<td></td>
<td></td>
<td>Adjusting Pin Nuts</td>
</tr>
</tbody>
</table>

**SECTION 6-04 TIMBER STRUCTURES**

<table>
<thead>
<tr>
<th>Section</th>
<th>1984 Code</th>
<th>1986 Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-04.1</td>
<td></td>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>6-04.2</td>
<td></td>
<td></td>
<td>Materials</td>
</tr>
<tr>
<td>6-04.3</td>
<td></td>
<td></td>
<td>Construction Requirements</td>
</tr>
<tr>
<td>6-04.3(1)</td>
<td></td>
<td></td>
<td>Scoring and Handling Material</td>
</tr>
<tr>
<td>6-04.3(2)</td>
<td></td>
<td></td>
<td>Workmanship</td>
</tr>
<tr>
<td>6-04.3(3)</td>
<td></td>
<td></td>
<td>Shop Details</td>
</tr>
<tr>
<td>6-04.3(4)</td>
<td></td>
<td></td>
<td>Field Treatment of Cut Surfaces, Bolt Holes, and Contact Surfaces</td>
</tr>
<tr>
<td>6-04.3(5)</td>
<td></td>
<td></td>
<td>Holes for Bolts, Dowels, Rods and Lag Screws</td>
</tr>
<tr>
<td>6-04.3(6)</td>
<td></td>
<td></td>
<td>Bolts, Washers and Other Hardware</td>
</tr>
<tr>
<td>6-04.3(7)</td>
<td></td>
<td></td>
<td>Countersinking</td>
</tr>
<tr>
<td>6-04.3(9)</td>
<td></td>
<td></td>
<td>Framing</td>
</tr>
<tr>
<td>6-04.3(10)</td>
<td></td>
<td></td>
<td>Caps</td>
</tr>
<tr>
<td>6-04.3(11)</td>
<td></td>
<td></td>
<td>Bracing</td>
</tr>
<tr>
<td>6-04.3(12)</td>
<td></td>
<td></td>
<td>Stringers</td>
</tr>
<tr>
<td>6-04.3(13)</td>
<td></td>
<td></td>
<td>Wheel Guard and Railing</td>
</tr>
<tr>
<td>6-04.3(14)</td>
<td></td>
<td></td>
<td>Single Plank Floors</td>
</tr>
<tr>
<td>6-04.3(15)</td>
<td></td>
<td></td>
<td>Laminated Floors</td>
</tr>
<tr>
<td>6-04.3(16)</td>
<td></td>
<td></td>
<td>Flank Sub-Floors for Concrete Decks</td>
</tr>
<tr>
<td>6-04.3(17)</td>
<td></td>
<td></td>
<td>Trusses</td>
</tr>
</tbody>
</table>
SECTION 6-05 FILING

6-05.1 Description
6-05.2 Materials
6-05.3 Construction Requirements
6-05.3.1 General
6-05.3.1A Ordering Filing
6-05.3.1B Driving Pins
6-05.3.1C Equipment for Driving
6-05.3.1D Test Pins
6-05.3.1E Taper Pins
6-05.3.2A Storage and Handling
6-05.3.2B Drilling
6-05.3.2C Splicing Composite Pins
6-05.3.2D Treatment of File Heads
6-05.3.2E Strapping
6-05.3.2F Determination of Bearing Values
6-05.3.3 Precast Concrete Filing
6-05.3.3A Casting
6-05.3.3B Finishing
6-05.3.3C Curing
6-05.3.3D Precast-Prestrained Concrete Filing
6-05.3.3E Storage and Handling
6-05.3.3F Driving
6-05.3.3G Extensions or Build-Ups
6-05.3.3H Determination of Bearing Values
6-05.3.3I Prestraining Steel
6-05.3.4 Cast-In-Place Concrete Pins
6-05.3.4A Steel Castings or Shells
6-05.3.4B Drilling and Inspection of Steel Castings
6-05.3.4C Reinforcement
6-05.3.4D Placing Concrete
6-05.3.4E Determination of Bearing Values
6-05.3.5 Presressed Hollow Concrete Fitting
6-05.3.5A Handling and Installing
6-05.3.5B File Manufacture
6-05.3.5C Determination of Bearing Capacities
6-05.3.6 Steel Filing
6-05.3.6A Storage and Handling
6-05.3.6B Driving
6-05.3.6C Splicing
6-05.3.6D Capping
6-05.3.6E Determination of Bearing Capacities
6-05.3.7 Measurement
6-05.3.8 Payment

SECTION 6-06 BRIDGE RAILINGS

6-06.1 Description
6-06.2 Materials
6-06.3 Construction Requirements
6-06.3.1 Timber Railings
6-06.3.2 Metal Railings
6-06.4 Measurement
6-06.5 Payment

SECTION 6-07 PAINTING

6-07.1 Description
6-07.2 Materials
6-07.3 Construction Requirements
6-07.3.1 Painting New Steel Structures
6-07.3.1A Number of Coats and Color
6-07.3.1B Weather Conditions
6-07.3.1C Application
6-07.3.1D Removal of Improper Paint
6-07.3.1E Field Cleaning
6-07.3.1F Field Painting
6-07.3.2 Repainting Existing Steel Structures
6-07.3.3 Painting Timber Structures
6-07.3.3A Number of Coats and Color
6-07.3.3B Application
6-07.3.3C Painting Treated Timber
6-07.3.4 Painting Galvanized Surfaces
6-07.3.5 Painting Miscellaneous Galvanized Surfaces
6-07.3.5A Paint Film Thickness
6-07.3.6 Protection of Public and Private Property
6-07.4 Measurement and Payment

SECTION 6-08 WATERPROOFING

6-08.1 Description
6-08.2 Materials
6-08.3 Construction Requirements
6-08.3.1 Storage of Fabric
6-08.3.2 Preparation of Surface
6-08.3.3 Application of Waterproofing
6-08.3.4 Protection Course
6-08.4 Measurement
6-08.5 Payment

SECTION 6-09 CIRCLING

6-09.1 Description
6-09.2 Materials
6-09.3 Construction Requirements
<table>
<thead>
<tr>
<th>Item</th>
<th>1984 WOOTT</th>
<th>1986 SUPP</th>
<th>1984 WOOTT</th>
<th>1986 SUPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-09.3(1) General Requirements</td>
<td>291</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(1A) Foundations</td>
<td>291</td>
<td>--</td>
<td>304</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(1B) Vacant</td>
<td>291</td>
<td>--</td>
<td>304</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(1C) Vacant</td>
<td>291</td>
<td>--</td>
<td>304</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(1D) Metal Cribbing</td>
<td>291</td>
<td>102</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(1E) Gabion Cribbing and Gabion Revetment</td>
<td>292</td>
<td>--</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(1F) Description</td>
<td>292</td>
<td>--</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(2) Gabion Type</td>
<td>292</td>
<td>--</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(2C) Dimensions</td>
<td>292</td>
<td>--</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(2D) Fabrication</td>
<td>292</td>
<td>--</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(2E) Filling Baskets</td>
<td>293</td>
<td>--</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(2F) Unit Weight Test</td>
<td>293</td>
<td>--</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.3(2G) Construction Requirements</td>
<td>293</td>
<td>--</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.4 Measurement</td>
<td>293</td>
<td>102</td>
<td>305</td>
<td>--</td>
</tr>
<tr>
<td>6-09.5 Payment</td>
<td>294</td>
<td>102</td>
<td>305</td>
<td>--</td>
</tr>
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</table>

SECTION 6-10 CONCRETE BARRIER

<table>
<thead>
<tr>
<th>Item</th>
<th>1984 WOOTT</th>
<th>1986 SUPP</th>
<th>1984 WOOTT</th>
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<tbody>
<tr>
<td>6-10.1 Description</td>
<td>295</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.2 Materials</td>
<td>295</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.3 Construction Requirements</td>
<td>295</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.3(1) Precast Concrete Barriers</td>
<td>295</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.3(2) Cast-In-Place Concrete Barriers</td>
<td>296</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.3(3) Vacant</td>
<td>296</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.3(4) Joining Precast Concrete Barriers with Cast-In-Place Barriers</td>
<td>296</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.3(5) Temporary Concrete Barrier</td>
<td>296</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.3(6) Placing Concrete Barrier</td>
<td>296</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.4 Measurement</td>
<td>297</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6-10.5 Payment</td>
<td>297</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

DIVISION 7

STORM DRAINS, CULVERTS, SANITARY AND COMBINED SEWERS, WATER MAINS AND RELATED STRUCTURES

SECTION 7-01 DRAINS

<table>
<thead>
<tr>
<th>Item</th>
<th>1984 WOOTT</th>
<th>1986 SUPP</th>
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<tr>
<td>7-01.1 Description</td>
<td>299</td>
<td>103</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-01.2 Materials</td>
<td>299</td>
<td>103</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-01.3 Construction Requirements</td>
<td>299</td>
<td>103</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-01.4 Measurement</td>
<td>300</td>
<td>103</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-01.5 Payment</td>
<td>300</td>
<td>104</td>
<td>--</td>
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SECTION 7-02 CULVERTS

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<tr>
<th>Item</th>
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<tbody>
<tr>
<td>7-02.1 Description</td>
<td>302</td>
<td>--</td>
<td>--</td>
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</tr>
<tr>
<td>7-02.2 Materials</td>
<td>302</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-02.3 Construction Requirements</td>
<td>302</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-02.4 Measurement</td>
<td>303</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-02.5 Payment</td>
<td>303</td>
<td>--</td>
<td>--</td>
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SECTION 7-03 STRUCTURAL PLATE, PIPE ARCH, ARCH, AND UNDERPASS

<table>
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<th>Item</th>
<th>1984 WOOTT</th>
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<tr>
<td>7-03.1 Description</td>
<td>309</td>
<td>--</td>
<td>--</td>
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</tr>
<tr>
<td>7-03.2 Materials</td>
<td>309</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-03.3 Construction Requirements</td>
<td>309</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-03.4 Foundations, General</td>
<td>309</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-03.4(1) Structural Plate Pipe, Pipe Arch, and Underpass</td>
<td>310</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-03.4(1A) Structural Plate Pipe, Pipe Arch, and Underpass</td>
<td>310</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-03.4(1B) Structural Plate Arch</td>
<td>310</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-03.4(2) Joining Precast Concrete Barriers with Cast-In-Place Barriers</td>
<td>310</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-03.4(3) Endwall</td>
<td>310</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-03.4(4) Measurement</td>
<td>310</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-03.5 Payment</td>
<td>310</td>
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SECTION 7-04 STORM SEWERS

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<td>7-04.1 Description</td>
<td>107</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.2 Materials</td>
<td>107</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3 Construction Requirements</td>
<td>107</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(1) Foundation Preparation</td>
<td>107</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(1A) Dewatering</td>
<td>107</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(2) Bedding for Precast Base Section</td>
<td>107</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(3) Bedding for Cast-In-Place Base Section</td>
<td>107</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(3A) Manholes with Monolithic Base</td>
<td>108</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(5) Dimensions</td>
<td>108</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(6) Precast Manholes</td>
<td>108</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(6A) Precast Base</td>
<td>108</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(6B) Cast-In-Place Base</td>
<td>108</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(7) Vacant</td>
<td>108</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(8) Shop Fabricated Corrugated Metal Manholes</td>
<td>108</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>7-04.3(9) Manhole and Catch Basin Grade Adjustment</td>
<td>108</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1984</td>
<td>1986</td>
<td></td>
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<td></td>
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<tr>
<td>7-05.3(10)</td>
<td>Inlet Grade Adjustment</td>
<td>109</td>
<td>SUPPL</td>
<td></td>
</tr>
<tr>
<td>7-05.3(11)</td>
<td>Manhole Chnals</td>
<td>109</td>
<td>SUPPL</td>
<td></td>
</tr>
<tr>
<td>7-05.3(12)</td>
<td>Manhole Pipe Connections</td>
<td>109</td>
<td>SUPPL</td>
<td></td>
</tr>
<tr>
<td>7-05.3(13)</td>
<td>Pipe Connections for Catch Basins and Inlets</td>
<td>109</td>
<td>SUPPL</td>
<td></td>
</tr>
<tr>
<td>7-05.3(14)</td>
<td>Relocate Existing Catch Basin or Inlet</td>
<td>110</td>
<td>SUPPL</td>
<td></td>
</tr>
<tr>
<td>7-05.3(15)</td>
<td>Rebuild Existing Catch Basin</td>
<td>110</td>
<td>SUPPL</td>
<td></td>
</tr>
<tr>
<td>7-05.3(16)</td>
<td>Backfill</td>
<td>110</td>
<td>SUPPL</td>
<td></td>
</tr>
<tr>
<td>7-05.4</td>
<td>Measurement</td>
<td>110</td>
<td>SUPPL</td>
<td></td>
</tr>
<tr>
<td>7-05.5</td>
<td>Payment</td>
<td>110</td>
<td>SUPPL</td>
<td></td>
</tr>
</tbody>
</table>

SECTION 7-06 CONCRETE PIPE ANCHORS

| 7-06.1 | Description | 321 | 112 |
| 7-06.2 | Materials | 321 | 112 |
| 7-06.3 | Construction Requirements | 321 | 112 |
| 7-06.4 | Measurement | 112 | SUPPL |
| 7-06.5 | Payment | 112 | SUPPL |

SECTION 7-07 CLEANING EXISTING DRAINAGE STRUCTURES

| 7-07.1 | Description | 322 | SUPPL |
| 7-07.2 | Construction Requirements | 322 | SUPPL |
| 7-07.3 | Measurement | 322 | SUPPL |
| 7-07.4 | Payment | 322 | SUPPL |

SECTION 7-08 MISCELLANEOUS PIPE CONNECTIONS

| 7-08.1 | Description | 114 | SUPPL |
| 7-08.2 | Materials | 114 | SUPPL |
| 7-08.3 | Construction Details | 114 | SUPPL |
| 7-08.3(1) | Excavation and Backfill | 114 | SUPPL |
| 7-08.3(2) | Connections to Existing Storm and Sanitary Sewers | 114 | SUPPL |
| 7-08.3(3) | Pipe Laying, Jointing and Testing | 114 | SUPPL |
| 7-08.3(4) | Catch Basin Connections | 114 | SUPPL |
| 7-08.3(5) | Inlet Connections | 114 | SUPPL |
| 7-08.3(6) | Drop Connections | 114 | SUPPL |
| 7-08.4 | Measurement | 115 | SUPPL |
| 7-08.5 | Payment | 115 | SUPPL |

SECTION 7-09 PIPE AND FITTINGS FOR WATER MAINS

| 7-09.1 | Description | 323 | 116 |
| 7-09.2 | Materials | 323 | 116 |
| 7-09.3 | Construction Details | 323 | 116 |
| 7-09.4 | Measurement and Payment | 323 | SUPPL |

SECTION 7-10 TRENCH EXCAVATION, BEDDING AND BACKFILL FOR WATER MAINS

| 7-10.1 | Description | 324 | 117 |
| 7-10.1(1) | Definitions | 324 | SUPPL |
| 7-10.1(1A) | Trench Widths | 324 | SUPPL |
| 7-10.1(1B) | Unsuitable Material | 324 | SUPPL |
| 7-10.1(1C) | Bedding | 324 | SUPPL |
| 7-10.1(1D) | Backfill Materials | 324 | SUPPL |
| 7-10.1(1E) | Foundation Materials | 324 | SUPPL |
| 7-10.2 | Materials | 324 | SUPPL |
| 7-10.3 | Construction Details | 324 | SUPPL |
| 7-10.3(1) | General | 324 | SUPPL |
| 7-10.3(2) | Ungraded Streets | 325 | SUPPL |
| 7-10.3(3) | Clearing and Grubbing in Ungraded Streets | 325 | SUPPL |
| 7-10.3(4) | Removal of Existing Street Improvements | 325 | SUPPL |
| 7-10.3(5) | Grade and Alignment | 325 | SUPPL |
| 7-10.3(6) | Existing Utilities | 325 | SUPPL |
| 7-10.3(7) | Trench Excavation | 325 | SUPPL |
| 7-10.3(7A) | Rock Excavation | 326 | SUPPL |
| 7-10.3(7B) | Extra Excavation | 326 | SUPPL |
| 7-10.3(7C) | Coring and Sheeting - Sharps | 326 | SUPPL |
| 7-10.3(8) | Removal and Replacement of Unsuitable Material | 327 | SUPPL |
| 7-10.3(8A) | Surplus Materials | 327 | SUPPL |
| 7-10.3(9) | Bedding the Pipe | 327 | SUPPL |
| 7-10.3(9A) | Rigid Pipe | 327 | SUPPL |
| 7-10.3(9B) | Flexible Pipe | 327 | SUPPL |
| 7-10.3(9C) | Bedding for Polyethylene Encased, Tape coated, or Special Coated Pipe | 327 | SUPPL |
| 7-10.3(9D) | Bedding for Polyethylene Encased, Tape coated, or Epoxy Coated Pipe | 328 | SUPPL |
| 7-10.3(10) | Bedding for Polyvinyl Chloride (PVC) Pipe | 328 | SUPPL |
| 7-10.3(11) | Bedding for Polyvinyl Chloride (PVC) Pipe | 328 | SUPPL |
| 7-10.3(12) | Backfilling Trenches | 328 | SUPPL |
| 7-10.3(13) | Compaction of Backfill | 328 | SUPPL |
| 7-10.4 | Measurement | 328 | SUPPL |
| 7-10.5 | Payment | 328 | SUPPL |

SECTION 7-11 PIPE INSTALLATION FOR WATER MAINS

| 7-11.1 | General | 330 | 123 |
| 7-11.2 | Materials | 330 | 123 |
| 7-11.3 | Construction Details | 330 | SUPPL |
| 7-11.3(1) | Desewatering of Trench | 330 | SUPPL |
| 7-11.3(2) | Handling of Pipe | 330 | 123 |
| 7-11.3(3) | Cutting Pipe | 330 | 123 |
| 7-11.3(4) | Laying of Pipe on Curves | 330 | 123 |
| 7-11.3(4A) | Laying and Jointing - Mechanical and Rubber Gasket (Push On) Joint Pipe | 331 | 124 |
| 7-11.3(4B) | Laying and Jointing Polyethylene Encased Pipe | 331 | 124 |
| 7-11.3(4C) | Laying and Jointing Multi-Layer Tape Coated Pipe | 331 | 124 |
| 7-11.3(4D) | Laying and Jointing Coal-Tar Epoxy Coated Pipe | 331 | 124 |

xxi
<table>
<thead>
<tr>
<th>1984 WEDOT</th>
<th>1986 SUPPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-11.3(15)A</td>
<td>General</td>
</tr>
<tr>
<td>7-11.3(15)A2</td>
<td>Bond Connections for Ductile Iron Pipe</td>
</tr>
<tr>
<td>7-11.3(15)A3</td>
<td>Insulated Bond Connections</td>
</tr>
<tr>
<td>7-11.3(15)A4</td>
<td>Application of Heat Shrink Pipe Joint Sleeve</td>
</tr>
<tr>
<td>7-11.3(15)B</td>
<td>Electrolysis Test Station</td>
</tr>
<tr>
<td>7-11.3(15)B1</td>
<td>Zinc Reference Electrodes</td>
</tr>
<tr>
<td>7-11.3(15)B2</td>
<td>Test Station</td>
</tr>
<tr>
<td>7-11.4</td>
<td>Measurement</td>
</tr>
<tr>
<td>7-11.5</td>
<td>Payment</td>
</tr>
<tr>
<td><strong>SECTION 7-12 VALVES FOR WATER MAINS</strong></td>
<td>340-136</td>
</tr>
<tr>
<td>7-12.1</td>
<td>Description</td>
</tr>
<tr>
<td>7-12.2</td>
<td>Materials</td>
</tr>
<tr>
<td>7-12.3</td>
<td>Construction Details</td>
</tr>
<tr>
<td>7-12.3(1)</td>
<td>Precast Valve Chambers</td>
</tr>
<tr>
<td>7-12.3(2)</td>
<td>Chambers Made with Precast Concrete Blocks</td>
</tr>
<tr>
<td>7-12.3(3)</td>
<td>Cast-In-Place Chambers</td>
</tr>
<tr>
<td>7-12.3(4)</td>
<td>Setting Ring and Cover</td>
</tr>
<tr>
<td>7-12.3(5)</td>
<td>Setting Valve Box</td>
</tr>
<tr>
<td>7-12.3(6)</td>
<td>Ladders</td>
</tr>
<tr>
<td>7-12.4</td>
<td>Measurement</td>
</tr>
<tr>
<td>7-12.5</td>
<td>Payment</td>
</tr>
<tr>
<td><strong>SECTION 7-14 HYDRANTS</strong></td>
<td>342-139</td>
</tr>
<tr>
<td>7-14.1</td>
<td>Description</td>
</tr>
<tr>
<td>7-14.2</td>
<td>Materials</td>
</tr>
<tr>
<td>7-14.3</td>
<td>Construction Details</td>
</tr>
<tr>
<td>7-14.3(1)</td>
<td>Setting Hydrants</td>
</tr>
<tr>
<td>7-14.3(2)</td>
<td>Hydrant Connections</td>
</tr>
<tr>
<td>7-14.3(2A)</td>
<td>Hydrant Restraint</td>
</tr>
<tr>
<td>7-14.3(2B)</td>
<td>Auxiliary Gate Valve and Valve Box</td>
</tr>
<tr>
<td>7-14.3(3)</td>
<td>Reconnecting Existing Hydrants</td>
</tr>
<tr>
<td>7-14.4(4)</td>
<td>Moving Existing Hydrants</td>
</tr>
<tr>
<td>7-14.5(1)</td>
<td>Reconnecting Existing Hydrants</td>
</tr>
<tr>
<td>7-14.5(2)</td>
<td>Hydrant Barrel Extensions</td>
</tr>
<tr>
<td>7-14.5(7)</td>
<td>New Hydrant on Existing Main (New Taps)</td>
</tr>
<tr>
<td>7-14.5(8)</td>
<td>New Hydrant on Existing Main (Existing Taps)</td>
</tr>
<tr>
<td>7-14.6</td>
<td>Retaining Walls for Hydrants</td>
</tr>
<tr>
<td>7-14.6</td>
<td>Measurement</td>
</tr>
<tr>
<td>7-14.5</td>
<td>Payment</td>
</tr>
<tr>
<td><strong>SECTION 7-15 SERVICE CONNECTIONS</strong></td>
<td>142</td>
</tr>
<tr>
<td><strong>SECTION 7-16 FLOW CONTROL SYSTEMS</strong></td>
<td>143</td>
</tr>
<tr>
<td>7-16.1</td>
<td>Description</td>
</tr>
<tr>
<td>7-16.2</td>
<td>Materials</td>
</tr>
<tr>
<td>7-16.2(1)</td>
<td>Flow Control Structure</td>
</tr>
</tbody>
</table>
7-16.2(2) Aluminum Detention Pipe  
7-16.2(3) Steel Detention Pipe  
7-16.3 General  
7-16.3(1) General  
7-16.2(2) Flow Control Structure  
7-16.3(1) Detention Pipe  
7-16.3(1) Take Connection to Corrugated Pipe  
7-16.4 Measurement  
7-16.5 Payment  

SECTION 7-17 STORM DRAINS AND SANITARY SEWERS  
7-17.1 Description  
7-17.2 Materials  
7-17.2(1) Proof Tests (Preliminary)  
7-17.2(2) Material Certification  
7-17.3 Construction Requirements  
7-17.3(1) Excavation and Preparation of Trench  
7-17.3(1) Trench Excavation  
7-17.3(1) A Unexpected Objects  
7-17.3(1) A2 Trench Excavation in Solid Rock  
7-17.3(1) A3 Surplus Material  
7-17.3(1) B Pipe Laying in Solid Rock Excavation  
7-17.3(1) B1 Bedding for Rigid Pipe  
7-17.3(1) B1A Class A Bedding  
7-17.3(1) B1B Class B Bedding  
7-17.3(1) B1C Class C Bedding  
7-17.3(1) B1D Class D Bedding  
7-17.3(1) B2 Bedding for Flexible Pipe  
7-17.3(2) Laying Sewer Pipe  
7-17.3(2) A Survey Line and Grade  
7-17.3(2) B Pipe Laying  
7-17.3(2) C Plugs and Connections  
7-17.3(2) C1 Fittings  
7-17.3(2) C2 Cut-To-See on Existing Pipe  
7-17.3(2) B Pipe Markings  
7-17.3(2) E Gasketed Joints  
7-17.3(2) F Joisting  
7-17.3(2) G Sewer Line Connections  
7-17.3(2) H Side Sewer Connections  
7-17.3(2) I Protection of Existing Sewerage Facilities  
7-17.3(2) J Jacking, Augering or Tunneling  
7-17.3(3) Backfilling Trenches  
7-17.3(3) A Concretion of Trench Backfill  
7-17.3(4) Cleaning and Testing  
7-17.3(4) E General  
7-17.3(4) B Exfiltration Test  
7-17.3(4) C Infiltration Test  
7-17.3(4) D Air Pressure Test for Sanitary Sewers  

7-17.3(4)E Air Pressure Test for Sanitary Sewers  
7-17.3(4)E1 Constructed of Non-Air-Pervious Materials  
7-17.3(4)F Recommended Procedure for Conducting  
7-17.3(4)F1 Acceptance Test by Pressure Drop Method  
7-17.3(4)F Other Test Allowances  
7-17.3(4)G Flushing Existing Sewer Pipe  
7-17.3(4)H Deflection Test for Flexible Pipe  
7-17.3(4)J Television Inspection  
7-17.4 Measurement  
7-17.5 Payment  

SECTION 7-18 SIDE SEWERS  
7-18.1 Description  
7-18.2 Materials  
7-18.2(1) Pipe  
7-18.2(2) Joints  
7-18.2(3) Fittings  
7-18.3 Construction Requirements  
7-18.3(1) General  
7-18.3(1) A Side Sewers Not Shown on the Plans  
7-18.3(1) B Side Sewers Shown on the Plans  
7-18.3(1) C Protection at Existing Side Sewer  
7-18.3(1) D Remove and Re-Lay Existing Side Sewers  
7-18.3(2) Excavation and Backfill  
7-18.3(3) Pipe Laying and Joisting  
7-18.3(3) A Line and Grade  
7-18.3(3) B Pipe Laying  
7-18.3(3) C Joisting  
7-18.3(3) D Fittings  
7-18.3(3) F Cleanouts  
7-18.3(3) G Inspection and Testing  
7-18.3(3) H Inspection  
7-18.3(3) I Testing  
7-18.3(3) J Miscellaneous Requirements  
7-18.3(3) K Pipe and Connections  
7-18.3(3) L Proximity to Water Supply Lines  
7-18.3(3) M Flags  
7-18.3(3) N Septic Tanks and cesspools  
7-18.3(3) O Restoring, Finishing and Cleanup  
7-18.3(3) P Extending Side Sewers into Private Property  
7-18.3(3) R End Pipe Marker  
7-18.4 Measurement  
7-18.5 Payment  

SECTION 7-19 SEWER CLEANOUT  
7-19.1 Description  
7-19.2 Materials  
7-19.3 Construction Details
### SECTION 7-20 ADJUSTMENT OF NEW AND EXISTING UTILITY STRUCTURES TO FINISH GRADE

<table>
<thead>
<tr>
<th>Item</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-19.4 Measurement</td>
<td>---</td>
<td>164</td>
</tr>
<tr>
<td>7-19.5 Payment</td>
<td>---</td>
<td>164</td>
</tr>
</tbody>
</table>

**DIVISION 8 MISCELLANEOUS CONSTRUCTION**

### SECTION 8-01 EROSION CONTROL

<table>
<thead>
<tr>
<th>Item</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-01.1 Description</td>
<td>356</td>
<td>169</td>
</tr>
<tr>
<td>8-01.2 Materials</td>
<td>356</td>
<td>169</td>
</tr>
<tr>
<td>8-01.3 Construction Requirements</td>
<td>356</td>
<td>---</td>
</tr>
<tr>
<td>8-01.3(1) Preparation of Area</td>
<td>356</td>
<td>169</td>
</tr>
<tr>
<td>8-01.3(1A) Cultivation</td>
<td>356</td>
<td>169</td>
</tr>
<tr>
<td>8-01.3(1B) Compaction</td>
<td>355</td>
<td>---</td>
</tr>
<tr>
<td>8-01.3(1C) Preparation</td>
<td>357</td>
<td>---</td>
</tr>
<tr>
<td>8-01.3(2) Topsoil</td>
<td>---</td>
<td>169</td>
</tr>
<tr>
<td>8-01.3(2C) Topsoil Type C</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>8-01.3(3A) Seeding</td>
<td>358</td>
<td>169</td>
</tr>
<tr>
<td>8-01.3(3B) Fertilizing</td>
<td>---</td>
<td>169</td>
</tr>
<tr>
<td>8-01.3(4C) Lining</td>
<td>358</td>
<td>170</td>
</tr>
<tr>
<td>8-01.3(5) Mulching</td>
<td>359</td>
<td>241</td>
</tr>
<tr>
<td>8-01.3(6A) Application of Asphalt Emulsion</td>
<td>359</td>
<td>241</td>
</tr>
<tr>
<td>8-01.3(6B) Soil Binder of Tack Agent</td>
<td>359</td>
<td>241</td>
</tr>
<tr>
<td>8-01.3(7C) Dates for Application of Seed, Fertilizer, and Mulch</td>
<td>359</td>
<td>241</td>
</tr>
<tr>
<td>8-01.3(8) Placing Jute or Excelor Matting or Clear Plastic Covering</td>
<td>360</td>
<td>---</td>
</tr>
<tr>
<td>8-01.3(9) Protection and Care of Seeded Areas</td>
<td>361</td>
<td>---</td>
</tr>
</tbody>
</table>

### SECTION 8-02 ROADSIDE PLANTING

<table>
<thead>
<tr>
<th>Item</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-02.1 Description</td>
<td>---</td>
<td>172</td>
</tr>
<tr>
<td>8-02.2 Materials</td>
<td>---</td>
<td>172</td>
</tr>
<tr>
<td>8-02.3(1) Responsibility During Construction</td>
<td>---</td>
<td>173</td>
</tr>
<tr>
<td>8-02.3(2) Weed Control Plan</td>
<td>---</td>
<td>173</td>
</tr>
<tr>
<td>8-02.3(2A) Chemical Pesticides</td>
<td>---</td>
<td>173</td>
</tr>
<tr>
<td>8-02.3(4) Planting Area Preparation</td>
<td>---</td>
<td>174</td>
</tr>
<tr>
<td>8-02.3(5) Layout of Planting</td>
<td>---</td>
<td>174</td>
</tr>
<tr>
<td>8-02.3(6) Planting</td>
<td>---</td>
<td>174</td>
</tr>
<tr>
<td>8-02.3(6A) Trees and Shrubs</td>
<td>---</td>
<td>174</td>
</tr>
<tr>
<td>8-02.3(6B) Ground Covers, Plants and Seedling</td>
<td>---</td>
<td>175</td>
</tr>
<tr>
<td>8-02.3(7) Pruning, Staking and Gaying</td>
<td>---</td>
<td>175</td>
</tr>
<tr>
<td>8-02.3(8) Fertilizers</td>
<td>---</td>
<td>176</td>
</tr>
<tr>
<td>8-02.3(9) Planting Mulch</td>
<td>---</td>
<td>176</td>
</tr>
<tr>
<td>8-02.3(10) Soil Amendments</td>
<td>---</td>
<td>176</td>
</tr>
<tr>
<td>8-02.3(11) Cultivation and Cleanup</td>
<td>---</td>
<td>176</td>
</tr>
<tr>
<td>8-02.3(12) Landscape Establishment</td>
<td>---</td>
<td>177</td>
</tr>
<tr>
<td>8-02.3(13) Plant Replacement</td>
<td>---</td>
<td>178</td>
</tr>
<tr>
<td>8-02.3(14) Lawn Installation</td>
<td>---</td>
<td>178</td>
</tr>
<tr>
<td>8-02.3(14A) Seeded Lawns</td>
<td>---</td>
<td>178</td>
</tr>
<tr>
<td>8-02.3(14B) Sodded Lawns</td>
<td>---</td>
<td>178</td>
</tr>
<tr>
<td>8-02.3(15) Lawn Establishment</td>
<td>---</td>
<td>179</td>
</tr>
<tr>
<td>8-02.3(16) Installing Removable Paver Blocks in Tree Cut-Outs</td>
<td>---</td>
<td>180</td>
</tr>
<tr>
<td>8-02.3(17) Grid Blocks</td>
<td>---</td>
<td>180</td>
</tr>
<tr>
<td>8-02.3(18) Cedar Edging</td>
<td>---</td>
<td>180</td>
</tr>
<tr>
<td>8-02.3(19) Bollard</td>
<td>---</td>
<td>180</td>
</tr>
<tr>
<td>8-02.3(19A) Wood Bollard</td>
<td>---</td>
<td>181</td>
</tr>
<tr>
<td>8-02.3(19B) Concrete Bollard</td>
<td>---</td>
<td>181</td>
</tr>
<tr>
<td>8-02.3(20) Benches</td>
<td>---</td>
<td>181</td>
</tr>
<tr>
<td>8-02.3(21) Tree Grates</td>
<td>---</td>
<td>181</td>
</tr>
<tr>
<td>8-02.3(22) Relocate Tree</td>
<td>---</td>
<td>181</td>
</tr>
<tr>
<td>8-02.4 Measurement</td>
<td>---</td>
<td>182</td>
</tr>
<tr>
<td>8-02.5 Payment</td>
<td>---</td>
<td>182</td>
</tr>
</tbody>
</table>

### SECTION 8-03 IRRIGATION SYSTEM

<table>
<thead>
<tr>
<th>Item</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-03.1 Description</td>
<td>375</td>
<td>185</td>
</tr>
<tr>
<td>8-03.2 Materials</td>
<td>375</td>
<td>---</td>
</tr>
<tr>
<td>8-03.3 Construction Requirements</td>
<td>---</td>
<td>185</td>
</tr>
<tr>
<td>8-03.3(1) Layout of Irrigation System</td>
<td>375</td>
<td>---</td>
</tr>
<tr>
<td>8-03.3(2) Excavation</td>
<td>375</td>
<td>---</td>
</tr>
<tr>
<td>8-03.3(3) Piping</td>
<td>375</td>
<td>---</td>
</tr>
<tr>
<td>8-03.3(4) Jointing</td>
<td>376</td>
<td>185</td>
</tr>
</tbody>
</table>
### SECTION 8-04 CEMENT CONCRETE CURB, CURB AND GUTTER

<table>
<thead>
<tr>
<th>Item</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-04.1</td>
<td>Description</td>
<td>---</td>
</tr>
<tr>
<td>8-04.2</td>
<td>Materials</td>
<td>---</td>
</tr>
<tr>
<td>8-04.2(1)</td>
<td>Concrete</td>
<td>---</td>
</tr>
<tr>
<td>8-04.2(2)</td>
<td>Reinforcing Steel and Steel Dowels</td>
<td>---</td>
</tr>
<tr>
<td>8-04.2(3)</td>
<td>Forms</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3</td>
<td>Construction Requirements</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(1)</td>
<td>General</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(1A)</td>
<td>Erecting Forms</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(1B)</td>
<td>Placing Concrete</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(1C)</td>
<td>Dowels</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(1D)</td>
<td>Stripping Forms and Finishing</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(1E)</td>
<td>Curing</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(1F)</td>
<td>Expansion and Dossy Joints</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(1G)</td>
<td>Finished Work</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(2)</td>
<td>Curb Block-Outs at Curb Reaps</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(3)</td>
<td>Type 41OA Curb</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(4)</td>
<td>Type 41OB Curb and Gutter</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(5)</td>
<td>Type 41OC Curb</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(5A)</td>
<td>Cement Concrete Curb on Existing Pavement</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(5B)</td>
<td>Cement Concrete Curb on New Pavement</td>
<td>---</td>
</tr>
<tr>
<td>8-04.3(6)</td>
<td>Mountable Curb</td>
<td>---</td>
</tr>
<tr>
<td>8-04.4</td>
<td>Measurement</td>
<td>---</td>
</tr>
<tr>
<td>8-04.5</td>
<td>Payment</td>
<td>---</td>
</tr>
</tbody>
</table>

### SECTION 8-06 EXTRUDED CURB

<table>
<thead>
<tr>
<th>Item</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-06.1</td>
<td>Description</td>
<td>---</td>
</tr>
<tr>
<td>8-06.2</td>
<td>Materials</td>
<td>---</td>
</tr>
<tr>
<td>8-06.3</td>
<td>Construction Requirements</td>
<td>---</td>
</tr>
<tr>
<td>8-06.3(1)</td>
<td>Extruded Asphalt Concrete Curb</td>
<td>---</td>
</tr>
<tr>
<td>8-06.3(2)</td>
<td>Extruded Cement Concrete Curb</td>
<td>---</td>
</tr>
<tr>
<td>8-06.3(3)</td>
<td>Equipment for Laying Curb</td>
<td>---</td>
</tr>
<tr>
<td>8-06.3(3A)</td>
<td>Extruded Asphalt Concrete Curb</td>
<td>---</td>
</tr>
<tr>
<td>8-06.3(3B)</td>
<td>Extruded Cement Concrete Curb</td>
<td>---</td>
</tr>
<tr>
<td>8-06.3(4)</td>
<td>Mixing and Placing</td>
<td>---</td>
</tr>
</tbody>
</table>

### SECTION 8-07 PRECAST TRAFFIC CURB AND BLOCK TRAFFIC CURB

<table>
<thead>
<tr>
<th>Item</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-07.1</td>
<td>Description</td>
<td>---</td>
</tr>
<tr>
<td>8-07.2</td>
<td>Materials</td>
<td>388</td>
</tr>
<tr>
<td>8-07.2(1)</td>
<td>Construction Requirements</td>
<td>388</td>
</tr>
<tr>
<td>8-07.3(1)</td>
<td>Installing Curb</td>
<td>388</td>
</tr>
<tr>
<td>8-07.3(2)</td>
<td>Painting of Curbs</td>
<td>---</td>
</tr>
<tr>
<td>8-07.4</td>
<td>Measurement</td>
<td>---</td>
</tr>
<tr>
<td>8-07.5</td>
<td>Payment</td>
<td>---</td>
</tr>
</tbody>
</table>

### SECTION 8-08 PLASTIC TRAFFIC BUTTONS AND LANE MARKERS

<table>
<thead>
<tr>
<th>Item</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-08.1</td>
<td>Description</td>
<td>---</td>
</tr>
<tr>
<td>8-08.2</td>
<td>Materials</td>
<td>---</td>
</tr>
<tr>
<td>8-08.3</td>
<td>Construction Requirements</td>
<td>---</td>
</tr>
<tr>
<td>8-08.3(1)</td>
<td>Surface Preparation</td>
<td>---</td>
</tr>
<tr>
<td>8-08.3(2)</td>
<td>Adhesive Preparation</td>
<td>---</td>
</tr>
<tr>
<td>8-08.3(3)</td>
<td>Application Procedure</td>
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### SECTION 8-09 LANE MARKERS

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### SECTION 8-10 GUIDE POSTS

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### SECTION 8-11 GUARD RAIL

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<td>394</td>
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### SECTION 8-12 CHAIN LINK FENCE AND WIRE FENCE

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### SECTION 8-13 MONUMENT CASES

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### SECTION 8-14 CEMENT CONCRETE SIDEWALKS

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### SECTION 8-15 RIPRAP

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### SECTION 8-16 CONCRETE SLOPE PROTECTION

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### SECTION 8-17 CATTLE GUARDS

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SECTION 8-26 ROCK PROTECTION FENCE

- 8-26.1 Description
- 8-26.2 Materials
- 8-26.3 Construction Requirements
- 8-26.3(1) Posts
- 8-26.3(2) Tension Cable and End Anchorage
- 8-26.3(3) Chain Link Fabric
- 8-26.4 Measurement
- 8-26.5 Payment

SECTION 8-27 STEEL BOX BEAM MEDIAN BARRIER

- 8-27.1 Description
- 8-27.2 Materials
- 8-27.3 Construction Requirements
- 8-27.3(1) Erection of Posts
- 8-27.3(2) Design A
- 8-27.3(3) Design B
- 8-27.3(4) Anchors
- 8-27.4 Measurement
- 8-27.5 Payment

SECTION 8-28 ALUMINUM BOX BEAM MEDIAN BARRIER

- 8-29.1 Description
- 8-29.2 Materials
- 8-29.3 Construction Requirements
- 8-29.3(1) Erection of Posts
- 8-29.3(2) Design A
- 8-29.3(3) Design B
- 8-29.3(4) Design C
- 8-29.3(5) Anchors
- 8-29.4 Measurement
- 8-29.5 Payment

SECTION 8-29 WIRE MESH SLOPE PROTECTION

- 8-29.1 Description
- 8-29.2 Materials
- 8-29.3(1) General
- 8-29.3(2) Wire Mesh
- 8-29.3(2) Wire Rope
- 8-29.3(2) Hardware
- 8-29.3(2) Hog Rings and Tie Wire
- 8-29.3(2) Grout
- 8-29.3(2) Anchors
- 8-29.3(3) Construction Requirements

---

SECTION 8-30 STREET LIGHTING SYSTEM

- 8-30.1 Description
- 8-30.1(1) General
- 8-30.1(2) Codes, Applicable
- 8-30.1(3) Shop Drawings
- 8-30.1(4) Guarantee
- 8-30.1(5) Definitions
- 8-30.1(6) Field Testing
- 8-30.1(7) Inspection, Final
- 8-30.1(8) Materials
- 8-30.3 Construction Details
- 8-30.3(1) General
- 8-30.3(2) Louvers
- 8-30.3(3) Bracket Arms
- 8-30.3(4) Relocating Equipment
- 8-30.3(5) Wiring, Fixing and Splicing
- 8-30.3(6) Metal Insulated (MI) Cable
- 8-30.3(7) Grounding and Bonding
- 8-30.3(8) Equipment, Removal and Salvage of Existing
- 8-30.4 Measurement
- 8-30.5 Payment

SECTION 8-31 TRAFFIC SIGNAL SYSTEM

- 8-31.1 Description
- 8-31.1(1) General
- 8-31.1(2) Definitions
- 8-31.1(3) Applicable Codes
- 8-31.1(4) Shop Drawings and Reference Materials
- 8-31.1(4) A Shop Drawings
- 8-31.1(4) B Reference Material
- 8-31.1(5) Controller Assembly Testing Requirements
- 8-31.1(5) A General
- 8-31.1(5) B Manufacturer's Test Procedure
- 8-31.1(5) C City of Seattle Functional Test Procedure
- 8-31.1(6) Field Testing
- 8-31.1(7) Final Inspection
- 8-31.1(8) Guarantee
- 8-31.2 Materials
- 8-31.3 Construction Details
- 8-31.3(1) Intersection Check-Out and Turn-On Procedures
- 8-31.3(1) A Traffic Control
- 8-31.3(1) B Check-Out Procedure
- 8-31.3(1) C Turn-On/Out-over Procedure
8-31.3(10) Technical Assistance
8-31.3(2) Controller Assembly
8-31.3(3) Signal Heads, Vehicle and Pedestrian
8-31.3(4) General
8-31.3(5) Pedestrian Signal Heads
8-31.3(6) Pedestrian Push Button and Signs
8-31.3(7) Detector Loops
8-31.3(8) Loop Wire
8-31.3(9) Loop Lead-In Cable
8-31.3(10) Testing at the Racehole, Inductance
8-31.3(11) Loop Continuity Testing
8-31.3(12) Testing at the Control Cabinet, Inductance
8-31.3(13) Interior Illuminated Sign
8-31.3(14) Interior Illuminated Crosswalk Sign
8-31.3(15) Interconnect Cable
8-31.3(16) Telephone Interconnect Connection
8-31.3(17) Signal Wiring
8-31.3(18) Conductor Installation
8-31.3(19) Splices
8-31.3(20) Terminations
8-31.3(21) Pedestrian Push Button Cable
8-31.3(22) Electrical Service Connections
8-31.3(23) Grounding and Bonding
8-31.3(24) Pole Line Hardware Installation
8-31.3(25) Relocating Equipment
8-31.4 Measurement
8-31.5 Payment

SECTION 8-32 POLES, PEDESTALS AND FOUNDATIONS
8-32.1 Description
8-32.1(1) Applicable Codes
8-32.1(2) Shop Drawings
8-32.1(3) Materials
8-32.2 Construction Requirements
8-32.3 General
8-32.3(1) Metal Poles and Pedestals
8-32.3(2) Wood Poles
8-32.3(3) Foundations
8-32.3(4) Controller Foundations
8-32.3(5) Pole, Pedestal and Pedestrian Push-Button Post Foundations
8-32.3(6) Back Guy Assemblies
8-32.3(7) Relocating Equipment
8-32.4 Payment
8-32.5 Payment

SECTION 8-33 CONDUIT AND TRENCHING
8-33.1 Description
8-33.1(1) Applicable Codes
8-33.1(2) Shop Drawings
8-33.2 Material
8-33.3 Construction Details
8-33.3(1) General
8-33.3(2) Trenching
8-33.3(3) Rigid Steel Conduit and PVC-Coated Rigid Steel Conduit
8-33.3(4) PVC Conduit
8-33.3(5) Conduit Risers
8-33.3(6) Raceholes
8-33.3(7) Jacking or Boring
8-33.4 Measurement
8-33.5 Payment

DIvision 9 MATERIALS
9-00.1 Fracture
9-00.2 Wood Waste
9-00.3 Test for Weight of Galvanizing
9-00.4 Wet Slewing
9-00.5 Dust Ratio
9-00.6 Sand/Silt Ratio
9-00.7 Galvanized Hardware, ASTM Designation A153

SECTION 9-01 PORTLAND CEMENT
9-01.1 Types of Cement
9-01.1(1) Type I Portland Cement
9-01.1(2) Type II Portland Cement
9-01.1(3) Low Alkali
9-01.1(4) Tests and Acceptance
9-01.1(5) Storage on the Work Site

SECTION 9-02 BITUMINOUS MATERIALS
9-02.1 Asphalt Material, General
9-02.1(1) Vacant
9-02.1(2) Medium-Curing (MC) Liquid Asphalt
9-02.1(3) Rapid-Curing (RC) Liquid Asphalt
9-02.1(4) Paving Asphalt
9-02.1(5) Rejuvenating (Recycling) Agents

xxxvi

xxxvii
### Section 9-03 Aggregates

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<td>462</td>
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</tr>
<tr>
<td>9-03.7</td>
<td>Mineral Aggregate for Coal Tar Pitch Seal</td>
<td>462</td>
<td></td>
</tr>
<tr>
<td>9-03.8</td>
<td>Aggregates for Asphalt Concrete</td>
<td>462</td>
<td></td>
</tr>
<tr>
<td>9-03.8(1)</td>
<td>General Requirements</td>
<td>462</td>
<td></td>
</tr>
<tr>
<td>9-03.8(2)</td>
<td>Test Requirements</td>
<td>463</td>
<td>260</td>
</tr>
<tr>
<td>9-03.8(3)</td>
<td>Grading and Storage</td>
<td>463</td>
<td>342</td>
</tr>
<tr>
<td>9-03.8(3A)</td>
<td>Gradation - Future Use</td>
<td>463</td>
<td>261</td>
</tr>
<tr>
<td>9-03.8(3B)</td>
<td>Aggregate Storage</td>
<td></td>
<td>342</td>
</tr>
<tr>
<td>9-03.8(6)</td>
<td>Blending Sand</td>
<td>466</td>
<td></td>
</tr>
<tr>
<td>9-03.8(5)</td>
<td>Mineral Filler</td>
<td>465</td>
<td></td>
</tr>
<tr>
<td>9-03.8(7)</td>
<td>Proportion of Materials</td>
<td>465</td>
<td></td>
</tr>
<tr>
<td>9-03.9</td>
<td>Paving Sand</td>
<td></td>
<td>342</td>
</tr>
<tr>
<td>9-03.9(1)</td>
<td>Aggregates for Ballast and Crushed Surfacing</td>
<td></td>
<td>343</td>
</tr>
</tbody>
</table>

### Section 9-04 Joint and Crack Sealing Materials

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-04.1</td>
<td>Premolded Joint Fillers</td>
<td>472</td>
<td></td>
</tr>
<tr>
<td>9-04.1(1)</td>
<td>Asphalt Filler for Contraction and</td>
<td>472</td>
<td></td>
</tr>
<tr>
<td>9-04.1(2)</td>
<td>Longitudinal Joints in Concrete Pavements</td>
<td>472</td>
<td>267</td>
</tr>
<tr>
<td>9-04.1(12)</td>
<td>Premolded Joint Filler for Expansion Joints</td>
<td>472</td>
<td>267</td>
</tr>
<tr>
<td>9-04.1(13)</td>
<td>Elastomeric Sheet</td>
<td>472</td>
<td></td>
</tr>
<tr>
<td>9-04.1(14)</td>
<td>Elastomeric Expansion Joint Seals</td>
<td>473</td>
<td></td>
</tr>
<tr>
<td>9-04.2</td>
<td>Joint Sealants</td>
<td>473</td>
<td></td>
</tr>
<tr>
<td>9-04.2(1)</td>
<td>Joint Sealants for Sewed Contraction Joints</td>
<td>473</td>
<td></td>
</tr>
<tr>
<td>9-04.2(2)</td>
<td>Joint Seals for Sewed Joints for Pavement Areas</td>
<td>473</td>
<td>267</td>
</tr>
<tr>
<td>9-04.2(3)</td>
<td>Joint Sealant for Walkways</td>
<td></td>
<td>267</td>
</tr>
<tr>
<td>9-04.3</td>
<td>Joint Mortar</td>
<td>474</td>
<td></td>
</tr>
<tr>
<td>9-04.4</td>
<td>Rubber Gaskets</td>
<td>474</td>
<td></td>
</tr>
<tr>
<td>9-04.4(1)</td>
<td>Rubber Gaskets for Concrete Pipes and</td>
<td>474</td>
<td></td>
</tr>
<tr>
<td>9-04.4(2)</td>
<td>Precast Manholes</td>
<td>474</td>
<td></td>
</tr>
<tr>
<td>9-04.4(3)</td>
<td>Rubber Gaskets for Aluminum or Steel</td>
<td>474</td>
<td></td>
</tr>
<tr>
<td>9-04.4(4)</td>
<td>Calvert or Storm Sewer Pipe</td>
<td>474</td>
<td></td>
</tr>
<tr>
<td>9-04.4(4A)</td>
<td>Rubber Gaskets for Aluminum or Steel Drain Pipe</td>
<td>474</td>
<td></td>
</tr>
<tr>
<td>9-04.4(4B)</td>
<td>Protection and Storage</td>
<td>474</td>
<td></td>
</tr>
<tr>
<td>9-04.5</td>
<td>Flexible Plastic Gaskets</td>
<td>474</td>
<td></td>
</tr>
<tr>
<td>9-04.6</td>
<td>Expanded Polystyrene</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>9-04.7</td>
<td>Expanded Rubber</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>9-04.8</td>
<td>Flexible Elastomeric Seals</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>9-04.9</td>
<td>Solvent Cements</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>1986</td>
<td></td>
<td></td>
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<td>---</td>
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</tr>
<tr>
<td>9-04.10</td>
<td>Crack Sealing - Rubberized Asphalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-04.43</td>
<td>Asphalt Coatings and Paved Invert</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-04.10(1)</td>
<td>Granulated Rubber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-04.45</td>
<td>Fiber Bonding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-04.10(2)</td>
<td>Asphalt Modifier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.46</td>
<td>Spun Asphalt Liner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.47</td>
<td>Delapidated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.48</td>
<td>Steel Nastable Pipe and Pipe Arch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.49</td>
<td>Steel End Sections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.49A</td>
<td>Fabrication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.49B</td>
<td>Galvanized Hardware</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.49C</td>
<td>Toe Plate Extensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50</td>
<td>Basis for Acceptance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(1)</td>
<td>Elliptical Fabrication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(2)</td>
<td>Mitered Ends</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(3)</td>
<td>Protective Treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(4)</td>
<td>Asphalt Coatings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(5)</td>
<td>Coupling Bands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(6)</td>
<td>Steel End Sections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(7)</td>
<td>Basis for Acceptance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(8)</td>
<td>Structural Plate Pipe, Pipe Arch, and Underpass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(9)</td>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(10)</td>
<td>Fabrication</td>
<td></td>
<td></td>
</tr>
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<td>9-05.50(11)</td>
<td>Elliptical Fabrication</td>
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<td></td>
</tr>
<tr>
<td>9-05.50(12)</td>
<td>Structural Plate Pipe Arch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(13)</td>
<td>Structural Plate Underpass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(14)</td>
<td>Concrete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(15)</td>
<td>Plates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(16)</td>
<td>Corrugated Steel Plates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(17)</td>
<td>Basis for Acceptance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(18)</td>
<td>Concrete Storm Drain, Sanitary Sewer, and Combined Sewer Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(19)</td>
<td>Basis for Acceptance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(20)</td>
<td>Structural Storm Drain, Sanitary Sewer, and Combined Sewer Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(21)</td>
<td>Reinforced Concrete Storm Drain, Sanitary Sewer, and Combined Sewer Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(22)</td>
<td>Basis for Acceptance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(23)</td>
<td>Reinforced Concrete Storm Drain, Sanitary Sewer, and Combined Sewer Pipe Joints</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(24)</td>
<td>Testing Concrete Storm Drain, Sanitary Sewer, and Combined Sewer Pipe Joints</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(25)</td>
<td>Hydrostatic Pressure on Pipes in Straight Alignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(26)</td>
<td>Hydrostatic Pressure Tests on Pipes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(27)</td>
<td>Hydrostatic Pressure Test on 15 Inch Diameter and Larger Pipe Under Differential Load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(28)</td>
<td>Vitrified Clay Sewer Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-05.50(29)</td>
<td>Steel Spiral Rib Storm Sewer Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-06.22</td>
<td>Bolts, Washers and Other Hardware</td>
<td>994</td>
<td>277</td>
</tr>
<tr>
<td>9-06.23</td>
<td>Bolts and Bolted Connections</td>
<td>Deleted</td>
<td>277</td>
</tr>
</tbody>
</table>

**SECTION 9-07 REINFORCING STEEL**

| 9-07.1 | Deformed Steel Bars | 496 | 277 |
| 9-07.1(1) | Bending | 496 | — |
| 9-07.1(1A) | Lengths | 496 | — |
| 9-07.1(2) | Inspection | 497 | — |
| 9-07.2 | Plain Steel Bars | 277 | — |
| 9-07.2(1) | Epoxy-Coated Steel Reinforcing Bars | 497 | — |
| 9-07.2(2) | Dowel Bars (For Cement Concrete Pavement) | 498 | — |
| 9-07.2(3) | Spiral Ties | Deleted | 498 |
| 9-07.3 | Tie Bars (For Cement Concrete Pavement) | 498 | — |
| 9-07.4 | Wire Mesh | 277 | — |
| 9-07.5 | Cold Drawn Wire | 499 | 277 |
| 9-07.6 | Posttensioning Reinforcement | 499 | — |
| 9-07.7 | Deformed Wire | 277 | — |

**SECTION 9-08 PAINTS**

| 9-08.1 | Raw Materials | 500 | 278 |
| 9-08.2 | Paint Formulas — General | 500 | — |
| 9-08.3 | Inspection Requirements General | 507 | — |
| 9-08.4 | Process of Manufacture | 507 | — |
| 9-08.4(1) | Tinting Adjustment | 507 | — |
| 9-08.4(2) | Weight Variations | 507 | — |
| 9-08.4(3) | Drying Time and Quantity of Drier | 507 | — |
| 9-08.4(4) | Working Properties | 508 | — |
| 9-08.4(5) | Storage Properties | 508 | — |
| 9-08.4(6) | Fineness of Grinding | 508 | — |
| 9-08.4(7) | Standard Colors | 508 | — |
| 9-08.4(8) | Contaminants | 508 | — |
| 9-08.5 | Test Methods | 278 | — |
| 9-08.6 | Shipping | 508 | — |

**SECTION 9-09 TIMBER AND LUMBER**

| 9-09.1 | General Requirements | 509 | 279 |
| 9-09.2 | Grade Requirements | 509 | 279 |
| 9-09.2(1) | Surfacing and Seasoning | 509 | — |
| 9-09.2(2) | Protection Against End Checking | 509 | — |
| 9-09.2(3) | Inspection | 509 | — |
| 9-09.2(4) | Woven and Round Timbers | 509 | — |
| 9-09.3 | Preservation Treatment | 509 | — |
| 9-09.3(1) | General Requirements | 511 | — |
| 9-09.3(1A) | Seasoning Before Treatment | 511 | — |
| 9-09.3(1B) | Placing in Treating Cylinders | 511 | — |
| 9-09.3(1C) | Inclining | 511 | — |
| 9-09.3(1D) | Plant Equipment | 511 | — |

**SECTION 9-06 STRUCTURAL STEEL AND RELATED ITEMS**

| 9-06.1 | Structural Carbon Steel | 492 | 275 |
| 9-06.2 | Structural Low Alloy Steel | 492 | — |
| 9-06.3 | Structural High Strength Steel | 492 | — |
| 9-06.4 | Vacant | 492 | — |
| 9-06.5 | Bolts | 492 | — |
| 9-06.5(1) | Unfinished Bolts | 492 | — |
| 9-06.5(2) | Turned Bolts | — | 275 |
| 9-06.5(3) | High Strength Bolts | 492 | — |
| 9-06.6 | Vacant | 492 | — |
| 9-06.7 | Vacant | 492 | — |
| 9-06.8 | Steel Castings | 493 | — |
| 9-06.9 | Gray-Iron Castings | — | — |
| 9-06.10 | Malleable Iron Castings | — | — |
| 9-06.11 | Steel Forgings and Steel Shaping | — | — |
| 9-06.12 | Bronze Castings | — | — |
| 9-06.13 | Copper Castings | — | — |
| 9-06.14 | Ductile Iron Castings | — | — |
| 9-06.15 | Shear Connectors | 275 | — |
| 9-06.16 | Vacant | — | — |
| 9-06.17 | Vacant | — | — |
| 9-06.18 | Metal Bridge Hauling | 275 | 275 |
| 9-06.19 | Bridge Drains | 275 | 275 |
| 9-06.20 | Doweledpots | 275 | — |
| 9-06.21 | Elastomeric Bearing Pads | 275 | — |
| 9-09.3(2) | Creosote Treatment | 511 | --- |
| 9-09.3(2A) | Creosote Oil | 511 | --- |
| 9-09.3(2B) | Oil Seasoning for Douglas Fir | 512 | --- |
| 9-09.3(2C) | Penetration and Retention | 512 | --- |
| 9-09.3(2D) | Heating in Oil | 513 | --- |
| 9-09.3(2E) | Full-Cell Process | 513 | --- |
| 9-09.3(2F) | Empty-Cell Process | 512 | --- |
| 9-09.3(3) | Pentachlorphenol Treatment | 513 | --- |
| 9-09.3(3A) | Pentachlorphenol | 513 | --- |
| 9-09.3(3B) | Treatment | 514 | --- |
| 9-09.3(3C) | Penetration | 514 | --- |
| 9-09.3(3D) | Water-Borne Preservatives | 514 | --- |
| 9-09.3(3E) | Penetration | 514 | --- |
| 9-09.4 | Vacant | 514 | --- |
| 9-09.5 | Vacant | 514 | --- |

**SECTION 9-10 | PILING**

| 9-10.1 | Timber Piling | 515 | 280 |
| 9-10.1(1) | Untreated Piling | 515 | --- |
| 9-10.1(2) | Creosote Treated Piling | 515 | --- |
| 9-10.1(3) | Composite Piling | 515 | --- |
| 9-10.1(4) | Peeling | 516 | --- |
| 9-10.2 | Concrete Piling | 517 | 280 |
| 9-10.2(1) | Concrete | 517 | --- |
| 9-10.2(2) | Reinforcement | 517 | --- |
| 9-10.3 | Cast-In-Place Concrete Piling | 517 | --- |
| 9-10.3(1) | Reinforcement | 517 | --- |
| 9-10.4 | Prestressed Hollow Concrete Piling | 517 | --- |
| 9-10.4(1) | Concrete | 517 | --- |
| 9-10.4(2) | Prestressing Reinforcement | 517 | --- |
| 9-10.5 | Steel Piling | 517 | --- |

**SECTION 9-11 | WATERPROOFING**

| 9-11.1 | Asphalt for Waterproofing | 519 | --- |
| 9-11.2 | Waterproofing Fabric | 519 | --- |
| 9-11.3 | Portland Cement Mortar | 519 | --- |

**SECTION 9-12 | MANHOLES, CATCH BASINS AND INLETS**

| 9-12.1 | Reinforced Concrete | 281 | --- |
| 9-12.1(1) | Cement | 281 | --- |
| 9-12.1(2) | Steel Reinforcement | 281 | --- |
| 9-12.1(3) | Aggregates | 281 | --- |
| 9-12.1(4) | Mixture | 281 | --- |
| 9-12.1(5) | Curing | 281 | --- |
| 9-12.2 | Steps | 282 | --- |
| 9-12.2(1) | Aluminum, Steps | 282 | --- |
| 9-12.2(2) | Galvanized Deformed Bar Steps | 282 | --- |

**SECTION 9-13 | RIPRAP AND SLOPE PROTECTION**

| 9-13.1 | Loose Riprap | 521 | --- |
| 9-13.1(1) | Heavy Loose Riprap | 521 | --- |
| 9-13.1(2) | Light Loose Riprap | 521 | --- |
| 9-13.2 | Hand Placed Riprap | 521 | --- |
| 9-13.3 | Sack Riprap | 521 | --- |
| 9-13.4 | Concrete Slab Riprap | 522 | --- |
| 9-13.5 | Concrete Slope Protection | 522 | --- |
| 9-13.5(1) | Seal-Open Concrete Masonry Units | 522 | --- |
| 9-13.5(2) | Furred Portland Cement Concrete | 522 | --- |
| 9-13.5(3) | Pneumatically Placed Portland Cement | 522 | --- |

**SECTION 9-14 | EROSION CONTROL AND ROADSIDE PLANTING**

| 9-14.1 | Planting Soil | 285 | --- |
| 9-14.1(1) | Top Soil Type A | 285 | --- |
| 9-14.1(2) | Top Soil Type B | 285 | --- |
| 9-14.1(3) | Top Soil Type C | 285 | --- |
| 9-14.1(4) | Planting Soil Type D | 285 | --- |
| 9-14.1(5) | Planting Soil for Tree Sites | 286 | --- |
| 9-14.2 | Seed | 286 | --- |
| 9-14.2(1) | Seed Mix #1 (Waves Mix) | 286 | --- |
| 9-14.2(2) | Seed Mix #2 (Lawn Seed Mix) | 287 | --- |
| 9-14.2(3) | Seed Mix #3 (Playground Mix) | 287 | --- |
| 9-14.2(4) | Seed Mix #4 (Play and Shade Mix) | 287 | --- |
| 9-14.3 | Fertilizer | 288 | --- |
9-14.3(1) Lime
9-14.4 Mulch and Amendments
9-14.4(1) Straw
9-14.4(2) Wood Cellulose Fiber
9-14.4(3) Bark Mulch
9-14.4(4) Sawdust Mulch
9-14.4(5) Peat
9-14.4(6) Vermiculite/Perlite/Pumice
9-14.4(7) Tackifier
9-14.5 Matting
9-14.5(1) Jute Matting
9-14.5(2) Excelsior Matting
9-14.5(3) Clear Plastic Covering
9-14.6 Plant Material Description
9-14.7 Plant Materials
9-14.7(1) Quality
9-14.7(2) Handling and Shipping
9-14.7(3) Tagging
9-14.7(4) Inspection
9-14.7(5) Substitution of Plants
9-14.7(6) Temporary Storage
9-14.7(7) Bed
9-14.7(8) Fill Material
9-14.7(9) Stakes, Guys and Wrappings

SECTION 9-15 IRRIGATION SYSTEM
9-15.1 Pipe, Tubing, and Fittings
9-15.1(1) Galvanized Pipe and Fittings
9-15.1(2) Polyvinyl Chloride Pipe and Fittings
9-15.1(3) Polyethylene Pipe
9-15.2 Control Tubing
9-15.3 Automatic Controllers
9-15.4 Sprinkler Heads
9-15.5 Valve Boxes and Protective Sleeves
9-15.6 Gate Valves
9-15.7 Control Valves
9-15.7(1) Manual Control Valves
9-15.7(2) Automatic Control Valves
9-15.7(3) Automatic Control Valves with Pressure Regulator
9-15.8 Quick Coupling Equipment
9-15.9 Drain Valves
9-15.10 Hose Risers
9-15.11 Backflow Prevention Devices
9-15.11(1) Atmospheric Vacuum Breakers
9-15.11(2) Pressure Vacuum Breakers
9-15.11(3) Double Check Valve Assemblies (DCVAs)
9-15.11(4) Reduced Pressure Principle Backflow Prevention Devices (RPPD)
9-15.12 Check Valves

9-15.13 Pressure Reducing Valves
9-15.14 Three Way Valves
9-15.15 Flow Control Valves
9-15.16 Sir Relief Valve
9-15.17 Electrical Wire
9-15.18 Water Loops
9-15.19 Sleeve
9-15.20 Detectable Marking Tape

SECTION 9-16 FENCE AND GUARDRAIL
9-16.1 Chain Link Fence and Gates
9-16.1(1) General
9-16.1(2) Posts
9-16.1(3) Top Rail, Braces and Trusses
9-16.1(4) Tension Wire and Attachments
9-16.1(5) Vacant
9-16.1(6) Fittings
9-16.1(7) Chain Link Fence Fabric
9-16.1(8) Fabric Bands and Stretchbar Bars
9-16.1(9) Tie Wire
9-16.1(10) Chain Link Gates
9-16.1(11) Miscellaneous
9-16.2 Wire Fence and Gates
9-16.2(1) General
9-16.2(2) Steel Fence Posts and Braces
9-16.2(3) Wood Fence Posts and Braces
9-16.2(4) Brace Wire
9-16.2(5) Staples and Wire Clamps
9-16.2(6) Barbed Wire
9-16.2(7) Wire Mesh
9-16.2(8) Vertical Clinch Stays
9-16.2(9) Wire Gates
9-16.2(10) Wire Fence and Gates, Miscellaneous
9-16.3 Road Guard Rail
9-16.3(1) Rail Element
9-16.3(2) Posts and Blocks
9-16.3(3) Galvanizing
9-16.3(4) Hardware
9-16.3(5) Anchors
9-16.3(6) Inspection
9-16.4 Vacant
9-16.5 Castle Guards
9-16.6 Glass Screen
9-16.6(1) General
9-16.6(2) Glass Screen Fabric
9-16.6(3) Posts
9-16.6(4) Tension Wire
9-16.6(5) Cable
<table>
<thead>
<tr>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SECTION 9-16.6(6)</strong></td>
<td>9-16.6(6)</td>
</tr>
<tr>
<td>Cable and Tension Wire Attachments</td>
<td>544</td>
</tr>
<tr>
<td><strong>SECTION 9-16.6(7)</strong></td>
<td>9-16.6(7)</td>
</tr>
<tr>
<td>Slats</td>
<td>545</td>
</tr>
<tr>
<td><strong>SECTION 9-16.6(7)A</strong></td>
<td>9-16.6(7)A</td>
</tr>
<tr>
<td>Wood Slats</td>
<td>545</td>
</tr>
<tr>
<td><strong>SECTION 9-16.6(8)</strong></td>
<td>9-16.6(8)</td>
</tr>
<tr>
<td>Plastic Slats</td>
<td>545</td>
</tr>
<tr>
<td><strong>SECTION 9-16.6(9)</strong></td>
<td>9-16.6(9)</td>
</tr>
<tr>
<td>Fabric Bands and Stretcher Bars</td>
<td>545</td>
</tr>
<tr>
<td><strong>SECTION 9-16.6(10)</strong></td>
<td>9-16.6(10)</td>
</tr>
<tr>
<td>Tie Wire</td>
<td>545</td>
</tr>
<tr>
<td><strong>SECTION 9-16.7</strong></td>
<td>9-16.7</td>
</tr>
<tr>
<td>Rock Protection Fence</td>
<td>546</td>
</tr>
<tr>
<td><strong>SECTION 9-16.7(1)</strong></td>
<td>9-16.7(1)</td>
</tr>
<tr>
<td>General</td>
<td>546</td>
</tr>
<tr>
<td><strong>SECTION 9-16.7(2)</strong></td>
<td>9-16.7(2)</td>
</tr>
<tr>
<td>Posts</td>
<td>546</td>
</tr>
<tr>
<td><strong>SECTION 9-16.7(3)</strong></td>
<td>9-16.7(3)</td>
</tr>
<tr>
<td>Cable</td>
<td>546</td>
</tr>
<tr>
<td><strong>SECTION 9-16.7(4)</strong></td>
<td>9-16.7(4)</td>
</tr>
<tr>
<td>Hook Bolts and Offset Blocks</td>
<td>546</td>
</tr>
<tr>
<td><strong>SECTION 9-16.7(5)</strong></td>
<td>9-16.7(5)</td>
</tr>
<tr>
<td>Hog Ring Fasteners</td>
<td>546</td>
</tr>
<tr>
<td><strong>SECTION 9-16.7(6)</strong></td>
<td>9-16.7(6)</td>
</tr>
<tr>
<td>Spring Anchorages Assemblies</td>
<td>546</td>
</tr>
<tr>
<td><strong>SECTION 9-16.7(7)</strong></td>
<td>9-16.7(7)</td>
</tr>
<tr>
<td>Chain Link Fence Fabric</td>
<td>547</td>
</tr>
<tr>
<td><strong>SECTION 9-16.7(8)</strong></td>
<td>9-16.7(8)</td>
</tr>
<tr>
<td>Post Anchor Rods for Positions B and C</td>
<td>547</td>
</tr>
<tr>
<td>9-16.8</td>
<td>547</td>
</tr>
<tr>
<td>Weathering Steel Beam Guard Rail</td>
<td>370</td>
</tr>
<tr>
<td><strong>SECTION 9-16.8(1)</strong></td>
<td>9-16.8(1)</td>
</tr>
<tr>
<td>Rail and Hardware</td>
<td>296</td>
</tr>
<tr>
<td><strong>SECTION 9-16.8(2)</strong></td>
<td>9-16.8(2)</td>
</tr>
<tr>
<td>Anchors</td>
<td>545</td>
</tr>
<tr>
<td><strong>SECTION 9-16.9</strong></td>
<td>9-16.9</td>
</tr>
<tr>
<td>Steel Box Beam Median Barrier</td>
<td>548</td>
</tr>
<tr>
<td><strong>SECTION 9-16.9(1)</strong></td>
<td>9-16.9(1)</td>
</tr>
<tr>
<td>Steel Box Beam</td>
<td>548</td>
</tr>
<tr>
<td><strong>SECTION 9-16.9(2)</strong></td>
<td>9-16.9(2)</td>
</tr>
<tr>
<td>Posts, Paddles and Anchors</td>
<td>548</td>
</tr>
<tr>
<td><strong>SECTION 9-16.9(3)</strong></td>
<td>9-16.9(3)</td>
</tr>
<tr>
<td>Hardware</td>
<td>548</td>
</tr>
<tr>
<td><strong>SECTION 9-16.9(4)</strong></td>
<td>9-16.9(4)</td>
</tr>
<tr>
<td>Reinforcing Steel</td>
<td>548</td>
</tr>
<tr>
<td><strong>SECTION 9-16.10</strong></td>
<td>9-16.10</td>
</tr>
<tr>
<td>Aluminum Box Beam Median Barrier</td>
<td>548</td>
</tr>
<tr>
<td><strong>SECTION 9-16.10(1)</strong></td>
<td>9-16.10(1)</td>
</tr>
<tr>
<td>Aluminum Box Beam Median Barrier</td>
<td>548</td>
</tr>
<tr>
<td><strong>SECTION 9-16.10(2)</strong></td>
<td>9-16.10(2)</td>
</tr>
<tr>
<td>Posts</td>
<td>549</td>
</tr>
<tr>
<td><strong>SECTION 9-16.10(3)</strong></td>
<td>9-16.10(3)</td>
</tr>
<tr>
<td>Paddles</td>
<td>549</td>
</tr>
<tr>
<td><strong>SECTION 9-16.10(4)</strong></td>
<td>9-16.10(4)</td>
</tr>
<tr>
<td>Spacers</td>
<td>549</td>
</tr>
<tr>
<td><strong>SECTION 9-16.10(5)</strong></td>
<td>9-16.10(5)</td>
</tr>
<tr>
<td>Anchors</td>
<td>549</td>
</tr>
<tr>
<td><strong>SECTION 9-16.10(6)</strong></td>
<td>9-16.10(6)</td>
</tr>
<tr>
<td>Hardware</td>
<td>549</td>
</tr>
<tr>
<td><strong>SECTION 9-16.10(7)</strong></td>
<td>9-16.10(7)</td>
</tr>
<tr>
<td>Reinforcing Steel</td>
<td>549</td>
</tr>
<tr>
<td><strong>SECTION 9-16.10(8)</strong></td>
<td>9-16.10(8)</td>
</tr>
<tr>
<td>Transporting and Storage of Materials</td>
<td>549</td>
</tr>
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**SECTION 9-17 GUIDE POSTS**  
550  

<table>
<thead>
<tr>
<th>1984</th>
<th>1986</th>
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<tbody>
<tr>
<td><strong>SECTION 9-17.1</strong></td>
<td>9-17.1</td>
</tr>
<tr>
<td>Posts</td>
<td>550</td>
</tr>
<tr>
<td><strong>SECTION 9-17.1(1)</strong></td>
<td>9-17.1(1)</td>
</tr>
<tr>
<td>Flexible Guide Posts-Testing</td>
<td>550</td>
</tr>
<tr>
<td><strong>SECTION 9-17.2</strong></td>
<td>9-17.2</td>
</tr>
<tr>
<td>Aluminum Plate</td>
<td>550</td>
</tr>
<tr>
<td><strong>SECTION 9-17.2(1)</strong></td>
<td>9-17.2(1)</td>
</tr>
<tr>
<td>Sheet Aluminum Stock</td>
<td>550</td>
</tr>
<tr>
<td><strong>SECTION 9-17.2(2)</strong></td>
<td>9-17.2(2)</td>
</tr>
<tr>
<td>Precast Cell Stock</td>
<td>551</td>
</tr>
<tr>
<td><strong>SECTION 9-17.3</strong></td>
<td>9-17.3</td>
</tr>
<tr>
<td>Reflectivization</td>
<td>552</td>
</tr>
<tr>
<td><strong>SECTION 9-17.4</strong></td>
<td>9-17.4</td>
</tr>
<tr>
<td>Hardware</td>
<td>553</td>
</tr>
</tbody>
</table>

**SECTION 9-18 PRECAST TRAFFIC CURB AND BLOCK TRAFFIC CURB**  
554  

<table>
<thead>
<tr>
<th>1984</th>
<th>1986</th>
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</thead>
<tbody>
<tr>
<td><strong>SECTION 9-18.1</strong></td>
<td>9-18.1</td>
</tr>
<tr>
<td>Precast Traffic Curb</td>
<td>554</td>
</tr>
<tr>
<td><strong>SECTION 9-18.1(1)</strong></td>
<td>9-18.1(1)</td>
</tr>
<tr>
<td>Aggregates and Proportioning</td>
<td>554</td>
</tr>
<tr>
<td><strong>SECTION 9-18.1(2)</strong></td>
<td>9-18.1(2)</td>
</tr>
<tr>
<td>Mixing</td>
<td>554</td>
</tr>
<tr>
<td><strong>SECTION 9-18.1(3)</strong></td>
<td>9-18.1(3)</td>
</tr>
<tr>
<td>Forms</td>
<td>554</td>
</tr>
<tr>
<td>1984</td>
<td>1986</td>
</tr>
<tr>
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<td>------</td>
</tr>
<tr>
<td>9-18.6.6(6)</td>
<td>Cable and Tension Wire Attachments</td>
</tr>
<tr>
<td>9-18.6.6(7)</td>
<td>Slat</td>
</tr>
<tr>
<td>9-18.6.7(3)A</td>
<td>Wood Slats</td>
</tr>
<tr>
<td>9-18.6.7(8)</td>
<td>Plastic Slats</td>
</tr>
<tr>
<td>9-18.6.8(8)</td>
<td>Fittings</td>
</tr>
<tr>
<td>9-18.6.8(9)</td>
<td>Fabric Bands and Stretcher Bars</td>
</tr>
<tr>
<td>9-18.6.10(10)</td>
<td>Tie Wire</td>
</tr>
<tr>
<td>9-18.6.11(11)</td>
<td>Rock Protection Fence</td>
</tr>
<tr>
<td>9-18.6.11(12)</td>
<td>General</td>
</tr>
<tr>
<td>9-18.6.12(2)</td>
<td>Posts</td>
</tr>
<tr>
<td>9-18.6.13(3)</td>
<td>Cable</td>
</tr>
<tr>
<td>9-18.6.14(4)</td>
<td>Hook Bolts and Offset Blocks</td>
</tr>
<tr>
<td>9-18.6.15(5)</td>
<td>Hog Ring Fasteners</td>
</tr>
<tr>
<td>9-18.6.16(6)</td>
<td>Spring Anchorage Assemblies</td>
</tr>
<tr>
<td>9-18.6.17(7)</td>
<td>Chain Link Fence Fabric</td>
</tr>
<tr>
<td>9-18.6.18(8)</td>
<td>Post Anchor Rods for Positions B and C</td>
</tr>
<tr>
<td>9-18.6.20(1)</td>
<td>Weathering Steel Beam Guard Rail</td>
</tr>
<tr>
<td>9-18.6.20(2)</td>
<td>Rail and Hardware</td>
</tr>
<tr>
<td>9-18.6.20(3)</td>
<td>Anchors</td>
</tr>
<tr>
<td>9-18.6.20(4)</td>
<td>Steel Box Beam Median Barrier</td>
</tr>
<tr>
<td>9-18.6.20(5)</td>
<td>Steel Box Beam</td>
</tr>
<tr>
<td>9-18.6.20(6)</td>
<td>Posts, Paddles and Anchors</td>
</tr>
<tr>
<td>9-18.6.20(7)</td>
<td>Hardware</td>
</tr>
<tr>
<td>9-18.6.20(8)</td>
<td>Reinforcing Steel</td>
</tr>
<tr>
<td>9-18.6.20(9)</td>
<td>Aluminum Box Beam Median Barrier</td>
</tr>
<tr>
<td>9-18.6.20(10)</td>
<td>Aluminum Box Beam Median Barrier</td>
</tr>
<tr>
<td>9-18.6.20(11)</td>
<td>Posts</td>
</tr>
<tr>
<td>9-18.6.20(12)</td>
<td>Paddles</td>
</tr>
<tr>
<td>9-18.6.20(13)</td>
<td>Fine Spacers</td>
</tr>
<tr>
<td>9-18.6.20(14)</td>
<td>Anchors</td>
</tr>
<tr>
<td>9-18.6.20(15)</td>
<td>Hardware</td>
</tr>
<tr>
<td>9-18.6.20(16)</td>
<td>Reinforcing Steel</td>
</tr>
<tr>
<td>9-18.6.20(17)</td>
<td>Transporting and Storage of Materials</td>
</tr>
</tbody>
</table>

SECTION 9-17 GUIDE POSTS

550 | -- |

9-17.1 | Posts | 550 | -- |
9-17.1(1) | Flexible Guide Posts-Testing | 550 | -- |
9-17.2 | Aluminum Plate | 550 | -- |
9-17.2(1) | Sheet Aluminum Stock | 551 | -- |
9-17.2(2) | Precoated Gull Stock | 551 | -- |
9-17.3 | Reflectostruction | 552 | -- |
9-17.4 | Hardware | 553 | -- |

SECTION 9-18 PRECAST TRAFFIC CURB AND BLOCK TRAFFIC CURB

554 | 297 |

9-18.1 | Precast Traffic Curb | 554 | -- |
9-18.1(1) | Aggregates and Proportioning | 554 | 297 |
9-18.1(2) | Mixing | 554 | 297 |
9-18.1(3) | Forms | 554 | -- |

SECTION 9-19 PRESTRESSED CONCRETE GIRDERS

559 | -- |

9-19.1 | Aggregates and Proportioning | 559 | -- |
9-19.2 | Reinforcement | 559 | -- |

SECTION 9-20 PLASTIC TRAFFIC BUTTONS

Deleted

SECTION 9-21 PLASTIC TRAFFIC BUTTONS AND LANE MARKERS

9-21.1 | Plastic Traffic Buttons and Lane Markers Type 1 | 299 | -- |
9-21.1(1) | Physical and Chemical Properties | 299 | -- |
9-21.1(2) | Test Methods | 299 | -- |
9-21.2 | Lane Markers Type 2 | 562 | -- |
9-21.2(1) | Physical Properties | 562 | -- |
9-21.2(2) | Optical Requirements | 562 | -- |
9-21.2(3) | Strength Requirements | 563 | -- |

SECTION 9-22 MOUSEMENT FRAMES AND COVERS

301 | -- |

SECTION 9-23 CONCRETE CURING MATERIALS AND ADIMXTURES

302 | -- |

9-23.1 | Sheet Materials for Curing Concrete | 565 | -- |
9-23.2 | Chlorinated Rubber Type Curing Compounds | 565 | -- |
9-23.3 | Transparent Curing Compound | 565 | -- |
9-23.4 | Vacuum | 302 | -- |
9-23.5 | Burlap Cloth | 566 | -- |
9-23.6 | Air-Entraining and Chemical Admixtures | 566 | -- |
9-23.7 | Air-Entraining and Chemical Admixtures for Precast Prestressed Concrete | 567 | -- |
9-23.8 | White Pigmented Curing Compound-Resin Base | 567 | -- |
9-23.9 (Concrete Mixes Incorporating Fly Ash) | 567 | 302 |
9-23.10 | Coloring Agent | 303 | -- |

xlviii

xlix
<table>
<thead>
<tr>
<th>Section</th>
<th>1984</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-28.2</td>
<td>Posts</td>
<td>—</td>
</tr>
<tr>
<td>9-28.2(1)</td>
<td>Wood Sign Post</td>
<td>—</td>
</tr>
<tr>
<td>9-28.2(2)</td>
<td>Parking Meter Post</td>
<td>—</td>
</tr>
<tr>
<td>9-28.2(3)</td>
<td>Street Name Sign Post</td>
<td>—</td>
</tr>
<tr>
<td>9-28.3</td>
<td>Sign Covering</td>
<td>—</td>
</tr>
</tbody>
</table>

**SECTION 9-29 PAVEMENT MARKING**

| 9-29.1  | General | —    |
| 9-29.2  | Paint | —    |
| 9-29.2(1)| Physical Properties of the Coating | —    |
| 9-29.2(2)| Test Methods | —    |
| 9-29.2(3)| Compositional Requirements | —    |
| 9-29.3  | Thermoplastic | —    |
| 9-29.4  | Pressure Sensitive Tape | —    |

**SECTION 9-30 WATER DISTRIBUTION MATERIALS**

| 9-30.1  | Pipe | —    |
| 9-30.1A | Ductile Iron Pipe | 613  |
| 9-30.1B | Fiber-Bonded Metal Cribbing | —    |
| 9-30.1C | Concrete Cylinder Pipe | —    |
| 9-30.1D | Steel Pipe | —    |
| 9-30.1D(1)| Steel Pipe Less Than 4 Inches Diameter | —    |
| 9-30.1D(2)| Steel Pipe 4 Inch Diameter and Larger | —    |
| 9-30.1D(3)| Steel Casing Pipe | —    |
| 9-30.1E | Polyvinyl Chloride (PVC) Pipe (4 Inches and Over) | —    |
| 9-30.2  | Fittings | —    |
| 9-30.2A | Ductile Iron Pipe | 614  |
| 9-30.2B | Deleted | —    |
| 9-30.2C | Concrete Cylinder Pipe | —    |
| 9-30.2D | Steel Pipe | —    |
| 9-30.2E | Polyvinyl Chloride (PVC) Pipe | —    |
| 9-30.2F | Restrained Joints | 614  |
| 9-30.2G | Transition Reducing, Flexible Couplings, and Sleeves | —    |
| 9-30.2H | Restrained Flexible Couplings and Sleeves | —    |
| 9-30.2I | Special Fittings | —    |
| 9-30.2J | Special Pipe Coatings | —    |
| 9-30.2J(1)| Coal Tar epoxy Coating | —    |
| 9-30.2J(2)| Multi-Layer Tape Coatings | —    |
| 9-30.2K | Two Inch Blow Off Assembly | —    |
| 9-30.2L | Plastic Foam | —    |
| 9-30.2M | Portland Cement Concrete | —    |
| 9-30.2N | Polystyrene Encasement | —    |
| 9-30.2O | Steel Casing Pipe | —    |
| 9-30.2P | Steel Pipe Casing Seals and Spacers | —    |
| 9-30.3  | Valves | —    |
| 9-30.3A | Gate Valves | —    |
SECTION 9-32 TRAFFIC SIGNALS SYSTEM

| 9-32.1   | Controller Assembly                  | 333 |
| 9-32.1(1) | General                              | 333 |
| 9-32.1(2) | Pre-timed Controller                 | 334 |
| 9-32.1(2A) | Signal Circuits                      | 335 |
| 9-32.1(2B) | 120 VAC Interconnection Interfaces  | 335 |
| 9-32.1(2C) | Master Controller Option             | 335 |
| 9-32.1(3) | Actuated Controller                  | 335 |
| 9-32.1(3A) | NEMA Standards                       | 335 |
| 9-32.1(3B) | Manual Inputs                        | 336 |
| 9-32.1(3C) | Visual Outputs                       | 336 |
| 9-32.1(3D) | Construction Standards – Wiring      | 336 |
| 9-32.1(3E) | Controller Pedestrian Sequence       | 336 |
| 9-32.1(4) | Associated Equipment                 | 337 |
| 9-32.1(4A) | Terminal Strip/Wiring Identification | 337 |
| 9-32.1(4B) | Police Panel                         | 337 |
| 9-32.1(4C) | Auxiliary Panel                      | 337 |
| 9-32.1(4D) | Load Switches and Bases              | 338 |
| 9-32.1(4E) | Other Equipment                      | 338 |
| 9-32.1(5) | Auxiliary Equipment                  | 338 |
| 9-32.1(5A) | Inductive Loop Detector Amplifier    | 339 |
| 9-32.1(5B) | Coordinating Unit                   | 340 |
| 9-32.1(5C) | Time Base Coordinator                | 340 |
| 9-32.1(5D) | Time Clocks                          | 341 |
| 9-32.1(5E) | Conflict Monitor                     | 342 |
| 9-32.1(5F) | Map Display Board                    | 342 |
| 9-32.1(5G) | Controller Assembly Cabinet          | 342 |
| 9-32.2   | Training                             | 343 |
| 9-32.2(1) | General                              | 343 |
| 9-32.2(2) | Course Content and Manuals           | 344 |
| 9-32.3   | Signal Heads, Vehicle                | 344 |
| 9-32.3(1) | General                              | 344 |
| 9-32.3(1A) | Housing                             | 345 |
| 9-32.3(1B) | Door Assembly                        | 345 |
| 9-32.3(1C) | Optical Unit                        | 345 |
| 9-32.3(1D) | Backplate                            | 345 |
| 9-32.3(2) | Bi-Modal Vehicle Signals Section     | 346 |
| 9-32.3(3) | Optically Programmed Vehicle Signal Section | 346 |
| 9-32.3(4) | Directional Lounders                 | 346 |
| 9-32.4   | Signal Heads, Pedestrian             | 347 |
| 9-32.4(1) | General                              | 347 |
| 9-32.4(2) | Message Module                       | 347 |
| 9-32.4(3) | Case                                 | 347 |
| 9-32.4(4) | Eggcrate Visor                       | 348 |
| 9-32.4(5) | Transformers                         | 348 |
| 9-32.4(6) | Optically Programmed Pedestrian Signal (2-Sections) | 348 |
| 9-32.5   | Pedestrian Pushbutton Assembly       | 349 |
| 9-32.6   | Detector Loops                       | 349 |

SECTION 9-33 POLES, PEDESTALS AND FOUNDATIONS

| 9-33.1   | General                              | 354 |
| 9-33.1(1) | Anchor Bolts                         | 354 |
| 9-33.1(2) | Galvanizing                          | 354 |
| 9-33.1(3) | Ground Lugs                          | 354 |
| 9-33.1(4) | Ornamental Nut Covers                | 354 |
| 9-33.1(5) | Concentricity                        | 355 |
| 9-33.2   | Steel Poles, Mast Arms, and Luminaire Extensions | 355 |
| 9-33.2(1) | General                              | 355 |
| 9-33.2(2) | Strength and Deflection Requirements | 355 |
| 9-33.2(3) | Bolt Circle                          | 355 |
| 9-33.2(4) | Welds                                | 355 |
| 9-33.2(5) | Handholes, Festoons and Wire Inlets  | 356 |
| 9-33.2(6) | Mast Arm Couplings                   | 356 |
| 9-33.2(7) | Anchor Base Plates                   | 356 |
| 9-33.2(8) | Pole and Mast Arm Caps               | 356 |
| 9-33.3   | Aluminum Poles                       | 356 |
| 9-33.4   | Wood Poles                           | 356 |
| 9-33.4(1) | Douglas Fir                          | 357 |
| 9-33.4(2) | Western Red Cedar                    | 357 |
| 9-33.5   | Steel Pedestals                      | 358 |
| 9-33.6   | Pedestrian Pushbutton Posts          | 358 |
| 9-33.8   | Rock Out Assemblies                  | 358 |
### SECTION 9-34 ELECTRICAL AND SIGNAL CONDUITS

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Code 1986</th>
<th>Code 1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-34.1</td>
<td>General</td>
<td>359</td>
<td>359</td>
</tr>
<tr>
<td>9-34.2</td>
<td>Rigid Steel Conduit</td>
<td>359</td>
<td>359</td>
</tr>
<tr>
<td>9-34.2(1)</td>
<td>Threads</td>
<td>359</td>
<td>359</td>
</tr>
<tr>
<td>9-34.2(2)</td>
<td>Couplings</td>
<td>359</td>
<td>359</td>
</tr>
<tr>
<td>9-34.2(3)</td>
<td>PVC Coating</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>9-34.2(4)</td>
<td>Expansion Fittings in Group D Areas</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>9-34.2(5)</td>
<td>Expansion/Deeffect Fittings in Non Hazard Areas</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>9-34.2(6)</td>
<td>Conduit Seals and Breathers in Class 1</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>9-34.3</td>
<td>PVC Conduit</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>9-34.4</td>
<td>Handholes</td>
<td>360</td>
<td>360</td>
</tr>
<tr>
<td>9-34.5</td>
<td>Conduit Riser</td>
<td>361</td>
<td>361</td>
</tr>
</tbody>
</table>

### DIVISION 2

#### EARTHWORK

**SECTION 2-01- CLEANING, GRADING AND EARTHWORK CLEANUP**

Delete Section 2-01 in its entirety and replace with the following:

### 2-01.1 DESCRIPTION (New Section)

Cleaning work shall consist of removing and disposing of debris, vegetation or other unwanted materials from the ground surface. Grading work shall consist of removing and disposing of such materials from the ground surface. Roadside cleanup shall consist of work done to give the roadside an attractive finished appearance.

#### 2-01.2 DISPOSAL (New Section)

Unless otherwise specified in the Project Manual, waste sites shall be provided by the Contractor. Borrow and waste sites shall be operated in such a manner as to meet the grading, safety and health requirements of the State, county and local political subdivisions. Sites, operations, or results of such operations, which create a definite nuisance problem, or which result in damage to public or private properties, will not be permitted.

Copies of permits for borrow and waste sites, and reclamation plans for fills shall be furnished to the Engineer by the Contractor.

The Contractor shall submit to the Engineer at the pre-construction conference a list of waste and borrow sites the Contractor proposes to use during the course of construction. The list shall identify, in addition to each location, the estimated quantities and type of material to be wasted or removed from each site. Should additional or alternate sites become necessary during the life of the contract, the locations and pertinent information for each site shall be submitted to the Engineer for approval, prior to their use.

Borrow and borrow sites and their operation shall be at all times subject to the Engineer’s approval. No waste or borrow site shall be utilized by the Contractor until the proper grading permits and property owner agreements have been obtained by the Contractor and copies submitted to the Engineer. Sites utilized by the Contractor without a legal grading permit, an agreement from the property owner, and approval of the Engineer will be considered uncontrolled.

Waste and borrow sites located within the City Limits of Seattle are subject to the rules and regulations set forth in Seattle Grading and Drainage Control Ordinance (Reg. No. 10000) as amended by Ord. No. 11004), or as otherwise provided in the Seattle Municipal Code (SMC), and shall require a grading permit issued to the property owner by the Director of Construction and Land Use.

Waste and borrow sites located outside the City Limits of Seattle but within unincorporated King County, shall be subject to the rules and regulations set forth in the King County Grading Ordinance (Ord. No. 1098M). Sites may also be subject to rules and regulations of a local governmental authority if located within their jurisdiction.

Surplus material shall not be wasted within the public rights of way without a grading permit and, if within the City Limits of Seattle, a street use permit issued by the Director of Engineering.

Upon completion of the work and before final acceptance and payment, the Contractor shall clean up all property and sites on which the Contractor has operated. The Contractor shall perform all operations necessary to put the sites in a neat, clean and orderly condition.

Final cleanup shall be in accordance with the requirements specified in the Grading Ordinance, permits, property agreements and other contract documents. Upon completion of grading operations at any site for which a written agreement between the Contractor and property owner is required, the Contractor shall submit and obtain from the Engineer a release from all damages, duly executed by the property owner, stating that the restoration of the property has been satisfactorily accomplished. Payment withheld from the Contractor’s contract price will not be released until all such property owner releases have been furnished to the Engineer. Should the release be, in the opinion of the Owner, arbitrarily withheld, then the Owner may, in his sole discretion, accept that portion of the work involved and cause final payment to be made.

All costs and expenses involved in securing, operating and maintaining any waste or borrow sites (including final cleanup and any erosion or anti-pollution controls required in the permits, property owner agreements, grading regulations, and other contract documents will be considered as incidental to
the contract and such costs and expenses shall be included in the contract price for the various pay lines shown in the Bid Form.

2-01.3 CONSTRUCTION REQUIREMENTS (New Section)

2-01.3(1) CLEARING (New Section)

Clearing shall consist of removing and disposing of all unsanitary material from the surface including, but not limited to, trees, brush, dense timber and related wood, rubbish, etc.; removing building site fences, and other obstructions interfering with the work when removal and disposal of such surface obstructions are not specifically provided for in Section 2-04; and protecting from all harm any trees, bushes, shrubs, or other existing improvements which are to remain. Only those trees marked for removal on the Drawings or designated by the Engineer will be removed by the Contractor.

All trees shall be felled within the area to be cleared. Where the tree limb structure interferes with utility wires, or where the tree is to be felled in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.

All buildings, fences, lumber piles, trash, and obstructions, except utility poles, within the area to be cleared shall be removed and disposed of by the Contractor.

The refuse resulting from the clearing operation shall be disposed of by the Contractor. In no case shall refuse material be left on the project site, exposed onto adjoining private properties, or be buried in embankments or sewer trenches on the project site. Refuse shall not be deposited in any street or body of water, or in any street or alley, or upon any private property except by written consent of the private property owner.

2-01.3(2) GRUBBING (New Section)

The work shall consist of removing and disposing of all unsanitary vegetation matter below the surface including, but not limited to, stumps, roots, buried logs and trunks, etc.; and removing and disposing of stumps, cutovers, wood catch basins, discontinued, water, and other obstructions interfering with the work when removal and disposal of such underground obstructions are not specifically provided for in Section 2-04.

All stumps, roots, foundations and grubbing embedded in the ground within the limits described herein shall be removed to a minimum depth of ten feet below original or ten feet below original grade, whichever is lower. Grubbing requirements for grubbing shall be the same as those described for clearing.

2-01.3(3) LIMITS OF CLEARING AND GRUBBING (New Section)

The limits of clearing and grubbing shall be as indicated on the Drawings or in the Project Manual.

2-01.3(4) ROADSIDE CLEANUP (New Section)

From time to time as may be ordered by the Engineer and immediately after completion of the work, the Contractor shall at his own expense clean up and remove all refuse and unsanitary materials of any kind resulting from the work. The Contractor shall not be required to remove any refuse and unsanitary materials of any kind that may be done by the Owner and the cost thereof be charged to the Contractor and deducted from his final estimate.

All cleanup shall be performed as specified in the various sections of these Specifications.

Final cleanup shall be in accordance with 1-04.11.

2-01.3(5) PROTECTION OF EXISTING IMPROVEMENTS (New Section)

Existing utilities and existing trees, shrubs and other landscape items designated to remain, shall be protected from damage as specified in Section 1-07.18 and 1-09.11.
SECTION 2-02 REMOVAL OF STRUCTURES AND IMPROVEMENTS

2-02.1 DESCRIPTION
Supplement this section with the following:
Work in this section shall also consist of removal, salvage, disposal, and abandonment of selected existing items of improvements listed in the Bid Form and located within an improved street right of way or area of existing improvements, where care must be exercised to prevent damage to existing utilities or portions of improvements that are to remain.

2-02.2 MATERIALS (New Section)
Materials shall meet the requirements of the following sections of this Specification:
- Non-structural concrete: 
- Aggregates: 
- Concrete for plug in end pipes shall be Class 5 (3/4) meeting the requirements of Section 5-06.
- Concrete for filling holes shall be Class 6.5 (1-1/2) H.L.S. meeting the requirements of Section 5-06.
- Bedding material for joining structure ends and openings (other than tunnels) shall be Mineral Aggregates Types 9 or Type 11 meeting the requirements of Section 5-01.10; selected material excavated on the project site; or such other material as designated by the Engineer.

2-02.3 CONSTRUCTION REQUIREMENTS

2-02.3.1 GENERAL REQUIREMENTS
Delete the last paragraph and replace with the following:
The Contractor shall dispose of surplus or waste material per Section 3-01.2. The Contractor shall not remove any circumstances dispose of surplus or waste material within a material as defined in Section 2-02.3.1(a). Costs of disposal shall be included in the bid prices for other work.
Supplement this section with the following:
The removal of street improvements shall be conducted in such a manner as to prevent damage to existing utilities or any portion of the improvement that is to remain in place. Any damage that obligates the Contractor at his own expense, to repair, replace or otherwise restore such damage to the satisfaction of the Engineer.

2-02.3.2 REMOVAL OF ENDS, SIZEMARKS AND CURB
Delete this title and section and replace with the following:

2-02.3.3 REMOVAL OF EXISTING STREET IMPROVEMENTS - CITY OF SEATTLE (New Section)

2-02.3.3.1 REMOVE NON-RIGID PAVEMENT AND UNTREATED ROADWAY SURFACES (New Section)
Non-rigid pavements shall be streets, driveways, alleys, sidewalks or other surfaces constructed from a bituminous mix or any combination of bituminous cities or surfaces treated, upon an earth or gravel base. Unsurfaced roadway surfaces shall be old cut, crushed rock, and gravel surfaces. Unsurfaced roadway surfaces shall not be considered pavements.
Removal of non-rigid pavements and untreated roadway surfaces shall be considered part of the work of excavation. Removal shall be to the neat line trench width with the following exceptions:
(a) Open cuts which straddle the edge of roadway shall be removed to the neat line or 2 feet from the edge of roadway, whichever is greater.

(b) Removal shall be to the edge of roadway if the strip remaining between the edge of roadway and neat line is less than 2 feet in width.
Non-rigid pavement shall be except prior to removal by use of an asphalt cutting wheel, sawing, or line drilling at the Contractor's option to ensure a neat straight line. Cutting shall be completely through the non-rigid pavement.
If the Contractor's work and equipment causes damage beyond the cut line, replacement of asphalt shall be to the width directed by the Engineer. The cost of this asphalt replacement shall be at the Contractor's own expense.

2-02.3.3.2 REMOVE ASPHALT OVERLAY (New Section)
When removing an asphalt overlay from a rigid base pavement the Contractor shall use methods and equipment that will not structurally damage the existing rigid base. The methods and equipment shall be subject to the Engineer's approval.

2-02.3.3.3 REMOVE RIGID PAVEMENT (New Section)
Rigid pavements are streets, driveways, alleys, and other rigid slabs greater than 4 inches in thickness from concrete, brick, cobblestones, or any combinations of these materials, with or without an asphalt overlay.
Rigid concrete pavement shall be removed to the maximum width shown on the Standard Plans, or beyond, subject to the following requirements:
(a) Pavement shall be removed to any longitudinal joint, crack, or edge of pavement that is less than 3 feet from the neat line trench area.
(b) Pavement shall be removed to any transverse joint or crack that is less than 5 feet from the neat line trench area.
(c) Minimum restoration shall be full panel replacement if one or more of the following conditions exist:
(1) In any panel less than 3 years old.
(2) On any panel where the cut removes (or requires removal of) more than half of the panel.
(3) On any panel in a primary lane of a street in the Central Business District where the cut exceeds more than 24 square feet.
(d) In areas of asphalt pavement over rigid base, the following requirements shall apply:
(1) If joints or cracks show through the asphalt paving, then all of the requirements extending pavement removal beyond neat lines shall apply.
(2) If no joints or cracks are visible, or their location cannot be determined, no additional removal beyond the trench neat line area will be required.
(3) The existing asphalt surfacing showing through the trench line or cut shall be "stopped back" a minimum of 4 inches to completely expose the rigid base.
After removal and before restoration, the Contractor shall trim the edges of the remaining pavement leaving clean vertical faces.
Rigid pavement shall be line drilled full depth or saw cut at the Contractor's option, except when sawing is specifically required on the Drawings. No sawing or line drilling is required where pavement removal extends to a full depth joint or crack.
After line drilling or saw cutting the pavement, the Contractor shall not proceed with pavement removal until he has demonstrated to the satisfaction of the Engineer, the method he will use to break and remove all concrete from the areas to be removed. A backhoe may be used to remove broken concrete only after the concrete portion that is to be removed is clearly broken away from the pavement that is to remain in place.
Use of a "hooligan bail" to break concrete pavements will not be permitted.
The Contractor shall remove appurtenant from the open wire before the open wire is disconnected from the poles. Existing open wire shall not be cut without first releasing the tension in the span.

2-02.13.34AABON CATCH BASIN, MANHOLE, OR INLET (New Section)

As applicable to each abondoned span, the Contractor shall remove the existing and deformat (deposition) break down the structure to a depth of the curb section, or 4 feet below the surface, whichever is greater, and place the outlet pipe with concrete Class 3 (20) for a minimum length of 12 inches, and fill the remaining structure and void with mineral aggregate or concrete as specified below.

Catch basins and manholes shall be filled with Mineral Aggregate Type B or Type 17 compacted to 90% of specified dry density per Section 2-01.13.40D9 old and Type 165 inlet shall be filled with Class B-3 (15/39) H.E. or concrete.

For certain concrete pavement, the surface of the concrete shall match the grade of the existing pavement and shall be smooth finished.

2-02.13.35AABON AND FALL FILL (New Section)

Pipes designated on the Plans to be filled and abandoned shall be filled with lightweight foamed concrete having an air dry density of 20-30 pcf and minimum compressive strength of 30 psi. At each end of the pipe, the pipe shall be plugged with Class 3 (20) concrete for a minimum length of 12 inches.

2-02.13.36A SANDING AND LINE DRILLING (New Section)

When using rigid pavement, driveway, or sidewalk, the depth of saw cut shall be 2 inches or half the depth of pavement, driveway, or sidewalk, whichever is greater. All mastic decorative or special pavement (e.g. bricks, cobblestones, paving blocks, etc.) shall be remove full depth along a near line with limit of salvaging as many units as possible.

Curb shall be sawed full height and width.

Asphalt shall be saw cut full depth.

When line drilling, spacing of drilled holes center to center shall be 6 inches maximum. Holes shall be perpendicular to the surface and shall penetrate completely through the pavement.

2-02.13.37 SAUCAGE (New Section)

2-02.13.37A GENERAL (New Section)

Unless otherwise indicated, all casings, pipes and other material of recoverable value taken from the disposal facilities shall be carefully salvaged and delivered to the &new to good condition and in pack order for salvage to the Engine so direct. Materials and things deemed of no value by the Engineer shall be removed by the Contractor and become the property of the Engineer.

All casings removed from the existing utilities which are not to be reused elsewhere on the project, and which in the opinion of the Engineer are suitable for salvage, shall be excavated and the concrete and dirt removed and shall be delivered to the location designated by the Engineer. Contact the Engineering Department Warehouse Supervisor for coordination.

All costs for delivering salvaged material shall be considered to be included in the prices for various bid items comprising the improvements.

2-02.13.37B WATER MAINS AND APPARATUS (New Section)

The Contractor shall excavate and completely remove hydrants, valves, and any other item specified in the Bid Form, using care not to damage these items to be salvaged. Cast iron apparatus designated for removal shall be disposed of by the Contractor. Redfill shall be with selected material, Mineral Aggregate Type B, or other mineral aggregate as designated by the Engineer. Rockfill material shall be compacted to meet the requirements of Section 4-17.3.30.32.
2-02 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

2-02.3(7)C ILLUMINATION, SIGNALS, AND ELECTRICAL (New Section)

Electrical and traffic items to be salvaged shall include the following:

(a) High pressure sodium luminaires, lamps and photo cells.
(b) Aluminum bracket arms.
(c) Aluminum lighting poles.
(d) Wood and steel lighting poles.
(e) Traffic poles, including joint lighting and traffic poles.
(f) Mast arms.
(g) Pedestals.
(b) Traffic signal controller assemblies and cabinets.
(i) Signal heads.
(j) Illuminated signs.
(k) Handholes.
(l) Junction and terminal boxes.
(o) Traffic signs - overhead.
(p) Traffic sign.
(q) Designated signal apparatus.

Miscellaneous channelization items

Items (a) through (d) shall be delivered by the Contractor to City Light South Service Center at 4th Avenue South and South Spokane Street, by 5:00 PM prior to delivery of steel poles, high pressure sodium luminaires, lamps, photo cells, and aluminum bracket arms.

Items (e) through (h) shall be returned to Seattle Engineering Department Traffic Shops at 1050 9th Avenue. Call 625-4103 prior to delivery.

2-02.3(7)D REINSTALLING SALVAGED ELECTRICAL MATERIAL (New Section)

When salvaged electrical equipment is to be reinstalled, the Contractor shall furnish necessary equipment, features and appurtenances required to install the equipment to the new installation. Any new hardware required to complete the reinstallation shall be of the same quality and type as hardware required in these specifications for all other new work.

2-02.3(8) STREET SADDLES AND STEEL PLATES (New Section)

When backfilling operations cannot be completed by the end of the working day, street saddles or steel plates meeting the requirements below may be used to temporarily cover the excavation.

2-02.3(9)A STREET SADDLES (New Section)

Saddle shall be made of 4-inch round cast steel pipe fittings with saddle. Saddle iron flanges shall be 2 inches wide by 8 inches long. They shall be made of 3/4-inch steel and have chamfered edges. The support iron shall be of adequate size so that there is no significant deflection with traffic. At any time the saddle iron flanges do not get full bearing on the roadway surface, edging shall be used. Saddle boards and tines may be held together providing toilet equipment is provided to the Seattle Engineering Department for their removal.

Saddle iron flanges shall be flush with the roadway surface. All before shall be cut to provide a good fit, with no excessive opening. Saddles shall be dovetailed to receive the iron or scabbling shall be added to the edges of the board so that the board is flush along the pavement opening. There shall be no more than 1 foot of unsupported board between truss. Saddle board and iron are used only on those streets which have a concrete or other surface which can safely support them.

2-02.3(9)B STEEL PLATES (New Section)

Steel plates shall be a minimum of 1/2 inches heavy on all sides of a cut and shall be anchored by driving steel pins on all corners or alternate alternate 90 degrees approved by the Engineer.

Flanges or angles iron will be added to the undersides conforming basically to the size of the street opening. Where the street surface is uneven, plates will be bedded on H250 asphalt mix.

Steel plates shall be capable of carrying a minimum of 350 loading.

All steel plates or saddles located in pedestrian crosswalks or within three feet of pedestrian crosswalk shall have their edges stopped with high orange paint or reflectors approved by the Engineer. The sides shall be striped with three orange paint or reflectors approved by the Engineer. The paint strips shall be a minimum of 2 inches wide and no more than 10 inches on center.

Any pedestrian crosswalk containing steel plates or saddles may be closed at the discretion of the Engineer.

2-02.4 MEASUREMENT (New Section)

Measurement for "Remove (Item)" will be by the square yard, linear foot, each, or lump sum as indicated for each removal item in the Bid Form.

Measurement for saw cutting will be by the linear foot along the slope of the surface cut.

During trench excavation, measurement for removal and laying of street improvements will be based on the removal and replacement limits indicated on Standard Plan No. 104 as modified by the estimated limits provided for in Section 2-02.3(8) and 2-02.3(9), or the limits designated by the Engineer.

Measurement for "Abandon (Item)" will be by each. Abandon pipe will not be measured.

Measurement for "Abandon and Fill Pipe" shall be by the actual number of linear feet of pipe filled with lightweight foamed concrete.

2-02.5 PAYMENT

Delete this section and replace with the following:

Payment will be made at the unit contract prices bid for each of the following Bid Items as are included in the Bid Form:

(1) "Remove (Item)," per square yard.
(2) "Remove (Item)," per linear foot.
(3) "Remove (Item)," each.
(4) "Remove (Item)," lump sum.
(5) "New Cement Concrete, 2 Inch Minimum Depth," per linear foot.
(6) "New Asphaltic Concrete, Full Depth," per linear foot.
(7) "Abondon (Item)," each.
(8) "Abandon and Fill Pipe," per linear foot.
(9) "Removal of Structures and Obstructions," lump sum.

The unit contract price for "Remove (Item)" shall include all costs for the work required to completely remove and dispose of or salvage the items as applicable.
2-02 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Removal of non-rigid pavement over granular base will be measured and paid as "Common Excavation" in accordance with Section 2-01, with the following exceptions:

(a) When excavating through non-rigid pavement over granular base to install underground improvements, the costs of removal of non-rigid pavement shall be considered as incidental to the bid item cost of installing the new improvement.

(b) Removal of non-rigid pavement over granular base on street improvement projects shall be paid as "Remove Pavement" if the average thickness of the pavement as determined by the engineer is greater than 6 inches.

(c) When the special provisions are amended to make removal of non-rigid pavement incidental to a particular bid item within the project, no separate payment will be made.

Removal of non-rigid pavement without removal of any underlying concrete base will be paid as "Remove Asphalt Overlay."

Removal of rigid pavement greater than 6 inches in total thickness will be paid as "Remove Pavement." Removal of rigid pavement 4 inches or less in total thickness will be paid as "Remove Cement Concrete.

All above utility structures, such as meter boxes, hydrants, valves, manholes, pipes, identified as removal on the construction drawings and located within the excavation area of the trench next line or within the structure excavation next line shown on the drawings, shall be considered as incidental to the bid price for installation of pipe or structure excavation. Removal of catch basins and manholes shall be paid for at the unit price bid for their removal.

Removal of cast-in-place curb shall be paid as "Remove Curb," regardless of whether removal is Class A or Class B. All costs for removing other types of curb, such as traffic curbs, shall be included in the bid price for the various bid items shown in the Bid Form, and no separate payment will be made. All costs for removal of curb skim underlying pavement is being removed shall be considered incidental to "Remove Pavement," and no separate payment will be made.

Removal of traffic barriers or traffic islands shall include all costs to restore the surface if required. If there is no specific bid item listed for the removal of existing traffic barriers or lane markers, the cost shall be considered incidental to the various bid items comprising the improvement.

Removal of traffic signs posts shall include all costs for the removal of the posts, traffic sign, mounting hardware and restoration of the surface where signs were previously installed.

The unit contract price for "Remove Pavement Markings" shall include costs of all the work required to remove pavement markings as indicated on the drawings or as directed by the engineer, and to restore surface if required.

The unit contract price for "Remove Laminated" and "Remove Laminated and Bracket Arm" shall be full compensation for removal of the existing laminate, or laminate and bracket arm and its balance, wiring, and appurtenances.

The lump sum payment for "Remove Signallization (Concrete)" shall be full compensation for all labor, material and equipment required to complete the removal, disposal and salvage work as specified and in the quantities shown on the drawings. The cost shall include removal of all materials and securing equipment as determined by the engineer, and shall include disposal of removed items not salvaged.

The unit contract price for "Remove Pole, Metal," shall be full compensation for all labor, material and equipment to remove and salvage the pole.

The unit contract price for "Remove Pole, Wood" shall include costs of all the work required to remove and salvage the pole, and to backfill and compact the void left after pole removal.

The unit contract price for "Remove Foundation, Type C" shall include costs of all work required to remove, and dispose of the foundation, and to backfill and compact the void left after removing the foundation.

Removal of items not listed in the Bid Form shall be considered as incidental to the construction, and the costs thereof shall be included in the various items comprising the improvement. No separate payment will be made.

The unit contract price for construction shall include all costs for the work required to saw cut concrete, or asphalt only at the locations indicated specifically on the Drawings, Specifications, or

Designated by the Engineer. No payment will be made for saw cutting concrete or asphalt which is done at the option of the Contractor.

No payment will be made to abandon pipe or other subsurface items identified on the Drawings and for which no work is required. Ripping the exposed or open ends of pipes to be abandoned shall be considered incidental to the installation of new pipe.

The unit contract price for "Abandon (Item)" shall include all costs for the work required to abandon the utility structure as specified.

The unit contract price for "Abandon and Fill Pipe" per linear foot shall be full compensation for all labor, materials, and equipment including patching the pipe where indicated on the Drawings, furnishing and filling the pipe with lightweight foam concrete and, incidental work necessary to complete the work specified.

All costs for furnishing, placing, and compacting backfill material after ripping or abandoning utility structures shall be considered incidental to "Remove (Item)" or "Abandon (Item)" for such structure, and no separate payment will be made.

All costs for salvaging and cleaning cuttings, electrical components, or other items, and delivering to the Engineer shall be considered to be included in the prices bid for the various items comprising this improvement.

All costs for furnishing and installing Street Saddle and Road Plates to cover street excavations shall be considered to be incidental to the various bid items requiring the excavation.
2-03 EXCAVATION AND ENHANCEMENT

SECTION 2-03 - ROADWAY EXCAVATION AND ENHANCEMENT

2-03.1 DESCRIPTION

Delete this section and replace with the following:

This work shall consist of excavating and grading the roadway; excavating below grade; removing and replacing side material; furnishing, placing, temporarily stockpiling, and expediting select or other backfill material; removing and disposing of unsuitable or excess material; and all work necessary for the construction and completion of cuts, embankments, slopes, roadway ditches, side street approaches, alley and alley approaches, driveways and driveway approaches, sidewalks and planting areas, and such auxiliary work described in this section and not otherwise provided for separately in other sections of these Specifications.

This work shall be performed in reasonably close conformity with the lines, grades, and cross sections indicated in the Contract Documents or established by the Engineer.

2-03.1(1) CLASSIFICATION (New Section)

Roadway excavation shall be classified as common excavation, solid rock excavation and unsuitable foundation excavation. Trench excavation shall be classified as elsewhere.

Solid Rock Excavation shall consist of the removal and disposal of solid rock, i.e., bedrock rock that requires systematic drilling and blasting for its removal and also boulders exceeding 1/2 cubic yard in volume. Hard pan, hard clay or glacial till shall not be classified as solid rock excavation. Sedimentary, clastic, earth or other sedimentary rocks which are soft, weathered or extensively weathered, or blasted solid rock shall be classified as soft rock excavation. Soft rock is defined as one which has a modulus of elasticity of less than 200,000 psi.

Unsuitable Foundation Excavation shall consist of the removal and disposal of unsuitable material including, but not limited to, peat, muck, swamp or other unsuitable materials such as buried logs and stumps, but only when the removal is as specified in Section 2-03.3(5E) or 2-03.3(5F) and such methods are specified in the Special Provisions and included in the Bid Plans, or are specifically ordered by the Engineer. Unsuitable Foundation Excavation shall be considered unsuitable below grade pursuant to Section 2-03.3(5).

Common Excavation shall consist of all other material not classified as solid rock excavation, unsuitable foundation material excavation, or excavation which is considered to be incidental to other contract bid items in the contract. The working of roadway cuts and ditches and excavation below the designated subgrade when ordered by the Engineer shall be considered as common excavation.

2-03.1(2) PROTECTION OF EXISTING IMPROVEMENTS (New Section)

In addition to the requirements of Section 1-07.16 and 1-07.17 the Contractor shall ensure that no material or debris from the work area, and materials from roadway excavation, are prevented from entering existing structures. No vehicle in the vicinity of roadway excavations or material stock piles shall be driven directly over the finished channel. Shields shall remain in place until excavation and placement are completed. After the application of the top portion of the subgrade, the shields shall be removed. Shields shall be such as to prevent material from falling into the channel.

2-03.1(2) ROAD CUTS

Delete paragraph 4 ("Controlled Blasting") and replace with the following:

Controlled Blasting: No blasting will be permitted until the Contractor submits and obtains the approval of the Engineer for a blasting plan outlining how drilling, loading, and blasting will be done.

See Section 1-07.22 Use of Explosives.

2-03.3(3) EXCAVATION BELOW GRADE

Supplement this section with the following:

Roadway excavation shall be to the depths indicated on the Drawings and staked by the Engineer except where excavation below grade is designated in the field by the Engineer. Excavation below grade shall be the same classification of excavation as that above.

Excavation below grade required to remove a portion of the subgrade made unsuitable by the Contractor's operations or failure to adequately protect the subgrade shall be at the Contractor's expense.

2-03.3(7) DISPOSAL OF UNSUITABLE MATERIAL

Delete this section and replace with the following:

Material obtained from all excavation within the project boundary shall not be wasted unless the excavated material is designated by the Engineer as unsuitable for use in embankment construction, trench backfill, or for other purposes. If an undue amount is wasted, the Contractor shall secure and furnish borrow at the Contractor's own expense.

Material obtained from excavation of unsuitable foundation shall not be disposed of within a wetland area. Wetlands are defined as those areas inundated or saturated by ground or surface water at a frequency and duration sufficient to support the prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Disposal of surplus material from trench excavation shall be as specified in Section 2-03.3(5).

Material which is suitable to the needs of the project or determined to be unsuitable by the Engineer shall be wasted in accordance with Section 2-03.2.

2-03.3(8) WAITING MATERIAL

Delete this section and replace with the following:

If the Contractor wastes excavated material deemed unsuitable by the Engineer for embankments or other backfills, and material is later needed for embankments or fills, the Contractor shall at the Contractor's expense replace the wasted material with material meeting the Engineer's approval.

2-03.3(9) ROADWAY DECREASES

Supplement this section with the following:

All ditches shall be constructed as shown on the Drawings and shall be graded to direct the flow of the water to catch basins, culverts or channels.

2-03.3(10) SELECTED MATERIAL

Delete this section and replace with the following:

Selected material shall be considered as that material designated by the Engineer as suitable for selected fill applications, which is obtained from the excavation or grading of the roadway, or other designated source. Selected material may be used first before any borrow material is obtained for construction of project embankments. Prior to the application of the top portion of the subgrade, backfill, or such other backfill applications the Engineer may designate.

Selected material shall be used for any of the following purposes as determined by the Engineer:

(a) Embankment construction
(b) In lieu of Mineral Aggregate (Type) meeting the requirements of Section 9-03
(c) Trench backfill
(d) Planting soil
(e) Other selected uses as determined by the Engineer

Excavated material which is in excess to the needs of the project shall be disposed of per Section 2-03.2.
Excavated material must be stockpiled for use as selected materials shall be protected from contamination by the contractor deemed necessary. Material that is wet and later found unsuitable by the engineer shall be disposed of and replaced with material acceptable to the engineer.

2-03.3.12 OVERBREAK
Delete paragraph 3 of this section and replace with the following:
If the engineer approves, the contractor may use overbreak:
(a) To complete an embankment when the excavated material unexpectedly falls short of the amount required. The city will pay the road excavation contract price for the volume of material available within the limits of the road project.
(b) To replace borrow excavation originally planned for an embankment. The city will pay for overbreak used this way at the unit contract price for road excavation.

2-03.3.13 BORROW
Delete this section and replace with the following:
Borrow is imported material obtained from sources other than the ordinary prairie trench excavation, or other excavation on the project. When sufficient native excavated material is available, borrow shall be used to construct embankments, subgrade, shoulders, or other road components to the standards shown on the drawings. Sources of borrow material shall be approved by the engineer.
Borrow shall be classified as "Unclassified Borrow" or "Borrow Type".
(a) "Unclassified Borrow" shall be an imported soil which meets the suitability requirements set forth in Section 2-03.3.14.
(b) "Borrow Type" shall be an imported soil which meets the suitability requirements set forth in Section 2-03.3.14, and in addition shall meet all gradation and other requirements (use in Section 2-03.16 for the type of Mineral Aggregate specified (e.g., "Borrow Type I", etc.).

2-03.3.14 EMBANKMENT CONSTRUCTION
Supplement this section with the following:
In the order of priority, material used for embankment shall be:
1. Selected material obtained from Common Excavation and Trench Excavation
2. Borrow of the type specified
Selected excavated material shall be used for the construction of all required project embankments per Section 2-03.3.10
Excavated material will be considered suitable for general fill applications only if the material meets specific Mineral Aggregate specifications found in Section 9-03.
(a) is capable of attaining the degree of compaction specified in Section 2-03.3.4;
(b) is within plus or minus 3 percent of optimum moisture content as determined in accordance with ASTM D698;

2-03.3.15 ROCK ENHANCEMENT CONSTRUCTION
Delete paragraph 5 and replace with the following:
When practical, and as approved by the engineer, the Contractor shall save the finest granular material from excavations or borrow pits for use in topping such fills. If excavated material suitable for topping are available on site, payment for such material will be made per Section 2-03.3.14. If such materials are not available on site, payment will be made for imported materials at the unit contract price for each other mineral aggregate as may be included in the Bid Form or ordered by the Engineer.

2-03.3.16 CONTACTING EARTH ENHANCEMENTS
Delete paragraph 1 and replace with the following:
This section describes 3 methods (A, B, and C) for building earth embankments. The Contractor shall use Method C unless the Special Provisions or other sections of these Specifications require another method.

2-03.3.17 CONTACTOR CONTROL TESTS
Delete this section and replace with the following:
In-place density will be determined by one or more of the following methods:
(a) ASTM D1556, Test for Density of Soil by Volumetric Method
(b) ASTM D1557, Test for Density of Soil by Gravimetric Method
(c) ASTM D6222, Test for Density of Soil by the nuclear method
Laboratory densities may be determined by one of the following methods:
(a) ASTM D698, Moisture-Density Relations of Soils and Soil-Mineral Mixtures
(b) ASTM D4253, Index Density of Soils using a Volumetric Table
ASTM D992 will be used for computing the maximum density of all fills except for those granular materials classified as Subbase Fill. In the opinion of the Engineer, an unsatisfactory moisture-density curve. In that case the maximum density will be determined by the method specified in ASTM D4253.
The Contractor shall conduct tests for density sampling at locations designated by the Engineer. Density sampling will be performed by Owner's forces.
Degree of compaction in trench backfill shall be as specified in Section 2-17.3.14. All other fills and earth embankments shall be as specified in Section 2-03.3.14.

2-03.3.18 IMPERVIOUS FOUNDATION EXCAVATION
Supplement this section with the following:
Materials excavated from the roadway or channel changes will not be classified as unstable foundation excavation as defined by Section 2-03.14.11 unless the removal is accomplished by drainage.
operation or by special excavation methods requiring different equipment from that used for roadway excavation, as determined by the Engineer.

2-03.3(14V) VERTICAL SAND DRAINS

Delete Item No. 3 and replace with the following:

3. Materials required in excavating the holes shall be disposed of to and outside the limits of the working platform if they are suitable as a blanket adjacent thereto; otherwise the materials shall be disposed from the area by the Contractor.

2-03.4 MEASUREMENT

Delete this section and replace with the following:

Excavation of the class specified will be measured by the cubic yard in its original position by the cross sectioning. Quantities will be computed to the nearest linear foot of cross sections as staked off or otherwise modified by the Engineer, except where such modification is the result of excavating beyond the limits established to remove and replace roadway material which has become unsatisfactory because of the Contractor’s neglect, negligence or method of operation.

Borrow will be measured by the ton at the point of delivery in accordance with Section 1-09.1.

Unsuitable foundation excavation will be measured by the cubic yard in its original position by cross sectioning.

Vertical sand drains will be measured by the vertical foot from the top of the working table to the bottom of the holes.

Borrow for drainage blanket will be measured by the cubic yard or by the ton as indicated on the Bid Form, provided that estimate in excess of 9 percent will be deducted in accruating the pay quantities then measured by the ton.

Embankment compaction will be measured by the cubic yard of embankment material compacted pursuant to Section 2-03.3(14A) or Method B or C in Section 2-03.3(14C). Quantities will be computed based upon measurements taken to the nearest linear foot of the staked cross section and no allowance will be made for settlement.

When existing material in a cut section is stabilized by Sacrificing, cementing and compacting, measurement for the replacement compaction will be based upon the length and width of cut section compacted and a maximum depth of 6 inches.

2-03.5 PAYMENT

Delete this section and replace with the following:

Compensation for the cost necessary to complete the work described in Section 2-03 will be made at the unit contract prices bid only for the pay items listed or referenced below:

(1) "Common Excavation," per cubic yard.
(2) "Solid Rock Excavation," per cubic yard.
(3) "Unclassfied Borrow," per ton.
(4) "Borrow (Type)," per ton.
(5) "Embarkment Compaction," per cubic yard.
(6) "Unsuitable Foundation Excavation," per cubic yard.
(7) "Vertical Sand Drains," per vertical feet.
(8) "Sand Borrow for Drainage Blanket," per ton or per cubic yard.

The unit contract price for "Common Excavation" and "Solid Rock Excavation" shall include the costs for all work described in Section 2-03 and not otherwise provided for elsewhere. When excavation below the designated subgrade elevation is ordered by the Engineer, that portion of the excavation 3 feet or less below subgrade will be considered as "Common Excavation." If the Engineer orders excavation more than 3 feet below subgrade that portion below subgrade will be paid at extra work per Section 1-09.4. Payments for both types and classes of excavation listed above shall be full compensation for the work done within the excavation limits established to remove and replace roadway material which has become unsatisfactory because of the Contractor's neglect, negligence or method of operation, placing it backfill, or otherwise disposing of the material as shown on the Drawings, as specified herein, or as directed by the Engineer.

Excavation or embankment work required to bring the subgrade in sidewalk areas to the level of the top of the sidewalk will be paid per Section 2-03.5. Excavation of the subgrade to the depth of the sidewalk will be paid per Section 2-04.14.

Where earthwork is required and a bid item is not provided in the Bid Form, all costs for excavation shall be included on the prices bid for the various bid items shown in the Bid Form, and no separate payment will be made.

Where solid rock is encountered on a project for which a pay item "Solid Rock Excavation" is not included in the Bid Form, then the work and materials involved in the excavation of the solid rock shall be considered as Extra Work and be paid for in accordance with provisions in Section 2-04.

The unit contract price for "Unclassfied Borrow" or "Borrow (Type)" shall include all costs necessary to excavate, haul, stockpile, and place the material as shown on the Drawings, as directed by the Engineer. Compaction of borrow material will be paid as "Embarkment Compaction."

The unit contract price for "Embarkment Compaction" shall include all costs for the work necessary to compact the embankments per Section 2-03.3(14) and earth embankments by Method B or C per to Section 2-03.3(14).

Compaction of approved on-site excavated native material used for backfill and compaction of borrow shall be paid as "Embarkment Compaction" per cubic yard, as indicated above.

The unit contract price for "Unsuitable Foundation Excavation" shall include all costs for the excavation or displacement of unsuitable foundation material only by the methods set forth in Section 2-03.3(14A) and 2-03.3(14C). Costs shall include disposal of the unsuitable material, and leaving the checked location or suitable material on the checked slopes when the unsuitable material is displaced. Replacement material will be paid separately.

The unit contract price for "Vertical Sand Drains" shall be full compensation for furnishing all labor, tools, equipment and materials necessary for excavating the drainage holes and for selecting, hauling, handling and placing the material.

All costs for excavation, backfill, and compaction of sampling sites shall be considered incidental to the various bid items in the Bid Form and no separate payment will be made.

Density testing by Owner forces will be performed at no charge to the Contractor for the first test section at a designated location. The Contractor will be charged the actual costs the Owner incurs for testing required due to failure to achieve required densities. Such charges will be deducted from amounts due to become due the Contractor on monthly disbursements.

Payment for overbreak material used to backfill or compaction of sampling site shall be considered incidental to the various bid items in the Bid Form and no separate payment will be made.

The unit contract price for "Sand for Drainage Blanket" shall include all costs for processing, hauling, and placing the material.
SECTION 2-04 - Haul

2-04.1 DESCRIPTION
Delete this section and replace with the following:
This work consists of transporting excavated material from its original site to its final resting place on the project or at a waste site.

2-04.3 CONSTRUCTION REQUIREMENTS (New Section)
Off-highway earthmoving equipment shall not haul on or across any street not being improved in the contract.

2-04.4 MEASUREMENT
Delete this section and replace with the following:
Hand work will not be measured.

2-04.5 PAYMENT
Delete this section and replace with the following:
All costs for the work described in Section 2-04 will be considered incidental to excavation. All costs for haul shall be included in the costs associated with the excavation.
2-06 SURFACE PREPARATION

SECTION 2-06 - SURFACE PREPARATION

2-06.1 DESCRIPTION

Delete this section and replace with the following:

This work shall consist of the preparation of subgrade for new and existing streets, alleys, driveways, sidewalks or other public places, upon which surfacing is to be placed, or the preparation of the surfaced material, either new or existing, upon which concrete pavement is to be placed. All work shall be done in accordance with the Contract Documents and in reasonably close conformity with the plans, specifications, grades, and typical cross sections indicated in the drawings or as established and stated by the Engineer.

2-06.3(1) SURFACE FOR SURFACING

Delete lines 6 of paragraph 1 and replace with the following:

6. Compact the subgrade to a depth of 6 inches. Compaction shall achieve 95 percent of standard density determined by tests described in Section 2-05.3(1). Compaction shall be to a depth of at least 8 feet beyond the pavement edge or to a depth that will accommodate the paving equipment being used. The time for the operation of the surface on the subgrade which are inaccessible to large compactor units shall be thoroughly compacted with smaller compactor units or mechanical tampers. If the underlying material is to be partially or wholly removed, the subgrade the Contractor shall, at the Engineer's option, loosen, screen, and compact or excavate, remove, and replace the subgrade material until compaction can be obtained.

Supplement paragraph 2 with the following items:

1. After surfacing work is completed and properly bedded and compacted before surfacing work is started. This shall include contract work and work performed by the Owner or others.

10. If the underlying subgrade is soft, spongy, oryielding and will not permit proper compaction, the Contractor shall stabilize the subgrade per Section 2-06.3(2).

11. Where normal cross sections are being constructed, stakes will be set at convenient points at intervals not to exceed 50 feet and at closer intervals where necessary, such as at street and alley intersections. It shall be the responsibility of the Contractor to set centerline grades which may be needed in cases where the street grades are warped or otherwise do not conform with the typical sections, in which case the Engineer will set the stakes.

12. When ordered by the Engineer, the Contractor shall sprinkle the subgrade with water in such an amount as to obtain a mat of moisture to the surface and shall then correct where necessary.

13. Grades and lines, throughout the stages of constructing the subgrade, shall be secured from the reference station. The subgrade shall be maintained in the finished condition until the first course of surfacing is placed upon it.

2-06.3(2) SURFACE FOR REPAIR

Delete paragraph 2 and replace with the following 6 paragraphs:

Profile grade in the point of greatest or vertical curve at the position indicated on the roadway section. Before any paving material is placed, the subgrade shall be brought to the proper line, grade, and cross section and shall be so maintained until the concrete is placed, except that extra depth of subgrade for increased thickness of the pavement, for pavement areas, for pavement hedges, and for increased thickness at the edges of the pavement may be removed just before the concrete is placed.

The subgrade shall be brought to a fine grading surface by rolling the entire area to a depth of at least 8 feet. Prior to the edge of the pavement with a compacting unit meeting the requirements of Section 2-06.3(2). All portions of the surface on the subgrade which are inaccessible to the compactors shall be thoroughly compacted with mechanical tampers. The subgrade shall be so compacted to prevent floating of the concrete. If directed by the Engineer, the full width of the roadway shall be kept well sprinkled with water before and during process of rolling the subgrade. The subgrade shall be rolled both before and after the forms are set.

2-06.6 SUBSURFACE PREPARATION

When the pavement is to be constructed over an old fashioned composed of gravel and macadam, the old gravel or macadam shall be scarified and the material shall be uniformly spread and rolled until thoroughly compacted.

The subgrade shall be thoroughly settled down with water from 12 to 48 hours before the concrete is to be placed, and shall be thoroughly wet just before the concrete is placed. The work of saturating the subgrade shall be started and continued as the direction of the Engineer.

The elevation of the subgrade from 1-1/2 feet inside of the edge of the proposed pavement (or form) to 1 foot outside of the edge of the pavement (or form) shall be brought to an elevation that is not more than 1 inch above or below the elevation for the finished subgrade over this area before stakes will be set for the forms.

2-06.6(3) SUBSURFACE STABILIZATION (New Section)

When the density of the native earth in any area of the roadway section is determined by the Engineer to be less than the density requirement for whichever method of compaction is specified for the earth embankment, or where the nature or condition of the earth existing below the designated subgrade is such that, in the judgment of the Engineer, it may impair the stability of the subgrade, the Contractor shall stabilize the subgrade by whichever of the following methods is designated by the Engineer:

(a) Thoroughly loosen the earth to a depth of 6 inches by scarifying, aerating or watering as applicable, and compact to the required density, or

(b) Excavate below grade to the limits and depth designated by the Engineer. As directed by the Engineer, the excavated material shall be stockpiled temporarily for use as backfill, used in adjacent embankments, or, if unsuitable, wasted and replaced with selected material or other designated backfill material, if deemed necessary by the Engineer, the earth remaining in the bottom of the excavation shall be loosened to a depth of 6 inches by scarifying, aerating or watering as applicable, and compacted to the required density. The excavated area shall then be backfilled with the previously excavated and stockpiled materials, with selected materials, or with other designated backfill materials, as directed by the Engineer.

The subgrade beyond the limits of the excavation shall be compacted in successive layers in accordance with the method of compaction required for excavations under the provisions of the contract. Excavation below grade as set forth above shall be classified as the excavation above grade.

2-06.6(4) MAINTENANCE AND PROTECTION OF SURFACE (New Section)

Once prepared, the subgrade for surfacing shall be maintained in a finished condition until the first course of surfacing has been placed. The Contractor shall maintain the subgrade by blading and rolling as fixed previously. All curbs, gutters, and breaks in the surface of the subgrade shall be maintained.

The Contractor shall take whatever steps are necessary to protect the prepared subgrade from inclement weather, the Contractor's operations, and public traffic prior to the placement of crushed surfacing, granular base, base, pavement, etc. These steps shall include, but are not limited to, the use of protective sheeting to protect the subgrade from inclement weather, placing to protect the subgrade from the Contractor's equipment, and the placing of paving materials or base materials from an adjacent lane in lieu of operating equipment over the prepared subgrade. Traffic detectors shall be in accordance with Section 2-04.1.

Healing over finished subgrade shall be limited to that which is essential for construction purposes. Equipment used for handling materials over the prepared subgrade shall be equipped with protective shields. Equipment used for healing over the prepared subgrade which, in the opinion of the Engineer, cause undue damage to the subgrade or to the underlying materials shall be removed from the work area or request of the Engineer. If ordered by the Engineer, the Contractor shall plow the subgrade before healing materials or operating equipment over it.

During extended periods of seasonal inclement weather in which the Engineer deems it impractical or infeasible to protect the prepared subgrade with plastic sheeting or planking where the Contractor is required to operate equipment over the prepared subgrade in order to construct a crushed surfacing base course, treated base, or finished pavement, the Engineer may order the use of a half, material to stabilize and protect the subgrade prior to paving. Stabilization shall be by Method 2 of Section 2-06.6(3). Stabilization shall be applied in the vicinity of the subgrade to the extent directed by the Engineer. Backup ballast shall be used for subgrade stabilization only when specifically authorized by the Engineer.
2-06.35 EQUIPMENT (New Section)

The trimming machine shall be equipped with automatic controls with sensors for both sides of the trimming capable of ensuring grade from outside reference lines and providing the automatic guidance which operates the trimmer to maintain the desired grade and transverse slopes. The trimmer shall provide a smooth, uniform surface without chatter or ripples.

Equipment used shall be subject to the engineer's approval.

2-06.5 MEASUREMENT AND PAYMENT (New Section)

Delete this title and section and replace with the following two sections:

2-06.4 MEASUREMENT

Preparation of the subgrade is incidental to the various items included in the contract and therefore no measurement is required.

Subgrade stabilization by Method A in Section 2-06.3(3) will be measured by the cubic yard of excavation in accordance with Section 2-03.

Subgrade stabilization by Method B in Section 2-06.3(3) will be measured by the cubic yard of the same class of excavation as that above grade, in accordance with Section 2-03.

The imported mineral aggregate of the type specified when ordered by the Engineer, used in lieu of select native material, will be measured in accordance with Section 2-04.11.

2-06.5 PAYMENT

Unless otherwise specified, all costs for the subgrade preparation shall be included in the prices bid for the various items included in the contract and no separate payment will be made.

Subgrade stabilization by Method A in Section 2-06.3(3) will be paid as excavation completion in accordance with Section 2-03.

Subgrade stabilization by Method B in Section 2-06.3(3) will be paid as excavation of the same class as above grade, in accordance with Section 2-03.

Mineral aggregate backfill of the type ordered by the Engineer used in lieu of select native material will be paid as mineral aggregate in accordance with Section 2-04.3.

Water used in subgrade preparation shall be considered as incidental to the construction in accordance with Section 2-07.

SECTION 2-07 - WATERING (New Section)

Delete Section 2-07 in its entirety and replace with the following:

2-07.1 DESCRIPTION (New Section)

This work consists of furnishing, placing, and applying water for compacting embankments, constructing subgrade, placing of crushed surfacing, dust control, testing and as the Engineer requires.

2-07.1(1) SOURCES OF WATER SUPPLY AND REGULATIONS FOR AND TO HUMAN USE (New Section)

Water shall be obtained at the Contractor's expense. Providing and applying water shall be considered incidental to the various pay items comprising the improvement. No separate payment will be made.
SECTION 2-06.4 MEASUREMENT (New Section)

Measurement for "Rebuild Rock Facing" and "Relocate Rock Facing" will be by the square foot of rock face for the new rock facing or the relocated rock facing. Measurement for "Rebuild Rock Facing" will be by the square foot based on measurement of the existing rock facing before dismantlement. Measurement will include that portion of the rock facing constructed below the existing ground elevation.

Mineral aggregate of the type specified for drainage backfill will be measured by the ton in accordance with Section 1-09.1.

2-06.5 PAYMENT (New Section)

Compensation for the costs necessary to complete the work described in this section will be made at the unit contract prices bid only for the work items listed or referenced below:


The unit contract prices for "Rock Facing," shall include all costs for the work required to build and place the rock, including excavation of the existing foundation.

The unit contract prices for "Rebuild Rock Facing" or "Relocate Rock Facing," shall include all costs for the work required to dismantle and reconstruct the rock facing as specified using the existing rock and including necessary stockpiling of the rock and such excavation as may be necessary for rebuilding or relocating the rock facing.

Costs required to inspect and place additional rock in order to rebuild the rock facing to original condition shall be included under this line. No additional payment will be made.

Additional rock facing area ordered by the Engineer during rebuilding or relocation of an existing rock facing will be paid in accordance with Section 1-09.4.

Payment for mineral aggregate of the type specified for drainage backfill will be made in accordance with Section 1-09.5.
2-09

SECTION 2-09 - STRUCTURE EXCAVATION

2-09.1 DESCRIPTION

Delete this section and replace with the following:

This work shall consist of excavation, removing, and disposing of all formations, debris, and materials, natural or manmade, irrespective of nature or condition, encountered within the limits hereinafter defined which are necessary for the construction of foundations, bases, or other foundation work as herein directed, including the removal of rock, boulders, destructible natural and manmade materials, cuttings, embankments, debris, and any other material which is necessary for the durability of the structures to be constructed. The work shall be performed to the satisfaction of the Engineer. This work shall be performed in conformance with the standards outlined in Section 2-09.4.

2-09.2 STAKING, CROSS SECTIONING AND INSPECTION

Supplement this section with the following:

When any foundation excavation is completed, the Contractor shall notify the Engineer, and no concrete or other permanent structural material shall be placed therein until permission to proceed is given by the Engineer.

2-09.3 DISPOSAL OF EXCAVATED MATERIAL

Delete this section and replace with the following:

The material obtained from structure excavation shall be used for backfilling and around the structures after they are complete. Material not required for this purpose shall be used in the construction of embankments, stockpiled per Section 2-09.3(1) or if deemed unsuitable by the Engineer, per Section 2-09.3(15), placed per Section 2-09.12. Material which meets the requirements for Mineral Aggregate Type 17 shall be selectively stockpiled for use as wall or basement backfill.

2-09.3(1) BACKFILLING

Delete paragraphs 1 and replace with the following:

Openings made for structures shall be backfilled with selected material from the structure excavation or from other excavations. In general, selected backfill material from the excavation shall be as defined in Section 2-09.3(10). The second paragraph is revised to read:

Alternative Source: When material from structure excavation is unsuitable for use as backfill, the Engineer may require the Contractor to obtain material elsewhere. The Contractor shall provide backfill material from a source acceptable to the Engineer. The material from such additional sources shall be tested for compatibility with the structures to be constructed.

Supplement this section with the following:

Spaces excavated and not occupied by structures, piers, or other permanent structures shall be backfilled up to the surface of the surrounding ground with a sufficient allowance for settlement and the top surface of the backfill shall be neatly graded.

26
2-09 STRUCTURE ELEVATION

2-09.3(4) CONSTRUCTION REQUIREMENTS FOR DITCHES (OR OTHER EXCAVATIONS) 4 FT OR MORE IN DEPTH

The requirements of Section 2-09 shall apply to all types of excavation to the extent that they do not conflict with the excavation requirements found in other sections of the Contract Documents for a specific kind of work (see Division 7).

If whorse enter any trench or other excavation 4 feet or more in depth, the Contractor shall be responsible for worker safety and the Owner assumes no responsibility. Shoring and cribbing or other excavation for other classes of excavation shall be incidental to and included in the unit contract price for Bid Items requiring the excavation and shall include removal of the shoring and cribbing, or backfilling of the extra excavation. If backfill material is required for backfilling within the trench limit of the excavation, it shall be required as backfill material for the extra excavation at the Contractor's expense.

2-09.4 MEASUREMENT

Delete this section and replace with the following:

The materials excavated will be measured in their original position by volume in cubic yards. The quantity measured for payment will include only the material excavated from within the line shown on the Drawings, regardless of the excavation made within a centerline enclosure or in an open pit.

The vertical net limit lines for measuring the excavation will be a vertical plane 1 foot (measured horizontally) outer side of and parallel to the center line of a plume cap, footing, or wall. Any measurement as structure excavation will be made for material removed (1) outside of vertical planes 1 foot outside of and parallel to the center line of a plume cap, footing, or wall, (2) more than 1 foot beyond the roadway side of a vug wall, and (3) more than 1 foot beyond the sides and end of a vug wall.

The bottom limit for measuring the excavation for plume caps, footings, or walls will be the bottom elevation as shown in the Drawings or as otherwise established by the Engineer. In pile foundations, the material resulting from the melt due to the presence of a melt pool shall be considered in the measurement. For example, the bottom limit for a vug wall will follow a line 1 foot below and parallel to the bottom line limit for the vug wall.

The upper limit for measuring excavation will be the top surface of the ground, or the bed of the stream or river at the time the excavation is started. When the contractor is designated responsible for the materials through a graded section above the structure excavation, and when there is designated pay items in the contract for the excavation above the upper limit for structure excavation, the upper limit for structure excavation will be the lower limit of the designated grading section, as shown in the Drawings.

"Shoring and Cribbing or Extra Excavation", and "Offender", shall be lump sum items and therefore no measurements are required.

Measurement for imported Mineral Aggregate, when ordered for backfill in lieu of native material by the Engineer, will be by the cubic yard based on the net line excavation area shown on the Drawings for the depth designated by the Engineer.

Backfill for foundations, drains, and walls will be measured by the cubic yard per Section 2-09.1.

Measurement for concrete seal will be as specified in Section 6-02.4.

2-09.5 PAYMENT

Delete this section and replace with the following:

Compensation for the cost necessary to complete the work described in this section will be made at the unit contract prices bid only for the pay items listed below:

(1) "Structure Excavation" per cubic yard
(2) "Shoring and Cribbing or Extra Excavation", lump sum
(3) "Offender" lump sum
SECTION 2-11 TRIMMING AND CLEANUP

2-11.4 MEASUREMENT
Delete this section and replace with the following:
Work described in Section 2-11 will not be measured for payment.

2-11.5 PAYMENT
Delete this section and replace with the following:
The work of trimming and cleanup shall be incidental to the various bid items comprising the project. No separate payment will be made.

SECTION 3-01 PRODUCTION FROM QUARRY & PIT SITES & STOCKPILE

3-01.3 STATE FURNISHED MATERIAL SOURCES
Delete Section 3-01.3 and its subsections.

3-01.4 CONTRACTOR FURNISHED MATERIAL SOURCES
Delete Section 3-01.4 and its subsections and replace with the following:
In addition to the requirements of Section 1-06 the Contractor shall make all necessary arrangements for obtaining material from borrow sites, approved by the Engineer, in the quantities necessary for the work. Use of Mineral Aggregate will not be permitted until representative samples have been taken by the Engineer and tested, the source approved, and authorities granted for use of the aggregate.

3-01.4(i) MINERAL AGGREGATE (New Section)
The Contractor is to provide his own source of Mineral Aggregate (type). The material shall be produced from sources approved by the Engineer in accordance with the requirements of Section 3-01. The grading and quality shall be as specified in Section 9-01.
Measurement and payment will be in accordance with Section 4-01.

3-01.5 MEASUREMENT
Delete paragraphs 3, 4, and 5.

3-01.6 PAYMENT
Delete paragraphs 2 and 3.
Delete Section 3-02 in its entirety.

SECTION 4-01 - MINERAL AGGREGATES (New Section)

4-01.1 DESCRIPTION (New Section)
This section serves to unite the measurement and payment for all Mineral Aggregate.

4-01.2 MATERIALS (New Section)
Grading of all mineral aggregates shall meet the requirements of the Mineral Aggregate Table in Section 9-03.10.

4-01.4 MEASUREMENT (New Section)
Mineral aggregates of the types specified will be measured by the ton or by the cubic yard as specified on the Bid Form.
Measurement for payment of mineral aggregates shall be in accordance with Section 1-09.1.

4-01.5 PAYMENT (New Section)
Compensation for the cost necessary to complete the work described in Section 4-01 will be made at the unit contract prices bid only for the pay items listed or referenced below:

1) "Mineral Aggregate, (Type)," per ton.
2) "Mineral Aggregate, (Type)," per cubic yard.
The unit contract price for "Mineral Aggregate, (Type)," shall include all costs of furnishing, hauling, stockpiling, placing, grading, and compacting the mineral aggregate.
Payment for roadway backfill will include all costs for removal and disposal of undesirable material.
Payment for backfill for walls and for drains will be by the cubic yard in place as determined by the measurements shown on the Drawings, or as ordered by the Engineer, except for the volume of pipes and gravel backfill for drains. Volume of pipes 3 inches in diameter or less, drainage gravel placed aroundweep holes, and minor structural features will not be deducted.
Payment for backfill for foundations and for drains will be by the cubic yard in place as determined by the measurements shown on the Drawings, or as ordered by the Engineer. Backfill for drains surroundingweep holes will be included in the unit contract price for concrete in place per Section 6-02.3, and therefore will not be measured.
SECTION 4-02 - GRAVEL BASE

4-02.2 MATERIALS

Delete this section and replace with the following:

"Mineral Aggregate (Type)" for gravel base will be measured by the ton in accordance with Section 1-09.1.

4-02.5 EMBEDMENT

Delete this section and replace with the following:

Payment will be in accordance with Section 4-01.3.
4-06. BALLASTING AND CRUSHED SURFACING

Other combinations and types of equipment may be substituted for the above if approved by the Engineer. Additional equipment shall be supplied if required by the Engineer. Such equipment includes, but is not limited to, ballast spreaders, including spreaders equipped witharing and leveling machines; and periodic bases equipped with wheels or so constructed as to preclude any damage to the subgrade or underlying courses.

The equipment used for the work shall be subject to the Engineer's approval. Equipment shall be kept in good repair.

4-06.2(4) PLACING AND SPREADING

Delete this section and replace with the following:

Unless indicated otherwise on the Drawings, in street areas to be paved with asphalt concrete pavement, crushed surfacing shall be placed to a compacted depth of 6 inches consisting of a 2 inch top course of Mineral Aggregate type 1 placed on a 4 inch base course of Mineral Aggregate type 2.

Spreading of the first course of surfacing or ballasting shall begin at points nearest to the point of loading and successive course shall begin at points farthest from the point of loading. Each course shall be constructed continuously from the beginning point of the course unless otherwise directed by the Engineer. The first course of surfacing or ballasting material shall be placed on all available subgrade surface. The second course shall be placed over a section of a previously placed course before the completion of that course.

Crushed surfacing, base course and top course shall be constructed in layers not to exceed 6 inches in depth. Ballast shall be constructed in layers not to exceed 4 inches in depth. Each layer of surfacing and ballasting material shall be placed and spread by equipment approved for use by the Engineer. The surfacing and ballasting shall be spread by any method that will result in an even distribution of the material upon the roadway without perceptible segregation in gradation. The material shall be spread and accutted to a depth and surface uniformity which will permit compaction to a reasonably firm line, grade, depth, course, and cross section without further shaping.

Should there occur during any stage of the placing and spreading operation a segregation of the course from inferior materials causing, in the opinion of the Engineer, serious lack of uniformity in the grading, the Contractor shall immediately, upon request of the Engineer, place such changes in the method of spreading the material as will prevent separation.

Unless otherwise approved by the Engineer, there shall be a distance of not less than 1 block nor more than 1/2 mile between the construction of any two courses of surfacing or ballasting. Uniform gradations of mineral aggregates shall be used for surfacing on roadways.

Before placing any course, the proceeding layer shall be properly bound up, and all floating or loose stones shall be removed from the surface.

Surfacing and ballasting materials shall not be placed upon subgrades covered with snow or which are soft, sandy, or frozen, or at times when the Engineer determines that the weather is such that satisfactory results cannot be obtained.

4-06.3(5) SHAPING AND COMPRESSION

Delete paragraph 2 and replace with the following:

Immediately following spreading and final shaping, each layer of the surfacing shall be compacted to at least 95 percent of the maximum density determined by the Engineer in accordance with Section 2-03.18(1) before the next succeeding course of surfacing or pavement is placed.

Supplement this section with the following:

When the thickness of a layer is less than 2 inches, density testing will not be required and the Engineer will determine the number of coverages required for the particular compaction equipment available. Each course of surfacing, including surfacing and leveling machines, shall be compacted until the material does not creep under the compaction equipment before a succeeding course of surfacing material is placed. All compaction shall begin at the outer edges of the surfacing and continue towards the center.

4-06.38(8) WEATHER LIMITATIONS

Supplement this section with the following:

The cured shall not be liable for damages or claims of any kind or description by reason of any unavoidable operations due to weather under directions of the Engineer.

4-06.3(10) HOURS OF WORK

Supplement this section with the following:

See Section 1-04.11 for specific requirements for working overtime.

4-06.3(12) APPLICATION OF DUST BALLASTING (New Section)

When required by the Drawings, in the Special Provisions, or when directed by the Engineer, completed crushed rock surfacing course or roadway shall be given two or more applications of dust ballastive oil to the limits specified. Dust ballastive shall be 0.06-0.1 and shall be uniformly applied on an approved pressure-type distributor at the rate of 0.3 gallons of solution per square yard of surface to be treated. Before succeeding applications of dust ballastive are applied. The preceding application shall have thoroughly dried, as approved by the Engineer.

Dust ballastive shall not be applied upon a wet surface nor when the temperature is below 60° F. When directed by the Engineer, the Contractor shall furnish and place Type No. 6 sand on newly worked streets to such limits as designated by the Engineer to prevent scattering of dust onto adjacent existing street widths. Sand shall also be used when, in the opinion of the Engineer, the dust penetration is unsatisfactory.

4-06.3(13) MAINTENANCE REQUIREMENTS AND CONDITIONS OF SURFACE EXPECTS (New Section)

The surface of each layer of surfacing material shall be maintained reasonably true to line, grade, and cross section by brushing, sweeping, and dusting, and by the removal of floating and other obstructions from the surface. Looseness, cracks, or seams in the surface shall be filled with the same material. Loose, broken concrete or asphalt, bricks, or other masonry work which will not pass a 3 inch mesh shall be removed. Any dirt or mud, paint, tar, or other organic matter shall also be removed, if required by the Engineer, prior to the application of the crushed surfacing. In shapin the existing surfacing, all material which may have been displaced by traffic or otherwise shall be blended into the newly formed surfacing section.

4-06.3(14) RESURFACING OF OIL NOT AND CLEANER STREETS (New Section)

The surface of existing oil not and gravel streets shall be scarified and blasted to a minimum width of 21 feet until it has a uniform grade and cross section with a 2 inch to 5 inch crown at the center of the street, with a 1 inch grade. In addition to the scarifying, cleaning and blasting of the entire roadway, preparation work on the street surface shall include that work necessary to prepare the surface for the new surfacing. 

Supplement this section with the following:

Crushed Surfacing, "Mineral Aggregate, Type 1," shall be applied only after the newly formed street surface has been approved by the Engineer. After approved, if the preponderant work, crushed surfacing shall be spread to a uniform depth of 2 inches, and the material shall be spread to the correct grade and cross section according to Section 4-06.3(14). Before or after spreading operations, the newly formed crushed surfacing shall be shaped by grading to conform to the 2 inch depth and the required grade and cross section. Water for laying dust caus be drained off by gravity through ditches, or by underdrains, or by drainage means and placement directed by the Engineer.

After final grading has been completed and approved by the Engineer, dust ballastive oil shall be supplied as specified in Section 4-06.3(13). Prior to opening the newly scarified streets to traffic, warning signs shall be placed at all routes leading to the facility rated roadway. Signs shall also be placed at "Street Gills," and shall be of a type approved by the Engineer and shall remain in place as long as may be required by the Engineer.
4-06.4 MEASUREMENT
Delete this section and replace with the following:
Crushed rock surfacing, top course and base course, ballast, and gravel base shall be measured by the
ton in accordance with Section 4-06.1.
Dust palliative oil shall be measured by the gallon.

4-06.5 PAYMENT
Delete this section and replace with the following:
Payment for crushed rock surfacing, top course, base course, ballast and gravel base shall be made in
accordance with Section 4-01.5.
When included on the Bid Form, payment for dust palliative will be as follows:
(1) "Dust Palliative," per gallon.
The unit contract price for "Dust Palliative" shall include all costs necessary to furnish and place
dust palliative as specified.

4-06.2 MATERIALS
Supplement this section with the following:
The asphalt binder shall be 40-60pen grade asphalt meeting the requirements of Section 9-02.

4-06.3(2) PREPARATION OF AGGREGATES
Delete paragraph 2 and replace with the following:
Aggregates for RSB shall be heated to a temperature between the limits of 350°F. and 375°F., or as
designated by the Engineer.

4-06.3(6) SPREADING AND FINISHING
Supplement this section with the following:
The Contractor shall place the RSB in courses not exceeding 3 inches in thickness. When the total
depth of RSB exceeds 3 inches, the RSB material shall be placed in two or more equal courses each not
to exceed 3 inches in thickness.

4-06.3(6A) DRAINAGE PROTECTION COURSE
Delete paragraph 1 and replace with the following:
Unless otherwise ordered by the Engineer, the Contractor shall place the first course of RSB as a
protection for the prepared subgrade as soon as possible after the subgrade has been completed.

4-06.3(6) ANTI-SPLITTING ADDITIVES
Delete this section and replace with the following:
When directed by the Engineer, an anti-splitting additive shall be added to the asphalt material in
accordance with Section 9-02.4.

4-06.3(9) COMPACTION (New Section)
The method of compaction shall be as specified in Section 5-04.3(9).

4-06.4 MEASUREMENT
Delete this section and replace with the following:
Asphalt treated base will be measured by the ton in accordance with Section 5-06.4.

4-06.5 PAYMENT
Delete this section and replace with the following:
Compensation for the cost necessary to complete the work described in Section 4-06 will be made at the
unit contract price bid for the pay items listed below:
(1) "Pavement Base, Asphalt Treated (ATB)," per ton.

The unit contract price for "Pavement Base, Asphalt Treated (ATB)," shall include the costs for all
work described in Section 4-06 and not otherwise specified for separately hereinfor necessary to
construct the asphalt treated base on a prepared subgrade to the lines, grades, and cross sections
required.
Payment for roadway excavation and subgrade preparation including excavation and disposal of unsuitable
material shall be in accordance with applicable sections.
SECTION 5-02 - BITUMINOUS SURFACE TREATMENT

5-02.1 DESCRIPTION

Delete this section and replace with the following:

This work shall consist of constructing a single or multiple course, bituminous surface by treating existing crushed rock, crushed gravel or bituminous treated surfaces with asphalt and wearing surface with good design and furnishing a wearing surface of good riding and skid resistance and of sufficient depth that shall be constructed in reasonably close conformity with the lines and cross sections shown in the plans and established by the Engineer.

Roadway surfaces shall be classified as treated or untreated roadway surfaces. A treated surface is defined as a paved surface consisting of asphalt concrete, cement concrete, brick, or seal coat. An untreated surface is defined as an unpaved surface which may consist of gravel, crushed rock or all soil surfaces. Surfaces may be existing or new construction.

The method of treatment to be used on any particular project shall be bituminous surface treatment, Class B, unless otherwise specified.

5-02.2 MATERIALS

Delete paragraphs 2 and 3 and replace with the following:

The grade of asphalt shall be Double Reduced Asphalt (CBO-2) meeting the requirements of Section 5-02.1(b).

Mineral aggregate for Bituminous Surface Treatment Class A or B shall be Mineral Aggregate Type 24, Chip Rock, meeting the requirements set forth in Section 9-03.

5-02.3 EQUIPMENT

Supplement this section with the following:

All equipment shall be maintained in good working order to ensure progress and quality of work.

The right is reserved for the Engineer to disapprove any equipment that, in the opinion of the Engineer, will not or does not accomplish the work satisfactorily.

Each the asphalt distributor and the self-propelled chip spreader shall be calibrated prior to their use to ensure applications within the coverage limits specified. Adjustment of the asphalt distributor spray bar height shall be such as to obtain a single lap of spray cones from bars with a 4-inch cone spacing and a double lap from bars having a 6-inch cone spacing.

The contractor shall frequently check and adjust, if necessary, the height of the spray bar during asphalt application to ensure the height above the pavement surface does not vary more than 1 inch as the truck load lightens.

5-02.3A UNTREATED SURFACES

Delete this section. Refer to Section 5-04.3C(3).

5-02.3B TREATED SURFACES

Delete this section. Refer to Section 5-04.3C(4).

5-02.4 APPLICATION OF ASPHALT

Delete this section and replace with the following:

Upon the properly prepared roadway surface, Double Reduced Asphalt (CBO-2) shall be applied at the rate of 0.15 to 0.40 gallons per square yard (0.80 to 0.60 gallon per square yard in shaded areas) at a distributor spraying temperature between 125°F and 165°F. The Engineer may vary the amount of asphalt to be placed that in his judgment will give the best results.

At any time during the progress of the work, the Engineer may order the use of other grades of asphalt materials as listed in Section 5-02 if in the Engineer's judgment, the results contemplated by the specifications will thereby be better obtained.

To ensure uniform distribution of asphalt prior to beginning work, the distributor bar shall be operated over a pit or vat. To avoid laps and ridges at transverse joints of separate applications of asphalt, the Contractor shall spread sufficient building paper over the treated surface to make sure that the spray jets will be functioning normally when the untreated surface is reached.

The pattern of application of shots, and width and length of application of shots of asphalt material shall be such as to provide proper coverage of crushed material within the limits specified, provide proper width to each dimension so as to facilitate the most satisfactory coverage with crushed cover stone, and provide lapping of subsequent adjacent applications.

Asphalt shall be applied to centers of intersections and driveways immediately ahead of, or immediately behind the adjacent longitudinal street application.

Gravels (dirt) by the distributor shall be immediately covered by hand patching with the same grade of hot asphalt.

Any loose spread of asphalt shall cover no more area than can be covered with mineral aggregate within 3 minutes from the time of application upon any part of the spread.

Unless otherwise directed by the Engineer, asphalt shall be spread toward the source of mineral aggregate to avoid injury to the freshly treated surface. No asphalt shall be spread until adequate supplies of mineral aggregate are on hand at the site.

Where earth exists, the application of asphalt shall extend 4 inches beyond the gutter line. Where concrete curb and gutter exist, the application shall lay on the gutter section, but shall not exceed 2 inches. Where concrete curb and gutter exist, the distributor shall be placed as closely as possible to the vertical surface without compressing which contacts the curb. Where concrete curb and gutter exist, the distributor shall be equipped with a splash board designed to prevent spraying thereon.

All castings shall be covered with heavy building paper and weighed down with sand or crushed material.

Nad sprayers shall be used to apply asphalt around castings and wherever else cover is insufficient.

5-02.5 APPLICATION METHOD OF AGRGEGATES

Delete this section and replace with the following:

Mineral aggregates shall be furnished and placed by the Contractor. Any method of handling the mineral aggregate which causes segregation of the various sizes of aggregate particles shall be corrected by the Contractor upon the request of the Engineer so that a uniform product will be incorporated in the work.

After applying the asphalt and at such time as the Engineer may direct, mineral aggregate shall be evenly applied to the roadway surface at a rate of 25 to 50 pounds per square yard. The quantity of aggregate to be applied shall be such that the asphalt will not stick to or get entertained into the aggregate. The aggregate shall be applied over the freshly spread asphalt by trailer-type or self-propelled, spreader boxes or as an approved design. The aggregate shall be applied on the truck, and spreader boxes as the asphalt is spread. The aggregate shall be spread in such a manner as to provide an 8-inch strip of asphalt exposed to provide a lap with the next application of asphalt.

The aggregate shall be damp when applied to the roadway. If the aggregate is dry and dusty, the Contractor shall dampen the aggregate by spraying with water.

As soon as the aggregate has been applied to the surface, the aggregate shall be well rolled with a pneumatic-tired roller. Places inaccessible to the pneumatic-tired roller, such as corners of intersections and private driveways, shall be rolled with a self-propelled smooth-wheel roller.

Where necessary, the aggregate shall be removed or be drilled uniformly over the adjacent roadway by using a motor patrol grade equipped with a wire brush solid board, subject to...
approval of the Engineer. This type of spreading shall be held to a minimum, and where necessary it shall be very carefully performed so as not to disrupt the emulsion in any way. Thin or bare spots in the spread of aggregate shall be corrected by hand spreading or by use of a grader as described above.

Rolling and brooming shall continue until the roadway is evenly covered and the aggregate is well compacted and "set" into the asphalt. This operation shall continue, as directed, until the asphalt has cured to the extent that it will not "pick up" under traffic. Primarily, all rolling shall be performed with pneumatic rollers, except as otherwise described above, and the final rolling shall be performed with a self-propelled smooth-wheel roller.

During the maintenance period following the application of the Bituminous Surface Treatment, the Contractor shall perform brooming, spotting, and rolling as may be necessary to prevent "pick up" or other damage to the surface.

At any time during the progress of the work, the Engineer may order the use of a different aggregate grading in lieu of the mineral aggregate specified in the Engineer's judgment, the results contemplated by the specifications will thereby be better attained.

5-02.3(7) PATCHING AND CORRECTION OF DEFECTS
Change "Section 5-02.3(3)" in paragraph 1 to read "Section 5-04.3(3)".

5-02.3(8) PROGRESS OF WORK
Delete this section and replace with the following:

The Contractor shall so organize the work that the entire operation will progress in an orderly and expeditious manner or make progress satisfactory to the Engineer.

(a) Apply asphalt emulsion on an adequately prepared roadway surface.
(b) Apply mineral aggregate by spreader boxes.
(c) Roll with pneumatic-tired and/or self-propelled smooth-wheel roller.
(d) Allow a minimum of 48 hours set time.
(e) Sweep with an approved road broom to pick up and remove excess aggregate. This work shall be accomplished in the early morning hours before the heat from the sun has warmed the pavement.
(f) Markout roadway surface for 5 calendar days by sweeping and patching as necessary on a daily basis, maintaining traffic signing, etc.

Ten (10) calendar days after the final application, the Contractor shall make a final sweep with a mechanical broom, using the pick up broom only, to clear off any remaining loose aggregates. Center brooms shall not be used. The Contractor shall dispose of the excess aggregates.

5-02.3(11) ANTI-STRIPPING ADDITIVE
Delete this section and replace with the following:

When directed by the Engineer, an anti-stripping additive shall be added to the asphalt material in accordance with Section 5-02.4 of the Standard Specifications.

5-02.5 MEASUREMENT
Delete this section and replace with the following:

"Asphalt (Grade)" will be measured by the gallon or ton before dilution in accordance with Section 5-06.4.1.

The measurement of aggregates shall be by the ton that is being placed in each truck, in accordance with Section 6-01.4.
SECTION 5-04 ASPHALT CONCRETE PAVEMENT

5-04.2 MATERIALS

Supplement this section with the following:

The grade of asphalt for tack coats shall be小女孩路面再生沥青 (C6 or C6-1) meeting the requirements of Section 9-02.

The grade of asphalt for sealing joints and other tight lines shall be C6-1 except when the paving to be sealed is inside the Seattle City Limits and under the jurisdiction of King County, in which case the asphalt for sealing joint lines and joints shall be AC-60. Tack coats for crack sealing shall be as specified in Section 5-04.3(F).

5-04.3 (C) SEALING EQUIPMENT

Supplement this section with the following:

The asphalt concrete mixture shall leave the mixing plant at a temperature between 260°F and 330°F, and when deposited on the road it shall have a temperature not less than 250°F. The exact temperature range within the above limits shall be as directed by the engineer.

5-04.3(D) ASPHALT RATINGS

The second paragraph is rewritten to read:

The screened or strike-off assembly shall effectively produce a finished surface of the required smoothness and texture without cracking, bleeding, or graining of the mixture. Any half-inch extensions over 1 foot in length on either side of the paver shall form the same equipment as the rest of the paver. Hydraulic extensions without screens, augers, and vibration shall not be used in the traveled way.

5-04.3(E) ROLLING

Supplement lines 3 of this section with the following:

(b) The minimum weight shall be 10 tons except for rollers used to compact areas inaccessible to a 10 ton roller (i.e., driveways, walkways, around curbs, etc.).

5-04.4A PLANNERS (New Section)

Planning shall be by the cold planing method only. Equipment shall be of a type that has operated successfully on both 4 and 6 lane highways in the past. The equipment shall be subject to the engineer's approval prior to use. Equipment shall be maintained in good working condition while in use. The storage of equipment and volatile material shall be off-street and in compliance with Seattle Fire Department regulations.

Cold planers shall be of the type equipment capable of cutting at least 5.5 foot wide and 4 inches in one pass. Steel edge planers may be used for cutting around utility cuttings and making new cuts for curb joints.

For standard cold planing operations, the equipment shall have automatic controls with sensors for either or both sides of the equipment capable of sensing the proper grade from an outside reference. The sensor shall be so constructed that it will alarm from a reference line or multi-footed ski-like structure. The sensor shall be of the type capable of maintaining the desired transverse slope. The transverse slope controller shall be capable of maintaining the grade at the desired slope within plus or minus 0.1 percent.

5-04.4B DIRECTIONAL (New Section)

Determines shall meet the requirements of Section 5-02.1(1).

5-04.3(C) HEATER SPRINKLERS (New Section)

Equipment used to heat-saturate pavement shall be capable of heater-saturating between 1,000 square yards and 1,500 square yards of pavement per hour. The heating unit shall have a minimum rating of 10,000 BTU's per hour. The heater-saturator shall also be equipped with a leveling device to provide for an even distribution of loose material. The saturator shall maintain continuous and uninterrupted pavement contact without damaging utility cuttings.

5-04.3(D) CONDITIONING OF EXISTING SURFACE

Delete this title and section and replace with the following:

5-04.3(D) PREPARATION OF STREET SURFACES

Street surfaces shall be classified as treated and untreated surfaces. Treated surfaces shall be coagulated asphalt concrete, brick, seal coat or other bituminous surface treatments. Untreated surfaces shall be classified as "street preparation" for treated street surfaces, and "roadway preparation" for untreated street surfaces.

5-04.3(E) PREPARATION OF EXISTING SURFACES

Delete this title and section and replace with the following:

5-04.3(E) SURFACE PREPARATION - TREATED SURFACES

When an existing treated surface is to be used as a base for one or more courses of new asphalt concrete or other surfacing, the treated surface shall be swept, cleaned, and patched as follows:

(a) Treated surfaces shall be swept with a power broom until free of dirt and other foreign matter. Hot brooms shall be used to clean emulsions of the power broom. Pasty asphalt patches, grease, and other objectionable material shall be removed from the existing pavement.

(b) Boxes asphalt joint filler shall be completely removed and premixed joint filler shall be removed to at least 1/16 inch below the surface of the existing pavement.

(c) In order to obtain a base having uniform grade and cross section, all surface irregularities in the existing treated side shall be corrected prior to placement of the new asphalt concrete or other asphalt material surfacing. Correction shall be by patching and/or surfacing. Patching shall be performed unless surfacing or heater-saturating is specified. Although patching and prelaying may be necessary after surfacing, such work, after surfacing, shall be performed only when specified in the contract documents or designated by the Engineer.

5-04.3(F) PRELAYING (New Section)

When a surface of the existing pavement or old base is irregular, it shall be brought to a uniform grade and cross section by prelaying, unless some other method of correction has been specified in the contract documents.

As soon as the existing surface has been thoroughly cleaned, holes and discontinuities in the surface and edges and edges broken shall be patched. Asphalt used for patching shall be Class II Asphalt concrete mix, heated to the temperature specified in Section 5-04.3(B), before placing the asphalt. The placement of asphalt material in the bottom and edges of the hole shall be by hand. The patched material shall be thoroughly tamped or rolled.

Patch filling shall be accomplished prior to prelaying or installation of the first asphalt course, whichever is applicable. Prelaying of seams or broken surfaces shall be accomplished by placing asphalt concrete of the class specified with a motor petrol grader, by hand-potting by Miller box, or by such other method as may be approved by the Engineer. After placement, the asphalt concrete shall be compacted thoroughly.

In cases where patching to remove high areas caused by patching, etc., shall be performed prior to prelaying. Locations to be planned prior to prelaying will be noted in the contract documents.
5-04.3(3)A PLANNING EXTENDED PAYMENTS (New Section)
When planning is specified, the surface of designated pavement or the top surface of subbase courses shall be improved or resurfaced by planing to remove irregularities and produce a prepared subgrade of sufficient thickness for the application as asphalt concrete overlay. Planing shall be by the cold cutting method stated hereinafter designated. The planer shall not be used on the final wearing course of new asphalt concrete construction.

Planing operations shall be conducted in such manner as will not tear, break, burn or otherwise damage the surface which is to receive the planed surface shall be slightly grooved or crisscrossed and shall be free from gouges, deep grooves, ridges, or other imperfections. A tapered wedge cut shall be made longitudinally along curb lines sufficient to provide a minimum of 4 inches of curb reveal after placement and compaction of the final wearing course. A tapered wedge cut shall also be made at transitions to adjoining pavement surfaces (e.g., locations where front doors are located on the roadside). Butt joints shall be cut in a straight line with vertical faces 6 inches or more in height and shall produce a smooth transition to the existing adjoining pavement.

After planing is complete or when designated by the Engineer, the planed surfaces shall be swept, cleaned, and, if required by the contract documents or Engineer, jetted and prewetted.

Temporary asphalt slabs (25C) shall be placed around each utility entry protruding above the surface in the traveled roadway, or any other area which can be a safety hazard to vehicular traffic. These temporary slabs shall be removed prior to laying the asphalt overlay.

5-04.3(3)A HEATING-SCRAPING (New Section)
When heating is specified, the surface of designated pavements shall be sufficiently softened by heating to permit scraping to a minimum depth of 3/4 inch without developing the reaching position. The scraped material shall, in one continuous operation, be thoroughly mixed, heated, and leveled by an oscillating or vibratory device followed by roller compaction while the material is still hot.

Scraping to a depth of not less than 3/4 inch shall provide 9 pounds of asphaltic material per square foot of scraped roadway.

After compaction, the material shall be repositioned by the application of a repositioning agent in the amount and at the rate designated by the Engineer. Subject to climatic conditions and directions from the Engineer, the repositioning agent shall be applied within 60 minutes from initial scraping.

Heating scraping shall produce a completed surface with a uniform grade and cross-slope varying not more than 1/4 inch from the lower edge of a 10-foot straightedge placed on the completed surface in any direction. Variance due to roadway cross, designated grade changes, repositioned edges at butt joints and along curbs or gutter will be taken into consideration by the Engineer.

Excess material from heating scraping shall be removed and disposed of by the Contractor.

The recycled pavement may be opened to traffic after application of the repositioning agent. However, if the proposed procedure is in the opinion of the Engineer, configurated or degraded by traffic, a tack coat of asphalt shall be applied at the rate of 0.1 to 0.2 gallons per square yard (0.08 to 0.16 mil).

5-04.3(3)A TACK COAT (New Section)
A tack coat of asphalt, applied at the rate of 0.08 to 0.09 gallons per square yard of treated subgrade, shall be applied by a mechanical distributor, approved by the Engineer and meeting the requirements of AC 2.1(1), to all surfaces on which any course of asphalt concrete is to be placed or added to prior to recycling. The distributor equipment shall be capable of applying a controlled spread of the tack coat to be applied. A spreader, equipped with integral spreader blades so that the spreader blades may be adjusted to the width of the spreader at any point and the spreader shall be equipped with hand operated spray equipment for use only on inaccessible areas and irregularly shaped areas. When asphalt concrete pavement Class 5 is being constructed, the tack coat shall be applied to the existing surface at a rate of 0.12 to 0.20 (0.08 to 0.16 mil) gallons per square yard.

5-04.3(3)A PREPARATION OF UNSTABLE SUBBASE
Delete this section and replace with the following:

Unbroken roadway surfaces, including intersections and side street approaches which are to receive asphalt concrete pavement or other surfacing, shall be shaped to a uniform grade and cross section, conforming as nearly as possible to those which exist except:

(a) Where new lines and grades are indicated in the contract documents or stated by the Engineer; or

(b) Where the height of the centerline cross relative to the roadway edge or roadway center exceeds 2 percent X 1/2 of the roadway width, in which case the cross shall be corrected by excavation or scarifying and blading to a cross section having a crown of 2 percent X 1/2 width or such other crown as may be designated by the Engineer.

Lanes and grades shall not be set by the Engineer in Class 8 asphalt.

Where cuts or curbs and gutters are not required or existing, subgrade preparation shall be 2 feet greater than the final asphalt pavement which indicated on the drawings for that street 1 foot on each side or to each other width designated by the Engineer. The radius at the edge of roadway or at intersections shall be a minimum of 20 feet.

The grade shall be shaped so that all from castings for manholes, manhole boxes, valve vault boxes, catch basins, etc., within the roadway section to be treated will extend above the prepared surface, such that the casting will be flush with the final surface.

Preparation work shall produce a subgrade with a smooth, crowned surface without ripples or ridges. All stones, lumps, broken concrete, asphalt, bricks, or other mineral matter which will pass 2 inch sieve on the roadside and disposed of by the Contractor. Snow, ice, or other organic matter shall also be removed and disposed of by the Contractor.

Where existing asphalt or concrete pavement is being cut with new asphalt surfacing, sufficient native material shall be removed to permit the forming of a cut joint.

These areas and surfaces which are to be prepared for the placement of asphalt concrete pavement or other surfacing shall be considered subgrade for the new construction. The existing roadway shall be scarified, excavated, bladed, shaped, and compacted to remove irregularities and secure a uniform surface that is free from loose material. The subgrade shall be scoured by the Contractor or bladed to the roadway edge and used as needed for fill or shoulder restoration following completion of the paving. The thickness of the material shall be used to the fullest extent possible an subbase material prior to the placement of new crushed rock.

During the operation of blading and rolling, water shall be applied in the amount and locations designated by the Engineer.

If there is a surplus of stockpiled material after construction to complete, the Contractor shall clean up the stockpile site and move and dispose of the surplus material.

The Contractor shall patch with prewetted materials any holes or other deformations that cannot be removed by blading. The prewetted material shall be made of crushed surface top course or course stone material and shall be added to the stockpile. All material for use in the roadways sections as designated by the Engineer. Small patches shall be thoroughly hand-dug and the

Where it is necessary to remove sections of existing pavements, the removal shall be performed in accordance with Section 2-04.

5-04.3(3)B PREPARATION OF UNSTABLE SOIL
Where the new asphalt concrete slabs a curb or gutter, cold pavement joint, tapered mast line, or any metal surface, a thin tack coat of asphalt, shall be applied on the vertical face of the slabs. The slabs or vertical contacts shall be painted or rolled so as to avoid an accumulation of excess asphalt in puddles. The Contractor shall apply a tack coat of vertical contact above the finished height of the asphalt concrete being placed.

Where it is necessary to remove sections of existing pavements, the removal shall be performed in accordance with Section 2-04.
larger holes or areas shall be patched and rolled with a smooth-wheel roller or a two-wheel power patching roller.

After scarifying, excavating, blading, shaping, and, if required, placing crushed surfacing, the roadway subgrade shall be compacted in accordance with the requirements of Sections 5-06 and 5-04. The subgrade shall be brought to a firm,Unified surfacing by compacting the entire area to a width of 1 foot outside the edge or pavement or to the curb or curb and gutter.

Soft, swampy, or yielding spots shall be removed, refilled with suitable, stockpiled material, and thoroughly compacted.

It is assumed that sufficient existing crushed rock material will be obtained from scarifying and excavation operations to provide a minimum of 2 inches of crushed rock sub-base for the asphalt paving, or that the subgrade, after scarifying, excavation, and shaping has been completed, will be acceptable as 2", without the need for additional processed crushed rock (i.e., the depth of the existing crushed rock is at least 2 inches deep).

When, in the opinion of the Engineer, the sufficient roadway subgrade material is not available, the Contractor shall furnish, place, and compact a minimum of 2 inches of "Mineral Aggregate, Type 1" on the subgrade. The material shall not be placed unless specifically ordered in writing by the Engineer. "Mineral Aggregate, Type 1" will not be considered a major bid item.

The Contractor shall ensure that a 2 inch minimum depth of native or processed crushed rock base is provided for the asphalt paving.

The full width of the roadway shall be sprinkled with water, when ordered by the Engineer, to alleviate dust and to keep the aggregate material moist as an aid to compaction.

Immediately before the prime coat of asphalt is applied, the roadway surface shall be scuffed and surfaced, dry to medium damp condition, free from irregularities and material segregation, and true to line, grade, and cross section.

In the event the compacted aggregates are of such gradation as to resist compaction of the asphalt, the Contractor shall loosen no more than the upper 1/2 inch of surface and relay without compaction immediately before the prime coat application. Following the application of aggregate on the prime coat, rolling shall be performed as specified above.

5-06.XX(3) PRIME COAT TREATMENT (New Section)

Unless otherwise specified, a prime coat treatment of asphalt per Section 5-06.XX for existing green, crushed rock, or all wet streets shall be required prior to being paved with asphalt concrete.

The prime coat shall be applied over the full length of the project, and asphalt concrete pavement shall not be placed until the prime coat has cured for a full 3 days.

The Contractor shall maintain the completed prime coat by blading or brooming until the asphalt concrete is placed. Should any holes, breaks, or irregularities develop in the roadway surface after the prime coat has been applied, a second prime coat shall be applied in accordance with Section 5-06.XX immediately in advance of placing the asphalt concrete pavement.

Immediately prior to tacking and placing the asphalt concrete pavement, the surface of the prime coat shall be kept clean of all dirt, dust, and other foreign matter.

In areas used as turnarounds or which will receive heavy service, the Engineer may order a change in the subgrade elevation to provide a greater depth of pavement.

The Contractor shall prepare unrestricted shoulders and traffic islands by blading and compaction to provide a smooth base for paving. The prime coat treatment shall be applied and the asphalt concrete pavement shall be constructed on the prepared subgrade after tacking per Section 5-06.XX(3)A.

When prime coat treatment is not required, the Contractor shall prepare the optimum subgrade as specified above except for the prime coat of asphalt and aggregate. The asphalt concrete pavement shall be constructed on the prepared subgrade and tacked per Section 5-06.XX(3)A.

5-06.XX(3)X CRACK SEALING

Item X is revised to read:

The sealant material shall conform to the requirements of Section 5-04.10 and shall be applied in accordance with the manufacturer's recommendations. The Contractor shall furnish the Engineer with a copy of these recommendations.

The cracks shall be completely dry before being filled with the rubberized asphalt. Pilling shall be controlled to confine the material within the crack or joint. Any overflow shall be cleaned from the pavement surface and will be deducted from payment.

5-06.XX(3)Y SOIL REINFORCEMENT

Delete paragraph 3 and replace with the following:

Prior to installing asphalt driveway or median, the driveway and median subgrade shall be treated with one application of an approved soil reinforced base. The soil reinforced base to be used shall be put down in at least 1/4 inch thickness on the asphalt concrete. Application of the reinforcement shall be by a uniform spray in accordance with the manufacturer's recommendations. Paving shall begin within 24 hours after application of the reinforcement. Areas not paved within that time limit or that have been raised shall be retreated at the Contractor's expense.

The Section number in the last paragraph shall be revised to read, "Section 5-06.XX(3)Xa.

5-04.XX(3)Y HEATING OF ASPHALT MATERIAL

Supplement this section with the following:

The asphalt shall be heated between 250 and 350 degrees Fahrenheit, the temperature within this range will be determined by the Engineer.

5-04.XXX(3)A MIX DESIGN

Delete paragraph 3 and replace with the following:

The Contractor shall submit the Engineer's approval prior to changing the source of asphalt cement during the production of asphalt concrete. Blending of asphalt from different sources will not be permitted.

5-04.XXX(3)B SPREADING AND FINISHING

Delete paragraph 1 and replace with the following 9 paragraphs:

Crushed surfacing shall be placed under asphalt concrete pavement per Section 5-04.XXX(3). If asphalt concrete, pavement in all street areas shall be Asphalt Concrete Class 8 to a compacted thickness of 2 inches, installed in 2 equal lifts.

The asphalt concrete pavement shall be constructed in one course or multiple courses of equal depth. Courses shall not exceed the nominal compacted depth specified below for the particular class of asphalt concrete being used:

<table>
<thead>
<tr>
<th>Asphalt Concrete Class</th>
<th>Nominal Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 3</td>
<td>0.25 foot (1 inch)</td>
</tr>
<tr>
<td>Class 4</td>
<td>0.30 foot (1.5 inches)</td>
</tr>
<tr>
<td>Class 5</td>
<td>0.35 foot (1.8 inches)</td>
</tr>
<tr>
<td>Class 6</td>
<td>0.40 foot (2 inches)</td>
</tr>
</tbody>
</table>

Where the compacted depth of any asphalt concrete pavement exceeds the depth specified above for the particular class of mixture, the course shall be constructed in two or more equal layers.

When more than 1 course is necessary to meet the final paving grade, the first course shall include any widening of the existing roadway and profiling of the existing pavement surface. The profiling course or courses shall be constructed so that the final wearing course will have a uniform compacted depth and will conform to the finished grade and cross section elevations specified.
5-06 ASAHLT CONCRETE PAVEMENT

The final wearing course placed after a roadway surface has been placed, or placed and pre-graded shall be constructed to a vertical compacted depth of 2 inches. Where meter-matching has preceded placement of the final lift, the vertical compacted depth of the final wearing course shall be 1 inch minimum.

Construction of 1 course upon another shall not proceed until the underlying course has completely cooled and set.

Unless otherwise directed by the Engineer, the construction of each course of asphalt concrete pavement shall commence at the point furthest away from the existing plant and progress toward the plant so that no hauling will be done over freshly placed pavement.

Any wearing course or other pre-graded course to be used for the driving surface will be evaluated by the Engineer to determine whether a fog seal is required. When the results of nuclear density gauge testing show that a seal is needed, or when the surface course in asphalt concrete class B, the Contractor shall apply a fog seal of 0.1% at the rate 0.05 to 0.10 (0.05 to 0.10 percent) square yard. Unless otherwise approved by the Engineer, fog seal shall be applied prior to opening the roadway surface to traffic.

Delete the third paragraph.

5-06.3(10) UTILITY APPEARANCES (New Section)

Utility appearances such as ditches, manhole covers and valve boxes shall be adjusted to finished grade prior to the construction of the final wearing course.

5-06.3(11) JUNKS

Delete this section and replace with the following:

For asphalt concrete Classes B, E, and F, where paving is in the traffic lanes and the specified compacted course thickness is greater than 0.10 inch, the acceptable level of pollution shall be 90 percent of the maximum density as determined by SDD/200 Best Method test. The level of pollution shall be determined at the average of 50 less than 1 nuclear density gauge runs taken after completion of the finishing rolling at randomly selected locations within each lift. The quantity represented by each lift shall be the total of the single day's production or approximately 600 tons, whichever is less. Control limits not meeting the prescribed stadium density standard shall be removed and replaced with satisfactory material. At the option of the Engineer, non-complying material may be accepted at a reduced price.

Grates may be used as an alternate to the nuclear density gauge tests and shall be taken within 48 hours of the placement of the mix. When cores are taken by the Engineer at the request of the Contractor, the grate shall be reimbursed for the coring expenses at the rate of $50.00 per core.

Asphalt concrete Classes B, E, and F constructed under conditions other than listed above shall be compacted on the basis of a test point evaluation of the compaction train. The test point evaluation shall be performed in accordance with instructions from the Engineer. The number of passes of the approved compaction train as required to meet the maximum test point density shall be used on all subsequent paving.

Asphalt concrete Class D and pre-graded mix shall be compacted to the satisfaction of the Engineer. In addition to the randomly selected locations for tests of the control lift, the Engineer reserves the right to test any area which appears defective and to require the further compaction of areas that fail below acceptable density readings.

5-06.3(12) JUNKS

Delete this section and replace with the following two sub-sections:

5-06.3(12)(A) LONGITUDINAL AND TRANSVERSE JUNKS (New Section)

The placing of the top or wearing course shall be as nearly continuous as possible, and the roller shall pass over the unprotected end of the freshly laid section only when the laying of the course is discontinued for such length of time as to permit the mixture to become chilled. When the work is resumed, the previously compacted mixture shall be cut back to produce a slightly beveled edge for the full thickness of the course.

Where a transverse joint is being made in the wearing course, strips of heavy wrapping paper shall be used. The wrapping paper shall be removed and the joint trimmed to a slightly beveled edge for the full thickness of the course prior to resumption of paving.

The material which is cut away shall be wasted and new mix shall be laid against the fresh cut. Rollers or tamper cross shall be used to seal the joint.

The longitudinal joint in any one layer shall be offset from the face of the course immediately below by not more than 6 inches nor less than 2 inches. All longitudinal joints constructed in the top layer shall be at a line or edge line of the traveled way. However, on one lane ramps which must remain open to traffic, a longitudinal joint may be constructed at the center of the lane subject to approval by the Engineer.

Immediately following the completion of the top wearing course, neat line joints where the new asphalt concrete course meets existing asphalt concrete pavement, Portland cement concrete pavement, all sets, concrete curb and gutter, etc., shall be sealed with 80-90 asphalt per Section 5-06.3(11)E.

5-06.3(12)(B) CONNECTIONS WITH EXISTING FACILITIES (New Section)

Where construction of new asphalt concrete pavement connects with an existing roadway surface, driveway, bridge, railway crossing, or other facility, the Contractor shall provide a smooth gradual transition between the new and existing surfaces. Such work may require the modification of the existing roadway profiles by grading, parging, striping, etc. to achieve the desired smooth riding transition or may require other adjustment of the connecting surface.

Where butt joints are required at the meet lines of new construction and existing surfaces, the existing surding pavement shall be trimmed by chiseling, parging, milling or other method as may be approved in order to insure a minimum depth of 2 inches of compacted asphalt concrete at the point of connection. Butt lines shall be trimmed square and the edges vertical. Waste material resulting from such trimming or chiseling shall be disposed of by the Contractor. Butt joints will be required only at locations designated on the drawings. Unless the existing roadway profile requires modification by grading, all other connections shall be made by trimming or feathering to provide the necessary smooth riding connection.

Where the transition is to be made by cutting or feathering, it shall be accomplished at the time the final wearing course is placed. Such work shall be constructed by taking out the overlaid aggregates of the asphalt concrete mix being used. The Contractor shall not leave the asphalt open graded when feathering and trimming down to an existing surface. If approved by the Engineer, chiseling and feathering may be accomplished at a later date. In such cases, asphalt concrete Class E shall be used.

Surfaces which will be in contact with the new asphalt shall be tackled in accordance with the requirements of Section 5-06.3(34).

Next lifts shall be sealed while the new asphalt concrete is still warm by painting with Special Back Coat (50%-5) asphalt and immediately covering the asphalt paint strip with close, dry paving sand meeting the requirements of Section 5-06.3(34).

5-06.3(13) SURFACE SMOOTHNESS

Delete the last paragraph and replace with the following:

Coatings, such as texturizers, manholes, valve chambers, water boxes, manhole covers, etc., shall be adjusted to finish grade prior to construction of the final wearing course.

5-06.3(14) PLANNING APPEARANCE PAVEMENT

Delete this section. Refer to Section 5-06.3(12).

5-06.3(15) REFERENCE PLANNING

Delete this section. Refer to Sections 5-06.3(15)A2 and 5-06.3(15)A3.
5-04.3(14) OLD PLANNING
Delete this section. Refer to Section 5-04.3(3)(E).

5-04.3(15) ASPHALT CONCRETE DRIVEWAYS
Delete this section and replace with the following:

Asphalt driveways shall be constructed at the locations shown on the Drawings or as directed by the Engineer in accordance with Section 5-04.

Unless otherwise shown on the Drawings, the Contractor shall complete the necessary earthwork and provide a 4 inch compacted asphalt concrete, Class B and 4 inch mineral aggregate, Type I driveway section to the limits shown on the Drawings or designated by the Engineer.

The subgrade shall be treated with a soil residual herbicide in accordance with requirements of Section 5-04.3(3)(E).

5-04.3(17) PAYING ENTER TRAFFIC
Delete this section and replace with the following:

When the roadway being paved is open to traffic the following requirements shall apply:

The Contractor shall ensure that all intersections are opened to traffic at all times except when paving through the intersection. EachClosure shall be kept to the minimum time required to place and compact the mixture and shall include advance warning of the intersection closure. Work shall be scheduled so that continuous intersections shall not be closed at the same time. No hot patching of asphalt concrete shall be allowed in the area of an intersection under construction.

No adjacent section of asphalt shall be placed asphalt until approval has been obtained from the Engineer. The installation of advance warning signs, decoys, and the maintenance of traffic shall be as specified in Section 5-07.18 and the Traffic Control Manual for Road Work.

During paving operations, center line stripes shall be established throughout the project by applying temporary pavement marking tape each day to the roadway that was paved that day. Temporary centerline striping shall consist of placing strips of pressure-sensitive pavement marking tape of 1/24 inch intervals along the centerline. Temporary marker tape shall be placed in sets of two 12-inch strips on 2 inch centers. These strips shall be centered on the center line with each set of markers placed in the same linear section of the roadway. Additional temporary centerline striping shall be installed wherever designated by the Engineer.

Temporary stop bars shall consist of a 12-inch wide stop bar made up of three parallel, 4-inch strips of temporary pavement marking tape placed at locations designated by the Engineer. All other temporary pavement markings utilizing pavement marking tape shall be designated by the Engineer.

Pressure-sensitive pavement marking tape used on the wearing course prior to installation of permanent line markers, traffic markings, or permanent paint striping shall be removed from the temporary pavement markings. The removal of the temporary pavement markings shall be made by the Contractor's responsibility. The Engineer will do the layout for permanent line markings as specified in Section 8-22(1).

Temporary pavement marking tape shall meet the requirements of Section 9-29.4.

Within five days, weather permitting, after the preliminary layout of permanent pavement marking paint has been completed by the Engineer, the Contractor shall install all permanent pavement markings. Installation shall be performed vigorously thereafter until all permanent pavement markings and traffic channelization work is complete.

5-04.3(19) SEALING OF DRIVING SURFACES
Delete the last sentence of the paragraph.

5-04.3(21) SHOULDER (New Section)

Shoulders, if required, shall be constructed to the line, grade, and cross-sections specified. Material for building up shoulders shall be mineral aggregate, Type I manufactured from crushed bridge rock.

5-04.3(22) ASPHALT CONCRETE SHOULDER (New Section)

Shoulder shall be constructed with a 4 inch section of compacted crushed rock and 2 inches of compacted Class 8 asphalt concrete. The subgrade shall be treated with a soil residual herbicide in accordance with the Requirements of Section 5-04.3(3)(E).

5-04.4 MEASUREMENT
Delete this section and replace with the following:

Measurements for asphalt concrete pavement shall be based on the actual quantity incorporated into the work as determined by the material load tickets received and approved by the Engineer on the day the material was delivered and incorporated into the work. Determinations will be made for any asphalt material included in the measurement that is not incorporated in the work on the day delivered.

The Engineer reserves the right to make random checks at independent weigh stations of the gross and tare weights of transport equipment hauling asphalt concrete material to the job site. In the event the gross weight is higher than the tare weight, the Contractor shall, at the Engineer's option, either utilize a certified scale on the Engineer's sites, or have the asphalt concrete material reweighed at the Engineer's option. In the event the tare weight is higher than the gross weight, the Contractor shall, at the Engineer's option, either utilize a certified scale on the Engineer's sites, or have the asphalt concrete material reweighed at the Engineer's option. All additional loadings, as determined by the Engineer, shall be paid for at the same rate as the average rate for the loadings previously weighed and recorded. Should the random check indicate that the Contractor's scale were overweighting (indicating more than true weight) by more than 1 percent of the小于测量的总重量, then all materials received subsequent to the last previous random check shall be paid by the percentage error in excess of the 1 percent.

"Roadway Preparation" will be measured by the linear feet once along the centerline of the main roadway being prepared. All related intersections, side street approaches, and irregular shaped areas thereto of which the roadway width measurement shall be to the nearest whole linear foot.

Measurements for "Surface Preparation, Place, and Closure Pavement" will be done by the square yard and shall be based on the average depth, minus the base of the Drawings plus any additional depth up to a 4 inch, to cover removal of high spots and the extra depth required to provide a 4 inch reveal along the curb line as required by Section 5-20.3(2). Should the Drawings indicate the Engineer order to be placed in excess of 4 inches, the square yard of surface placed shall be increased by the actual area of surface placed in excess of 4 inches. If the Engineer directs an additional planting beyond the depth required above, the total quantity of placed surface will be increased to include area planted. The Engineer will determine depth of planting during each planting operation.

Measurements for "Surface Preparation, Paved" will be done by the ton of asphalt concrete placed for paving surface based on the actual quantity incorporated into the work as determined by the material load tickets received and approved by the Engineer on the day the material was delivered and placed.
5-04 - ASPHALT CONCRETE PAYMENT

Measurement for "Surface Preparation, Heater-Scarrify" will be by the square yard of area actually heater-scarrified to a minimum depth of 5/6 inch.
Measurement for "Plasticizing Rejuvenator" will be by gallon. Measurement of quantities will be based upon the actual quantities incorporated into the work.
Measurement for "Crack Sealing" will be by linear feet.

5-04.5 PAYMENT

Delete this section and replace with the following:

Payment will be made for each of the following bid items as are included on the Bid Form:

1. "Pavement, Asphalt Concrete (Class A)" per ton.
5. "Surface Preparation, Heater Scarrify" per square yard.
6. "Plasticizing Rejuvenator" per gallon.

The unit contract price for "Pavement, Asphalt Concrete (Class A)" shall include all costs for the work required to furnish, haul, place and compact the asphalt concrete mix as specified in Section 5-04, including asphalt for tack coat, fog seal and sealing joints and most lines, and all costs for joints and sets lines, paving and other preliminary surface preparation, and all other work as may be necessary according to this section and not otherwise set forth as a separate bid item on the Bid Form.

Asphalt concrete driveways, sidewalks, curbs, and shoulders will be paid for as "Pavement, Asphalt Concrete (Class A)," which will include costs for all residual herbicides.

MC 205 use for temporary asphalt skin shall be measured and paid in accordance with Section 5-07.

If the Engineer orders a change in grade of paving asphalt, any additional compensation will be limited to the actual additional cost of the asphalt based on invoices from the supplier. If the cost of the substituted paving asphalt is lower, the difference in the cost and contract of the original material specified, based on invoices from the supplier, shall be deducted from moneys due the Contractor.

The unit contract price for "Roadway Preparation" shall include all costs for the work required to prepare the unstabilized roadway, including scarifying, blading, shoring, and compacting to remove irregularities and secure a uniform surface, and each other work as specified in Section 5-04.29.0, except those costs not treatment which shall be paid per Section 5-25.

The unit contract price for "Surface Preparation, Prolevel" shall include all costs for the work required to prolevel, smooth or broken surfaces by placing asphalt, by spot paving or other work as specified in Section 5-04.29.0, herein.

The unit contract price for "Surface Preparation, Plane Transverse Pavement" shall include all costs for the work required to prepare the surface as specified herein including milling and paving, removing or replacing existing surfacing, removing and disposing of cuttings, extra paving for best joints, and feathering out areas in preparation for an asphalt overlay of either leveling course or wearing course.

The unit contract price for "Surface Preparation, Heater Scarrify" shall include all costs for the work required to heat, scarify, course, mix, redistribute, level and compact to a minimum depth of 5/6 inch of an existing transverse surface as specified herein.

All costs for preliminary surface preparation work on treated surfaces as described in Section 5-04.29.0 shall be considered incidental to the paving work.

The lump sum contract price for "Crack Sealing" shall include all costs for the work required to clean and fill the cracks and joints as specified in Section 5-04.29.0.
SECTION 5-06 CEMENT CONCRETE PAVEMENT - CITY OF SEATTLE (New Section)

5-06.1 DESCRIPTION (New Section)

The work shall consist of the construction of portland cement concrete pavements in streets and alleys, and curb and storm drain structures at locations shown on the drawings.

5-06.2 MATERIALS (New Section)

Materials shall meet the requirements of the following sections of this specification:

- Portland Cement
- Fine Aggregate
- Coarse Aggregate
- Water
- Air-entraining admixtures
- Joint Sealants
- Glimmer Materials and Additives

The concrete mix for street pavement and alleys shall be Class 6 (1-1/2), unless otherwise specified in the drawings or the Special Provision.

5-06.2(1) CONCRETE MIXING INTEGRATED PLANT (New Section)

Concrete mixes incorporating fly ash may be utilized for all classes of concrete, unless otherwise noted in the Special Provision. Mix proportions will be subject to approval by the Engineer and shall be in compliance with Section 9-20.9.

5-06.3 CONSTRUCTION DETAILS (New Section)

5-06.3(1) PROPORTIONING MATERIALS (New Section)

The class of concrete for non-structural use refers to the nominal number of sacks of cement per cubic yard, although this designation does not constitute a guarantee of yield. The figures in parentheses indicate maximum aggregate size. Example: (2) 5 (1-1/2) in a 5 sack mix with 1-1/2 inch maximum size coarse aggregate.

H.E.S. indicates high-early-strength cement and may be required by the Engineer for any of the classes of mix.

With approval of the Engineer, the Contractor may use high-early-strength cement in any of the mixes.

Air-entrained concrete shall be used, unless otherwise provided for in the Special Provision.

The volume of air in freshly mixed concrete shall conform to that specified in the table which follows:

<table>
<thead>
<tr>
<th>ACI CONTENT OF FREELY MIXED CONCRETE</th>
<th>Air Content Percent by Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2, 2 and 3</td>
<td>5 + 1</td>
</tr>
<tr>
<td>3/4 and 1</td>
<td>6 + 1</td>
</tr>
<tr>
<td>3/8 and 1/2</td>
<td>7+1/2</td>
</tr>
</tbody>
</table>

If the measured air content is found above or below the values contained in the table, the Contractor shall immediately make changes in mixing or materials as will be necessary to comply with the requirements for air content.

Fine and coarse aggregates shall be proportioned by weight, except that if the project is small, volumetric proportioning may be used with permission of the Engineer. In proportioning, the unit of measure for cement will be by the 94 pound sack.

5-06.3(2) CONSISTENCY (SLUMP REQUIREMENTS) (New Section)

Slump shall be measured in accordance with ASTM C143 "Method of Test for Slump of Portland Cement Concrete". A water/cement ratio mix shall not produce a concrete slump of more than 2 inches. Where additional workability is required due to weather conditions or other variables, the Contractor may add, at approval of the Engineer, a water reducing agent to increase the slump up to 3-1/2 inches. The Engineer has the authority to reject any concrete mix with a slump greater than 3-1/2 inches.

5-06.3(3) EQUIPMENT (New Section)

Equipped shall conform to the requirements of Section 5-05.3(3) with the following exceptions: The requirements of items (e) "Finishing Equipment" shall not apply.

5-06.3(4) HANDLING, MEASURING AND BATCHING MATERIALS (New Section)

Handling, measuring, and batching materials shall conform to the requirement of Section 5-05.3(4).

5-06.3(5) MIXING CONCRETE (New Section)

Mixing concrete shall conform to the requirements of Section 5-05.3(5).

5-06.3(5A) LIMITATIONS OF MIXING (New Section)

Limitations of mixing shall conform to the requirements of Section 5-05.3(5A).

5-06.3(6) SUBGRADE (New Section)

Subgrade shall conform to the requirements of Section 2-06 with the following exception:
(a) The subgrade may be trimmed by equipment other than automatically controlled machine using reference lines.

After the forms have been securely set to grade and alignment, the subgrade between the forms shall be brought to true cross section by dropping a subgrade template as many times as may be necessary to assure a true subgrade. The trimmed subgrade shall be brought to an unyielding surface by rolling with compacting units meeting the requirements in Section 5-06.

Where thickened edges for pavements are required, such as shown on the Standard Plans, the subgrade shall be excavated and shaped to provide for the section shown.

Where possible, vehicles shall be kept off the finished subgrade. If vehicles must travel on the irregularities in the subgrade caused by any equipment during the placement of concrete shall be smoothed out and compacted immediately ahead of placing the concrete.

No concrete shall be placed until the subgrade is approved by the Engineer. The subgrade as finally completed and approved shall be maintained by the Contractor at an optimum moisture content by setting with water until the concrete is actually placed.

5-06.3(7) FORMS (New Section)

Forms shall be and specified in Section 5-06.3(21) and in addition shall meet the following requirements:

Forms may be of wood or metal or any other material at the option of the Contractor, provided the forms as constructed result in a pavement of specified thickness, cross section, grade, and alignment as shown on the Drawings.

Forms shall be adequately supported to prevent deflection or movement and which will result in concrete pavement conforming with the Drawings and Specifications. The rise of the forms shall not exceed more than 1/8 inch in 10 feet and the slope of the forms shall not exceed 1%.

The forms may be removed the day after pouring if the concrete is sufficiently set to withstand removal without danger of cracking or spalling. The forms are removed before the application of the curing period, the edge of the concrete shall be protected with moist earth or sprayed with curing compound. All forms shall be cleaned, oiled and removed for re-use before they are used again.

5-06.3(8) PLACING AND SPREADING CONCRETE (New Section)

The concrete shall be placed upon the prepared subgrade or base between the forms to the required depth and cross section in a continuous operation between construction or expansion joints.

The concrete shall be thoroughly consolidated by mechanical vibration. Complete consolidation is required along all forms or adjoining pavements by such means as will prevent gravel pockets along the edges of the finished pavement. Any gravel pockets found after removing the forms shall be repaired by the Contractor.

When integral curb is being constructed with the pavement, fresh concrete for the integral curb shall be placed at such time as will enable the top section of the curb to be consolidated, finished, and bonded to the pavement slab while the concrete is plastic.

When curb is required, and such curb is not being placed integrally with the pavement slab, dovetail shall be placed in the pavement slab as detailed on the Standard Plans, or as specified in Section 8-06.

Prior to placing concrete around symbols, catch basins, valve chambers, etc., a temporary cover forming below the rim of the ring casting shall be provided to prevent the concrete from flowing into these openings.

5-06.3(9) PLACING CONCRETE AT THROUGH JOINTS (New Section)

Concrete placement around through joints shall be such that the through joint assembly will not be damaged and that it will remain in a straight line perpendicular to the subgrade, as shown on the Standard Plans. The concrete shall then be vibrated along the entire length of the Joint to consolidate the concrete and breathoioke to knock pieces anywhere at the joint. If any rock pockets are exposed, they shall be repaired.

5-06.3(10) PLACING CONCRETE WITH REINFORCING STEEL OR WIRE MESH (New Section)

Concrete shall be placed in two courses. The first course shall be struck off at the elevation established for reinforcing steel bar or wire mesh, immediately prior to placing the reinforcement. The concrete shall be brought to a fairly even surface by means of a template conforming to the depth of the reinforcement. Reinforcement shall be placed on the bottom course before the concrete attains the required strength. No concrete shall be placed in more than 45 minutes shall elapse between placing of the first course and placement of the second course.

Reinforcement shall be free of dirt, soil, scale, old, grout, or other foreign material that may impair bond. Steel, coated with rust, may be used if the rust is not deep or loose coated. Successive parts of steel or wire mesh shall be securely lapped together and tied so that longitudinal bars will lap 40 diameters and wire mesh will lap 6 to 12 inches.

Reinforcement shall be laid as a continuous mat. Continuity shall be maintained between expansion joints. Steel shall terminate within four inches of the joint.

Concrete may be placed in one lift, provided a method acceptable to the Engineer is used to position and secure the reinforcement at the designated location in the slab.

If the concrete is placed in two courses where reinforcement is used, all dirt, sand, or dust which collects on the base course shall be removed before the top course is placed.

5-06.3(11) SLIP FORM CONSTRUCTION (New Section)

At the option of the Contractor and with the approval of the Engineer, concrete pavement may be constructed by the use of slip-form paving equipment.

Slip-form paving equipment shall be provided with traveling side forms of sufficient dimensions, shape, and strength to support the concrete laterally for a sufficient period of time during placement to produce pavement of the required cross sections and the pavement shall spread, consolidate, smooth, and float-finish the freshly placed concrete in such a manner as to provide a dense and homogeneous pavement.

The concrete shall be distributed uniformly into final position by the slip-form paver and the horizontal deviation in alignment of the edges shall not exceed the 1/2 inch from the alignment established by the Engineer.

Regardless of the method or machinery used to construct pavement, depressed curb for driveways and ramps shall be provided at those locations indicated on the Drawings or as required by the Engineer. When a slip-form paving machine is used for pavement construction, the Contractor shall block out the pavement areas beneath areas where depressed curb is to be constructed. Such block out pavement areas, together with the depressed curb sections, shall then be constructed concurrently with the concrete concrete form making the depressed curb.

When concrete is being placed adjacent to an existing pavement, that part of the equipment which is adjacent to the existing pavement, shall be equipped with protective gait or rubberized wheels and shall be equipped to run a sufficient distance from the edge of the pavement to avoid breaking or cracking the pavement edge.

After the concrete has been given a preliminary finish by the finishing devices in the slip-form paving equipment, the surface of the fresh concrete shall be checked with a straightedge to comply with the tolerances and finish specified in Section 5-06.3(12).

5-06.3(12) COMPACTING CONCRETE (New Section)

All concrete pavement shall be vibrated. Vibration shall be by:

(a) Internal vibration, or
(b) machine compaction.

59
5-06.350A INTERNAL VIBRATION (New Section)
Internal vibration shall be performed in accordance with Section 5-06.350B.

5-06.350B MACHINE COMPACTING (New Section)
The machine used for compacting shall be self-propelled and designed to run on the side forms. Moveable parts shall be capable of adjustment and they shall be adjusted so as to produce accurately the required sections shown on the drawings. The machine shall be equipped with two reciprocating scoops. The type of the forms shall be kept clean with a suitable device attached to the machine.

The travel of the machine on the forms shall be maintained true without lift, wobble or other variations which might prevent a precise strike off.

The machine shall be put in forward motion as soon as concrete is deposited on the subgrade. In the first pass, a half of the concrete shall be carried ahead of the machine. Screeds and tampers shall be used to remove any surface segregation of the concrete.

Machines shall be operated prior to placing longitudinal and transverse dummy joints.

Machines shall be operated at least twice and as many more times as may be necessary to compact concrete free from rock pockets, and to a section that can be finished properly.

Care must be exercised not to overcompact the concrete and bring an excess of mortar to the surface. The concrete vibration shall be conducted to the satisfaction of the engineer being capable of consolidating the concrete across the full width of the pavement into a homogeneous mass, free of rock pockets, and without separation of mortar and aggregate.

The equipment shall consist of the machine described in Section 5-06.350B, MACHINE COMPACTING, or an approved spreading machine to which is attached a vibrating unit composed of individual internal vibration units not more than 30 inches apart. The units shall be spaced equidistantly and parallel to the forms. All the forms shall be compacted simultaneously, and the vibrating unit shall be operated adjacent to the forms. The vibrating unit shall be self-propelled. The concrete shall consist of the previously designated equipment, and shall be laid in a manner which will permit adjustment of both the depth of penetration into the concrete and the angle of the vibrator with the horizontal.

The entire vibrating unit shall allow raising the vibrator tips completely clear of the concrete surface. The vibrators shall be capable of vibrating at rates between 4,000 and 8,000 impulses per minute when inserted in the concrete. All vibrators shall be synchronized to vibrate at a frequency specified by the Engineer, within the limits established.

On the first trip over the freshly placed concrete the vibration equipment shall be submerged in the concrete to ensure adequate consolidation. Unless otherwise directed by the Engineer, the vibration equipment shall be operated on the first pass only. The vibration equipment shall not be operated when the machine is not in motion except when vibrating near an expansion joint.

After the first pass with vibration, one or more trips without vibration shall be made as described in Section 5-06.350B MACHINE COMPACTING.

5-06.350C VIBRATING SCREED CONCRETE PAVEMENT CONSTRUCTION (New Section)
The type of vibrating screed which the Contractor proposes to use, whether roller or beam, shall be subject to approval by the Engineer. Upon request by the Engineer a test section of pavement shall be placed for the purpose of demonstrating the capabilities of the screed to satisfactorily compact and strike off the concrete to the established grade and section.

Concrete shall be uniformly distributed between the forms and it shall then be compacted and struck off to the level of the top of the forms by means of the vibrating screed. Supplemental compaction by mechanical vibration of the concrete adjacent to the forms will be required if the concrete cannot otherwise be adequately compacted.

The vibrating screed shall be operated over the freshly placed concrete in successive passes only a sufficient number of times to obtain satisfactory compaction. Over-vibration of the concrete, resulting in an amount of mortar at the surface of the pavement, will not be permitted.

After the final passes of the vibrating screed, the surface of the concrete shall be made suitable for concrete grade and cross section and shall be sufficiently smooth as to require only a very moderate amount of hand finishing for smoothness to meet approval of the Engineer.

5-06.350D WATER (New Section)
Water for pavement construction will be furnished as provided in Section 2-07.

5-06.350E JOINTS (New Section)
Transverse and longitudinal joints for street pavement may be contraction joints, construction joints or joints shown on the drawings and as called for in these specifications. When the pavement shall be an existing pavement, the locations of the joints in the new pavement shall coincide with the joints in the existing pavement unless otherwise shown on the drawings or specified in the Special Provisions.

5-06.350F FORCED CONSTRUCTION JOINTS (New Section)
 Forced contraction joints shall be constructed by embedding a 1/8 inch thick phenolic joint material. The depth of the forced joints shall be no less than 1/4 of the pavement thickness. The filler shall be placed in the joint sections of the joint. The length of the premolded joint filler shall extend to within 1/2 of both edges of any panel. Transverse contraction joints (dummy joints) shall be placed after finishing and finishing of concrete have been completed and before initial set. A groove shall be cut into the surface of the location of the transverse contraction joints using a tool provided with steps (see brim) to prevent cutting the groove down into the planned depth of the joint filler. The joint filler shall then be forced into the groove until the top of the joint filler is flush with the pavement surface. The joint filler shall be perpendicular to the surface and always be a straight line. After the joint filler has been placed in the concrete, the surface of the pavement shall be finished against the joint filler strip with hand tools to restore the surface finish. While performing this operation, the filler strip must be maintained in a perpendicular position, true to alignment. After finishing the entire area the joint shall be true to grade and smoothness without any irregularities.

5-06.350G BASED CONSTRUCTION JOINTS (New Section)
 Based contraction joints shall be placed after the concrete has hardened to a strength to prevent cracking due to drying shrinkage and to provide for a predetermined crack. Once a predetermined crack has been set, the crack shall then be used as an expansion joint. Based contraction joints shall not be made in a maximum of 60 foot intervals or at any location as directed by the Engineer, as soon as the cut can be made without undue cracking of concrete. Intermediate joints shall be spaced therefrom.

Based longitudinal joints in general are not critical as to a specific time schedule after burning of the concrete and may be delayed until favorable conditions before an incident of longitudinal random cracking begins. The Engineer shall direct the time schedule for making contraction joints.

Any scheduling for the making of joints that results in premature or uncontrolled cracking shall be noted immediately, under direction of the Engineer, by adjusting the time interval between placing of concrete and making of contraction joints. After the schedule has been approved, the jointing shall proceed as a continuous operation day and night until all joints have been completed.

Too or more using units may be required to accomplish the jointing in order to achieve random cracking. Preliminary equipment shall be on the job to ensure continuous jointing as specified regardless of any breakdown of equipment.

When cure water is used, the area disturbed by Jointing of joints shall be reprimed immediately upon completion of the opening operation and care shall be exercised to prevent the curing compound from mixing with the concrete.
gating into the groove. Joint sealing compound shall not adhere to concrete if curing compound is present.

The depth of grade longitudinal or transverse contraction joints shall be a minimum of 1/3 of the pavement thickness.

The concrete saw shall be powered adequately to perform the required cutting. It shall cut to the required depth and not less than 1/8 inch nor more than 1/4 inch in width. The contractor shall be expected to so arrange his schedule of sawing joints, including initial sawing, in such a manner as to prevent any possible effort to make control cracking by the use of judiciously spaced and closed sawed joints, as the most practical means of accomplishing the required results. The saws shall be used only after all other topping materials have been removed from the surface to be cut and all water removed. The concrete shall be removed in such a manner as to leave a smooth surface for sawing. The contractor shall provide artificial lighting facilities for night sawing. All equipment required for sawing shall be on the job prior to and continuously during concrete placement or formed, transverse contraction joints must be constructed every 40 feet. Sealing equipment shall be available immediately and continuously upon call by the Engineer on a 24-hour basis, including Saturdays, Sundays and other legal holidays.

After the curing period, sawed joints shall be cleaned and sealed with joint sealants meeting the requirements of Section 5-06.2(1). Excess sealing materials shall be brushed off the surface of the pavement before opening to traffic. Sealing shall be carried out Section 5-06.3(3).

5-06.3(1) THROUGH JOINTS (New Section)

Through (expansion) joints are placed only where shown on the drawings or where directed by the Engineer. The joint alignment must be at right angles to the pavement center line unless otherwise specified.

Longitudinal through joints shall be placed where shown on the drawings or where required for concrete pavement between or along retaining walls, curbs or other structures.

Through joints shall be constructed with presold material, 1/2 inch in thickness and conforming to Section 5-06.1(2). They shall extend from 1 inch below the subgrade to 1 inch below the top of the pavement. Transverse through joints shall extend the full width of pavement poured.

The joint material shall be held accurately in place during the placing and finishing of the concrete by a bullhead, a bolster or any other approved method. The joint material shall be removed from the hardened concrete in place long enough to prevent segregating of the material, especially on streets having steep grades.

In multiple lane construction, the joints shall be covered so as to form a continuous alignment over all lanes.

Through joints shall extend continuously through all curbs, special uses being exercised to preserve alignment perpendicular to the pavement in the curb section.

A wood filler strip or wood cap shall be placed on the top of the presold joint filler to form the groove. The filler strip, and the final concrete must be sufficiently set to resist separating in the groove material. The joint filler must be staked together at the sides to preserve continuity.

Immediately after removal of side forms, the edges of the pavement shall be carefully inspected and wherever the joint filler is not fully exposed, the concrete should be chipped down until the edge of the filler is fully exposed for the final depth.

5-06.3(1) SEALING THROUGH JOINTS (New Section)

After the pavement is cured, and before any traffic, the space left by the removal of the wood filler strip or wood cap shall be properly closed. The top of the presold joint filler strip shall be thoroughly closed at all loose material. The groove 3/4 inch wide shall be completely free of any projecting concrete from the sides and the groove shall be continuous across the slab to slab joint. The groove shall be sealed with the pavement surface with joint sealant meeting the requirements of Sections 5-06.2(1).

The joint sealant material shall be heated and placed in complete accord with the manufacturer’s instructions. Surplus material will be rejected. The joint groove shall be dry at the time of pouring the sealing compound. An additional payment will be made for the sealing filler or its application and the cost, thereof shall be included in the unit contract price per square yard for Portland Concrete pavement of the required class and thickness.

5-06.3(1) CONSTRUCTION JOINTS (New Section)

Longitudinal construction joints shall be an shown on the Standard Plans. The Contractor shall install a linear and straight edge for longitudinal construction joints. Themed edge shall not be required for pavement 12 inches thick or greater.

Transverse construction joints formed by placing a header board transversely across the subgrade shall be made at the slab of each joint or at even placing of standard sized concrete to be discontinued for pavement greater than 12 inches thick. Transverse construction joints (or an equivalent joint) shall be left in place until the paving is completed. If the location of the header board is to be a construction joint, then the header shall have fastened to the concrete side a wedge-shaped strip of wood to form a key in the concrete. Thickened edge shall be constructed at the construction joint header to provide ample depth of concrete above and below the header.

Where prefabricated construction joints are used, the joint seals by the construction joint header shall have a 2 inch strip of joint material embedded against the hardened concrete when paving is required. Where sized construction joints are specified, the joint seals shall be held up and sealed, or may have 2 inch strip inserted as specified above for prefabricated construction joints.

5-06.3(1) TRANSVERSE JOINT LOCATION (New Section)

Standard spacing of transversely formed construction joints along straight sections of streets between through expansion joints or between intersections or other irregular areas, shall be at intervals of 15 feet across the full width of the pavement and at right angles to the center line of roadway. Where the spacing between through expansion joints are as much as possible, the length of the spaces between the expansion joints of the same road shall be varied by shortening or lengthening the joints. The last several spaces approaching the expansion joint or header shall be varied by shortening the joints, the last several spaces approaching the expansion joint or header shall be varied by shortening or lengthening the joints. The last several spaces approaching the expansion joint or header shall be varied by lengthening the joints. Between the expansion joints the spacing of 15 feet shall be along the other edge of the pavement and at right angles to the center line.

When pavement adjacent to existing pavement, joints shall be placed to match joint locations in the existing pavement.

For intersections and other irregular areas, the arrangement of contraction joints shall be placed in accordance with standard intersection patterns, or as directed by the Engineer. The area of any no turn irregular pattern formed by contraction joints in intersections shall not exceed 225 square feet and the greatest dimension thereof shall not exceed 15 feet.

When grading a second level adjacent to the previously paved road, the contraction joints shall be matched with the former, except on curbs where the least distance between transverse joints of the resultant pavement would be less than 12-1/2 feet.

Where uncontrolled cracks are existing in the first lane, they shall be matched as nearly as possible in the second lane. Should the uncontrolled cracks in the existing paved lane be too frequent or in track, it shall be practical to catch with a uniform spacing in the second lane, then in that event the two lanes shall be completely separated. The two lanes shall be completely separated.
5-06 CEMENT CONCRETE PAVEMENT - CITY OF SEATTLE (New Section)

5-06.4(11) FINISHING CURB (New Section)

In the event the roadway is divided into two lanes, the construction joints shall be located on the center line of the roadway unless otherwise approved by the Engineer. In separate lane construction, a joint filler 3/16 inch by 3 inches shall be placed between the two lanes when the second lane is constructed.

5-06.4(12) FINISHING CURB (New Section)

The pavement surface shall be finished by hand and machine methods as necessary. On all vertical curvatures at irregular intersections, modified tools shall be provided as necessary to ensure a smooth, uniform contour and surface.

5-06.4(12A) HAND FINISHING (New Section)

After the concrete has been struck off and consolidated, it shall be smoothed by longitudinal floating. Placement shall be by use of successive passes of not more than 1/2 the length of the float. Floating shall continue until all irregularities are removed. Longitudinal floating shall follow contours of the concrete by not less than 20 feet.Free water on the pavement shall be removed with the float or other suitable tool. After floating, the surface shall be swept with a broom not at least 10 feet in length with a long handle for operating at the edge of the pavement. The broom shall be operated in a manner to correct irregularities in the pavement surface and remove water and lumps. Construction joints shall be placed after all floating has been completed in accordance with provisions of Section 5-06.11A Formed Construction Joints.

5-06.4(12B) MACHINE FINISHING (New Section)

The finishing machine shall be of a type approved by the Engineer. The machine shall be adjustable to both crown and plane of the finished pavement surface. The speed shall oscillate longitudinally during its travel transversely across the pavement. It shall be operated in the forward direction so that the speed shall pass over the same section of pavement at least 2 times during its transverse travel.

The finishing machine shall be moved over the pavement as many times as is necessary to give the pavement smooth even textured surface, conforming to the exact cross and cross section specified on the drawings.

The finishing shall not be considered complete until all free water is removed from the surface.

The finishing operations shall be performed at a time and over such lengths of the pavement surface as existing conditions necessitate. All finishing operations are subject to strict control by the Engineer, and shall be performed to his satisfaction.

5-06.4(12X) SURFACE SMOOTHNESS (New Section)

The surface smoothness shall be checked with a straightedge 10 feet long, mounted to a long handle to permit operation from outside the pavement. The straightedge shall be placed on the surface of the pavement parallel to the centerline and at intervals of no more than 3 feet across the full width of the pavement. At the conclusion of the finishing operation, the surface of the pavement shall not vary from a true surface when tested with a 10 foot straightedge, more than 1/6 inch in 10 feet on streets, 1/4 inch in 10 feet on residential streets, 3/8 inch in 10 feet in alleys, and 1/2 inch in 10 feet in concrete bases.

The transverse slope of the finished pavement shall be uniform to a degree such that no variation greater than 1/4 inch in 10 feet is present when tested with a 10 foot straight edge laid in a direction perpendicular to the center line.

5-06.4(12X) SURFACE SMOOTHNESS (New Section)

Regardless of the curing method used, as described herein, the Contractor shall maintain such curing protection and shall protect the pavement from access by animals, rapid temperature changes, rain, water, mechanical injury or any other cause for at least the minimum curing time stated, exclusive of the day the concrete is placed, or for a greater length of time, as designated by the Engineer.

5-06.3(12X) CURING PERIOD (New Section)

When the curb section is to be placed separately, the surface of the pavement directly underneath the curb section shall be covered with a protective cover to protect that area from the curing agent when the pavement is sprayed.
5-06.

GREAT CONCRETE PAINTING – CITY OF SEATTLE (New Section)

Portland cement
Highway-strength cement
3 days
3 days

5-06.3(13)(B) WHITE PREMIXED CURING COMPOUND (New Section)

Application of white premixed curing compound shall be per Section 5-05.3(13)(B).

White premixed curing compound shall conform to the requirements of Section 9-23.1.

5-06.3(13)(C) WHITE POLYETHYLENE SHEETING (New Section)

Application of white polyethylene sheeting shall conform to the requirements of Section 5-05.3(13)(C).

White polyethylene sheeting shall conform to the requirements of Section 9-23.1.

5-06.3(13)(D) SPRINKLING SYSTEM (New Section)

The sprinkling system shall keep the entire surface of the concrete pavement continuously wet. 24 hours a day, care shall be taken to avoid damage to the surface of the pavement during placement of the concrete. The water flowing off the pavement shall be treated in a manner satisfactory to the Engineer.

5-06.3(13)(E) WATERPROOF PAPER (New Section)

The waterproof paper shall first be wetted with a fine spray of water and then completely covered with a waterproof paper, leaving all joints at least 12 inches. The paper shall be weighed sufficiently to conform to the requirements contained in Section 9-23.1.

5-06.3(13)(F) TRANSPARENT CURING COMPOUND (New Section)

The use of transparent liquid curing compounds shall be restricted to areas not exceeding 1,000 square yards.

The compounds shall meet requirements contained in Section 9-23.1. Sufficient pigment shall be present so that the applied compound is easily distinguishable. The application and the curing shall be the same as for "White Liquid Membrane Curing Compound" in Section 9-05.3(13)(B).

5-06.3(13)(G) UNBLEACHED ASHALT (New Section)

Concrete pavement when laid as a base for an asphalt wearing course shall be cured by spraying with an asphalt emulsion type not cut back with one or two parts of water for one part of asphalt emulsion. 0.10 gallon of retardant asphalt per square yard.

5-06.3(13)(H) CURING IN HOT WEATHER (New Section)

In periods of low humidity, drying wind, or high temperatures, a fog spray shall be applied to cement as soon after placement as practical to prevent the formation of shrinkage, membrane or other curing media. The Engineer shall make the decision when the use of a fog spray is necessary.

5-06.3(14) COLD WEATHER WORK (New Section)

Cold weather work shall conform to the requirements of Section 6-02.3(14).

To provide for cold weather curing and when ordered in writing by the Engineer, the Contractor shall provide a sufficient supply of straw, hay, gravel, sacking, or other suitable insulating materials on the job.
5-06.3.202 (New Section)

**Concrete Base Pavement** (New Section)

Concrete pavement, which is intended as a base for an asphalt wearing course, shall conform to all requirements of Section 5-06 and Standard Plan No. 403.

5-06.3.203 (New Section)

**Concrete Base Pavement (New Section)**

Concrete base pavement, which is intended as a base for an asphalt wearing course, shall conform to all requirements of Section 5-06, with the following exceptions:

(a) The surface tolerance shall be 3/8 inch in 10 feet.

(b) The surface of the concrete base, if jointed, may be struck off with only one strike-off rod.

(c) Construction joints shall be constructed as follows:

1. A separated plane shall be made in the plastic concrete every 15 feet or to match existing cracks as designated by the Engineer.

2. The plane shall be separated with a joint cutter to a minimum depth of 2 inches.

3. Righthand corners shall be cut off by floating lightly.

4. Joint material shall be placed completely through the cut at the joint where the weakened plane intersects the curb.

(d) Joint filler, concrete which has a very fine in the concrete shall not be used for curbing concrete mixtures. A curb shall be placed in a liquid curing compound, it shall meet the requirements of Section or an asphalt binder 90-1 or 92-1 meeting the requirements of Section applied at a rate between 5.5 gallon and 7.5 gallon per square yard of surface.
Cement Concrete Pavement - City of Seattle (New Section)

Reinforcing steel shown on the Standard Plans and required for ties of the pavement to driveway, curb, and curb and gutter and for bond coatings shall not be measured.

Measurement for edge wall, support wall and curb wall will be per cubic yard of concrete based on net lines indicated on the Standard Plans.

Steel required for pavement reinforcement as specified in Section 5-06.30(3) will be measured by the pound of steel reinforcement in place.

Measurement and pay for curb constructed with aliy pavement will be in accordance with Section 8-06.

Measurement for roadway ballast will be by the ton in accordance with Section 1-09.1.

5-06.5 PAVEMENT (New Section)

Compensation for the costs necessary to complete the work described in Section 5-06 will be made at the unit contract prices bid only for the pay items listed or referenced below:

1. "Pavement, Cement Concrete (Class), Thickness," per square yard.
2. "Pavement, Cement Concrete, Class, 11/3, Thickness," per square yard.
3. "Pavement Base, Cement Concrete (Class), Thickness," per square yard.
4. "Pavement, Thickened Edge (18 inch x 3 inch)," per linear foot.
5. "Underplastering, Cement Concrete, Class, Thickness," per cubic yard.
6. "Wall, Cement Concrete, Edge, Type 403B," per cubic yard.
7. "Wall, Cement Concrete, Support, Type 800," per cubic yard.
8. "Wall, Cement Concrete, Curb, Type 801," per cubic yard.
9. "Steel Reinforcing Bars, Grade 60," per pound.

The unit contract price for "Pavement, Cement Concrete (Class) (Thickness)" and "Pavement Base, Cement Concrete (Class) (Thickness)," shall include all costs for the specified class and thickness of pavement, including construction joints, contraction joints, through joints, saw cutting, keyways and sealing joints.

The unit contract price for "Pavement, Thickened Edge (18 inch x 3 inch)," shall include all costs for the work required to shape and compact the subgrade for the thickened edge including the concrete.

The contract price for "Underplastering, Cement Concrete, Class, 3/4," shall include all costs for the work required including furnishing and placing the underplastering and reinforcing steel and engineering as required.

The unit contract price for "Wall, Cement Concrete Edges, Type 403B," shall include all costs for the work required to construct the wall as shown on the Drawings and as specified. Reinforcement for the edge wall shall be considered incidental to the wall and no separate pay will be made.

The unit contract price for "Wall, Cement Concrete, Support, Type 800," shall include all costs for the work required to construct the wall as shown on the Drawings and as specified. Reinforcement and reinforcing steel (including steel extending into pavement slab) for the support wall shall be considered incidental to the wall and no separate pay will be made.

The unit contract price for "Wall, Cement Concrete, Curb, Type 801," (including reinforcing steel extending into pavement slab) shall include all costs for the work required to construct the wall as shown on the Drawings and as specified. Reinforcement and reinforcing steel for curb wall shall be considered incidental to the wall and no separate pay will be made.

The unit contract price for "Steel Reinforcing Bars," shall include all costs for the work required to furnish and install the reinforcing steel as specified in Section 5-06.30(3).

Steel required for pavement ties to driveway, curb, and curb and gutter, and for reinforcement around castings as specified in Section 5-06.30(3) will be considered incidental to the pavement and no separate pay will be made.

Payment for roadway ballast will be as "Mineral Aggregate (Type)" in accordance with Section 4-01.5.

The unit contract price for each specific concrete bid item shall include all costs for curing and finishing.
5-07 PAYMENT MEETING (New Section)

5-07.1 DESCRIPTION (New Section)
This work shall consist of the patching of various types of pavement cuts, the performance of which shall be in accordance with the requirements outlined hereunder and as shown on the Standard Plans.

5-07.2 MATERIALS (New Section)
All materials shall conform to the requirements specified for material in other sections of these Standard Specifications, as sections 9-03 and 5-06.

Asphalt concrete pavement patch shall be Class B meeting the requirements of Section 5-04. Temporary pavement patch shall be MC 290 meeting the requirements of Section 5-06.

Crushed rock surfacing shall meet the requirements of Mineral Aggregate Types 1 and 2 per Section 5-03.

5-07.3 CONSTRUCTION REQUIREMENTS (New Section)

5-07.3(1) GENERAL (New Section)
Pavement patching shall be scheduled to accommodate the demands of traffic, and shall be performed as rapidly as possible to provide minimal safety and convenience to public travel.

The placing and compaction of the trench backfill, and the preparation and compaction of the subgrade shall be in accordance with the requirements of the various applicable specifications of these specifications.

Before the patch is constructed all pavement cuts shall be tarmad so that the marginal lines of the patch will form a rectangle with straight edges and vertical faces. The use of a concrete saw will not be required unless so indicated in the Special Provisions.

The class of concrete used in patches will depend upon the urgency of opening the street to traffic.

The class of concrete will be as specified in the Special Provisions and Road Plans. Tarmading composed as specified in Section 5-06.3(1) shall be placed on the concrete immediately after finishing.

Proper signage, barricades, lights and other warning devices, as may be required by the Engineer, shall be maintained all 24 hours of the day until the patch is completed and ready for traffic.

On all public works contracts, the Contractor shall perform all work required to backfill the excavation made under existing pavement and to restore pavement cuts with intacting in accordance with these Specifications unless otherwise provided in the Special Provisions.

Construction of the subgrade shall be completed prior to the required patching. Construction shall be to 95% maximum density as determined by the methods specified in Section 2-05.3(10).

5-07.3(1A) TEMPORARY PAYMENT PAYMENTS (New Section)
The Contractor shall furnish, place and maintain a 2 inch thick crushed rock surfacing and a 2 inch thick MC 290 patch over trench areas when and where directed by the Engineer. Such temporary asphalt shall not be removed where new or existing traffic and pedestrian traffic may be affected by such movement.

In Section 5-07.3(1A) and the MC 290 capped and placed in accordance with adjacent surfacing. The temporary surfacing shall be applied by maintaining the surface. Rockdike of the plant mix and crushed surfacing shall be placed in accordance with the patching procedure. The patch shall be placed in accordance with the Special Provisions.

The Contractor shall remove the temporary asphalt, clean the exposed face of the existing pavement and restore the pavement.

5-07.3(2) CEMENT CONCRETE PAYMENT (New Section)
After the subgrade for the pavement has been constructed and compacted to finish grade and the concrete concrete pavement patch shall be placed, compacted and struck off to the grade of the adjacent pavement in accordance with the provisions set forth in Section 5-06. Through joints and cross joints shall be placed and edged where directed. The surface shall be finished and treated with a surface course. Approved curing compound shall be placed on the finished concrete immediately after finishing.

5-07.3(3) CRUSHED ROCK SURFACING WITH ASPHALT CONCRETE (New Section)
Surfaces which have rigid type pavements resurfaced with asphalt concrete shall be patched as shown on the Standard Plans, or as ordinations specified. The surface of the pavement concrete portion of the patch shall be at least left edge of the pavement. Brush finishing will not be required. Surfaces shall be placed in accordance with the Engineer. Surfacing shall be placed with Surfacing asphalt emulsion diluted with water as directed by the Engineer.

Asphalt concrete or hotmix asphalt plant mix shall not be placed until 3 days after the concrete has been placed. The concrete must be placed in accordance with the Engineer. Surfacing asphalt concrete shall be placed in accordance with the Engineer. Surfacing asphalt concrete shall be placed in accordance with the Engineer. Surfacing asphalt concrete shall be placed in accordance with the Engineer. Surfacing asphalt concrete shall be placed in accordance with the Engineer. Surfacing asphalt concrete shall be placed in accordance with the Engineer. Surfacing asphalt concrete shall be placed in accordance with the Engineer. Surfacing asphalt concrete shall be placed in accordance with the Engineer. Surfacing asphalt concrete shall be placed in accordance with the Engineer.

5-07.3(4) ASPHALT CONCRETE ON GRANULAR BASE (New Section)
The subgrade for the pavement has been prepared as shown on the Standard Plans, or as directed by the Engineer, asphalt concrete pavement concrete shall be placed to a thickness of the existing asphalt pavement depth or to a thickness of 2 inches, whichever depth is the greater, and compacted in the manner specified in Section 5-07.3(3).

Restoration of asphalt concrete roadway pavement on granular base (non-rigid pavement) shall consist of asphalt concrete pavement concrete 1 and 2, a minimum thickness of 2 inches of a 6-inch base course of asphalt concrete and 2 inches. "Pavement, Asphalt Concrete C 1" shall be compacted to a thickness equal to the thickness of the adjacent pavement or 2 inches, whichever is greater.

Restoration of MC 290 paved roadway surfaces, or seal coats, on a granular base shall consist of asphalt concrete pavement concrete 1 and Pavement, Asphalt Concrete C 1" to a compacted thickness of 2 inches. "Pavement, Asphalt Concrete C 1" shall be compacted to a thickness of 3 inches.

Restoration of asphalt driveways shall be the same as specified above for MC 290 pavements.

All shoulders on paved roads, disturbed during the course of construction, shall be restored by forming and asphalt concrete pavement concrete 1, a thickness of 2 inches and width up to 4 feet or as required by the Engineer. Only asphalt concrete pavement concrete shall be used in the shoulders.

5-07.3(5) UNSIGNED ROADWAY SURFACES (New Section)
Existing crushed rock, gravel, and all dirt streets shall be restored with Woodland Aggregate Types 1 and 2 to a compacted depth of 4 inches within the lane lines of the trench as detailed on Standard Plan 29A. Surfacing shall be constructed as specified in Section 5-04.3(9)(A).

5-07.4 MEASUREMENT (New Section)
Measurement of concrete pavement patching shall be made by the cubic yard for concrete pavement patching, by the cubic yard for asphalt concrete pavement patching. Quantities for surface excavations for gravel, drainage and waterways may be based upon computations made by the Engineer using the required installed thickness and the payment shall be based upon the criteria specified in Section 5-07.3(3).

Quantities for pavement patching for electrical conduits will be based on actual measured dimensions with the provision that the width of restoration for payment purposes shall be no greater than 24 inches.
Measurement of temporary pavement patch will be made for the initial placement only. Additional MC 250 and crushed rock surfacing required to maintain the surface of the temporary patch level with adjacent roadway surfaces will not be measured.

Measurement for crushed surfacing will be made in accordance with Section 4-06.1.

5-07.5 Patching (New Section)

Compensation for the cost necessary to complete the work described in Section 5-07, will be made at the unit contract prices bid only for the pay items listed or referenced below:

1. "Pavement Patch, Cement Concrete, Class 6.5 (1/2), B.E.S.," per cubic yard.
2. "Pavement Patch, Asphalt Concrete, Class 9" per ton.

The unit contract price for pavement patching of the type required shall be limited to the maximum pay width as shown on Standard Plan 404 or 406 or the City's Open and Reinforcement Plan, and shall include the costs for all work described in Section 5-07, and not otherwise provided for in this pay section, necessary to temporary patching and surfacing, or for bridge repairs, where applicable, pavement or other traffic bearing surfaces which have been opened by trench excavation or similar work. All areas which require the patching of street surfaces as specified, including installing joints where required, shall be considered incidental to the patching, and the costs thereof shall be included in the item for which payment is provided. Payment for "Pavement Patch, Temporary, MC 250" will include reimbursement for removal of temporary patch before final patching.

The costs for additional MC 250 and crushed surfacing material required to maintain temporary pavement patch after the initial installation shall be borne by the Contractor.

Payment for backfill and compaction of the subgrade shall be included in the unit contract price for the particular work item which necessitated the pavement cut.

Payment for crushed rock surfacing shall be paid separately in accordance with Section 4-06.

SECTION 6-01 GENERAL REQUIREMENTS

6-01.2 Foundation Data

Delete this section and replace with the following:

Foundation data, when shown in the Drawings or Project Manual, have been obtained from past borings, test piles or other sources and represent the best information in the possession of the Engineer as to the character of the underlying material at the locations actually tested.

6-01.5 Erection Methods

Delete this section and replace with the following:

The Contractor shall submit for approval a plan of the method he proposes to follow in the erection of all steel structures, all precasted concrete girder structures, and if required in the Contract Documents, any other concrete structures. The plan shall be supported with any necessary drawings to clearly describe the method proposed. The plan shall show details of all falsework bends, bracing, guy, deadmen, lifting devices and attachments to the bridge members. Sequence of erection, location of cranes and barges, crane capacities, location of lifting points on the bridge members and weights of the members. The plan and detail drawings shall be complete in detail for all anticipated phases and conditions during erection.

The plan and detail drawings shall be submitted for approval as prescribed in Section 1-05.3.

6-01.15 Normal Temperatures

Delete the title and section and replace with the following:

6-01.15 Normal Temperature and Dimensions

Dimensions on bridge drawings are for a normal temperature of 64 degrees F. Dimensions on bridge drawings are horizontal or vertical unless otherwise specified.
CONCRETE STRUCTURES

6-02.2 MATERIALS

Supplement this section with the following items:

<table>
<thead>
<tr>
<th>Bridge Banjo</th>
<th>9-06.19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dowels</td>
<td>9-06.20</td>
</tr>
</tbody>
</table>

6-02.3 PROPORTIONING MATERIALS

Delete paragraph 4 and replace with the following:

If the aggregate used in the concrete develops not less than 95 percent of the strength of washed sand and gravel from Oaklawn, Washington when tested in accordance with Section 9-03.1, the following proportions of cement and aggregate may be used in Class A concrete:

<table>
<thead>
<tr>
<th>Pounds of dry cement per cubic yard</th>
<th>610</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds of dry fine aggregate per cubic yard</td>
<td>106</td>
</tr>
<tr>
<td>Pounds of dry No. 5 coarse aggregate per cubic yard</td>
<td>1,210</td>
</tr>
<tr>
<td>Maximum water per cubic yard (pounds per 100 lbs. of cement = 5.33)</td>
<td>35.5</td>
</tr>
</tbody>
</table>

6-02.3.3 WATER-REDUCING ADJUVANTS

Supplement paragraph 1 with the following:

Water-reducing and retardant admixtures shall be used in the concrete mix when required by the Special Provisions of the Engineer.

6-02.3.1C LOW-SHRINK CONCRETE

Delete this section and replace with the following:

Low-shrink concrete shall meet all the requirements for concrete Class A as stated in Section 6-02.3 except that the quantity of water shall be reduced such that the water/cement ratio shall not exceed 0.30 by weight.

A water-reducing admixture shall be used in this mix and shall be as outlined in Section 6-02.3.3a.

6-02.3.10 CONCRETE MIXES INCORPORATING FLY ASH (New Section)

Concrete mixes incorporating fly ash may be utilized for all classes of concrete, unless otherwise noted in the Special Provisions. The proportions will be subject to approval by the Engineer and shall be in compliance with Section 9-03.9.

6-02.3.1X LOW-SHRINK CEMENT AND GRAIN (New Section)

Low-shrink cement and grain shall be proportioned as follows:

1 part high early strength (HEG) cement
2 parts clean fine-grained sand and weight-stabilized with sufficient water to obtain a stiff consistency.

Superplasticizing admixture shall be added to the dry cement in the proportion of one heaping tablespoonful per sack of cement no more than 30 minutes before the concrete mixture reaches its final impulse position.

The required strength of the low-shrink concrete or grain shall be 6,000 psi and be verified by the cube strength test. The strength shall be confirmed by Schmidt hammering of the pads.

Prior to placing the grain, the contact surface shall be thoroughly cleaned, roughened, and wetted with water. The grain shall be covered with burlap soaked after the initial concrete set and wetted at regular intervals until the required strength is obtained.

6-02.3.2A MACHINE MIXING

Delete paragraph 3 and replace with the following:

In general, all concrete shall be mixed for a period of not less than 1 minute after all materials, including water, are in the mixer. Except Class B and B, which shall be mixed 1/2 minutes, less mixing time shall be possible where practical, and equipment for special types of mixing equipment if tests indicate that equal or better results are obtainable.

Admixtures for increasing the workability or for accelerating the set shall be added to the mix only when specified or approved by the Engineer.

6-02.3.2C READY MIXED CONCRETE

Supplement this section with the following:

The central ready mix plant shall meet the requirements of CSM C 96. In general, the batching plant shall include bins, weighing hoppers and scales for the fine aggregate and each size of coarse aggregate. A coarse mix is used to make a 4:1, 6:1, 8:1, and separate scale for cement shall also be included. The weighing hoppers shall be properly sealed and vented to facilitate during operation. The batching plant shall be equipped with a suitable non-interruptible batching counter which will correctly indicate the number of batches proportioned during a day. Nine and hoppers shall have separate compartments of adequate size for the fine and each size of coarse aggregate. Scales shall meet the requirements of Section 9-03.2. Plugs shall be equipped to proportion aggregates and bulk cement by means of automatic weighing devices of an approved type.

Delete paragraph 9 and replace with the following:

The mix shall be subject to inspection, surveillance, and testing by the Engineer at either the plant site or the job site, at the Engineer's discretion.

6-02.3.2D RETEMPERING

Delete this section and replace with the following:

Concrete shall be mixed only in such quantities as are required for immediate use and shall be used while fresh before initial set has taken place. Any concrete having initial set before placing and finishing shall be wetted and not used for the work. Reconditioning of concrete (tempering with water or other materials) will not be allowed.

6-02.5 CONSISTENCY

Delete this section and replace with the following:

Slump shall be measured in accordance with ASTM C143 Method of Test for Slump of Portland Cement Concrete and shall not exceed 4-7/8 inches for non-vibrated concrete, or shall not exceed 4-11/16 inches for non-vibrated concrete.

6-02.6 PLACING CONCRETE

The 17th paragraph is supplemented by the following:

The concrete traffic and pedestrian barrier may be constructed by the slip-forming method at the Contractor's option.

If an unsatisfactory barrier is constructed, the Contractor shall stop work, remove the unsatisfactory barrier, and take corrective action before proceeding.

The maximum allowable deviation from a 10-foot straight edge laid longitudinally on the front face, top surface, and back face shall be 1/6-inch.
CONCRETE STRUCTURES

6-02.73(M) WEATHER AND TEMPERATURE LIMITATIONS - PROTECTION OF CONCRETE

Delete this section and replace with the following:

The temperature of the concrete mixture during placement shall be between 60 degrees F. and 90 degrees F.

Concrete shall not be placed on frozen ground, against frost-damaged steel, or frost-damaged forms.

Concrete shall not be placed or not placed while the atmospheric temperature is below 35 degrees F. unless adequate means are employed to heat the water and/or aggregates and satisfactory provisions have been made for encasing the concrete and heating the enclosures. No concrete shall be placed when the weather forecasts indicate that the temperature will fall below 35 degrees F. during the succeeding 7 days unless provisions are made for enclosing the concrete and heating the enclosures.

When concrete is placed at atmospheric temperatures below 35 degrees F., the mixing water and/or aggregates shall be heated to a temperature of at least 70 degrees F. The temperature of the aggregate shall not be more than 130 degrees F. if the water is heated to more than 150 degrees F. The temperature of the mixing water and/or aggregates shall be maintained at the specified temperature before the cement is added. The heating equipment and methods shall be capable of heating the materials uniformly and shall not alter or prevent the entrainment of the required amount of air in the concrete.

Stockpiled aggregates may be heated by the use of dry heat or steam. Aggregates shall not be heated directly by the use of live flames or steam near hot water or steam tanks. When aggregates are heated in bins, steam- or water-cell heating, water-cell heating, or other methods which will not injure the aggregates may be used. The use of live flame or steam near hot water or steam tanks shall not alter or prevent the entrainment of the required amount of air in the concrete.

Concrete shall be effectively protected from atmospheric temperatures below 35 degrees F. for a period of 7 days after placing. The Contractor shall enclose the concrete immediately after placing concrete and provide dry heat and moisture to such a way that the air within the enclosures is kept above 50 degrees F., but not above 90 degrees F., for 7 days after concrete placement. The addition of protective material to cover lightweight slabs, shall be discontinued 24 hours prior to discontinuing the application of heating equipment; and concrete placed on heated surfaces, covers, metal, or edges, this section, and concrete poured in heated forms are particularly vulnerable to freezing and need special attention.

When required by the Engineer, the Contractor shall provide and maintain a suitable, nonmetallic thermometer in the general vicinity of the structure site where concrete is being placed. It shall be used when required by the Engineer, to provide control during freezing or near freezing weather and the information obtained thereby shall be made readily available to the Engineer.

The Contractor assumes all risks connected with the placing of concrete during cold weather. The Contractor shall provide and maintain, at his expense, adequate means by which the Engineer can observe and test the concrete when placed during cold weather conditions. The Contractor shall make the concrete placed under such conditions properly satisfactory in any way, the Engineer shall have the right to remove the work although the plan and specifications are approved. When the air temperature is below 70 degrees F., the forms, reinforcing steel, steel beam flanges, and other surfaces which will come in contact with the mix shall be maintained above 80 degrees F. by means of a water spray or by other approved methods. When required, admixtures shall be used on the surface and sub-surface of the concrete. The concrete shall be kept to a minimum on contact with the reinforcing steel. Concrete shall not be exposed to the sun while setting is being completed. Clean, dry, and clean lines shall be avoided.

Should the Contractor employ such measures as are necessary to maintain the temperature of the concrete mixture below 35 degrees F., the measures may include shading, cooling the aggregate piles, refrigerating the mixing water, or substituting cold concrete water, or substituting concrete mixtures from a cooler source. The Contractor determines when concrete is ready to be delivered to the site. When this is substituted, it shall be uniformly mixed and the finished mix shall be used as required by the Engineer.

In addition, concrete placed in bridge roadway slabs must meet the following requirements:

To keep the forms and reinforcing steel cool prior to placing the concrete, the top layer of reinforcing steel shall be completely covered with clean, wet burlap and the forms and reinforcing steel shall be sprinkled with cold water immediately prior to placing the concrete as ordered by the Engineer. The concrete slab shall be finished within 24 hours. Equipment for applying a water film spray after finishing is completed shall be available in case it is needed to prevent plastic cracks.

When the combinations of air temperature, relative humidity, temperature of the concrete, and the wind velocity at the site produces an evaporation rate of 0.50 pound per square foot of surface per hour, as determined from Table 6-02.73(M), the Contractor shall provide an effective enclosure to protect the concrete from wind blowing over the surface of the concrete until the curing compound is applied. If the Contractor proposes to cast deck concrete heating temperatures above 80 degrees F., he shall supply approved equipment for determining the relative humidity and wind velocity at the site.

6-02.73(B) PLACING CONCRETE IN WATER

Delete the last paragraph and replace with the following:

Concrete placed under water shall be Class 5 or IC mix and shall be proportioned for a medium slump of 7 inches. The length and width of section of footing being poured shall not exceed 10 feet for each truck used.

6-02.74(M) POINT OF ACCEPTANCE (New Section)

Determination of concrete properties for acceptance will be made based on samples taken to most nearly represent the concrete placed. In general, the concrete shall be placed to the front edge placement under which no operations, alter the specified properties of the concrete will remain sampling at the discharge from the cement mixer system.

It shall be the Contractor's responsibility to provide adequate and representative samples of the fresh concrete to a location designated by the Engineer for testing of concrete properties and making of cylinder specimens. Sampling shall be provided as directed in Sections 3-50.1 and 3-50.2.

When mutually acceptable to the Owner and the Contractor, acceptance samples may be taken at a location other than the point of discharge. The alteration of concrete properties in passage through the placement system shall be recognized in analyzing results of such samples and in determining acceptance of the fresh concrete.

6-02.73(10) FINISHING ROADWAY SLABS

The title of this section is revised to read:

6-02.73(10) ROADWAY SLABS

The 11th paragraph is revised to read:

Concrete shall be placed the full width of the roadway slab or the full width between construction joints shown on the drawings. In general, construction joints shall be overlapped by block or web which shall completely separate the slab on each side of the joint. Alish shall not be permitted near slabs, except as shown on the drawings. The construction joints shall be formed vertically and in true alignment. Furthermore, no corner or edge of each part of the roadway slab shall not be released until the concrete of both parts has properly aged as specified.

The 12th paragraph is deleted.

The 14th paragraph is supplemented with the following:

All concrete splashed or otherwise deposited on exposed reinforcing steel of adjacent parts shall be removed before those adjacent parts are paved.

Delete paragraph 21 (bottom of page 200) and replace with the following:

The bridge deck shall be given a final surface finish by texturing with a comb perpendicular to the centerline of the pavement. The comb shall consist of a single row of metal teeth and be capable of producing striations approximately 1/16 inch in depth, 1/8 inch in width at an approximate 1/16 inch spacing in the fresh concrete. The actual depth of striations shall be determined in the field by the Engineer.

The textures shall be started as soon as the concrete is hard enough to support the texture operation. The texturing operation shall be done at such time and in such manner that the desired texture will be achieved while avoiding or minimizing displacement of the larger
CONCRETE STRUCTURES

6-02 EXPANSION JOINTS (BUDGE DRUMS)

Supplement this section with the following:

The expansion joints shall be as shown and noted in the Drawings and shall be installed in accordance with the manufacturer's written recommendations.

The Contractor shall submit working drawings of the expansion joints proposed for use to the Engineer for approval. Such working drawings shall be in accordance with provisions of Section 6-02.3 of the Standard Specifications. The working drawings shall show details of the system, including expansion joint member, method of installation, and method of sealing the system to prevent leakage of water through the joint. The Contractor shall submit, with his working drawings submittal, the manufacturer's written installation procedures to the Engineer for approval.

After the joint system(s) is installed, the joint area shall be flooded with water and inspected, from below the joint(s), for leakage. If leakage is observed, the joint area shall be repaired, at the expense of the Contractor, as recommended by the manufacturer and approved by the Engineer.

To aid in ensuring proper use and installation of the expansion joint system under job conditions, the Contractor shall submit, with his working drawings submittal, the services of a qualified full-time field representative of the manufacturer of the expansion joint system installed in this project. Recommendations made by the manufacturer's representative, on and/or off the job site, and approved by the Engineer, shall be adhered to by the Contractor at his own expense.

The expansion joints shall seal the roadway deck surface and curbs to prevent water from passing through the joint to portions of the structure below. Installation of the expansion joints and guarding of the exposed joint parts shall be in accordance with the manufacturer's recommendations. The sealant recommended by the manufacturer supplying the expansion joint shall be approved by the Engineer before installation. The transition of the expansion joint from the roadway to the curb face and horizontally to the back of the curb shall be in a continuous factory fabricated curbing unit.

The seats for the expansion joint shall be absolutely parallel to longitudinal and transverse members grade and shall match the transverse crown of the final pavement surface. All grouts, low pressure or high pressure in the expansion joint seat shall be recessed so that the surface is no more than 1/8 inch from a 10 foot straightedge placed at a constant cross slope. Each successive check with the straightedge device shall lay the previous check by at least 1/2 of the length of the straightedge. All concrete outside corner of the expansion joint seat shall have a radius of rounding no greater than 1/4 inch.

When the expansion joint seat consists of steel plates or steel angles, all high areas shall be ground down and all low areas having a depth of less than 1/8 inch from the top seat corner shall be filled with epoxy. Areas with a depth greater than 1/8 inch shall be filled with an epoxy sand mix. The joint shall be to a depth of 3 or 5 foot straightedge shall be the same as stated above for concrete seats.

The expansion joint material shall have full firm bearing for the entire length and width of the joint. The expansion joint material shall be placed so that its top surface is recessed 1/8 inch below the driving surface of the pavement or on both sides of the expansion joint.

Slabs, barriers or other devices shall not be used below the expansion joint material to bring the joint into proper elevation and/or tolerance.

All expansion joints are to be furnished and installed by the manufacturer, on and/or off the job site, and approved by the Engineer.

The expansion joint material shall be of the tested and approved type specified in the Standard Specifications. The expansion joint material shall be of the tested and approved type specified in the Standard Specifications. The expansion joint material shall be of the tested and approved type specified in the Standard Specifications.
6-02 CONCRETE STRUCTURES

The crown section of the seal shall be shaped to allow adequate expansion of the seal under design conditions. The length of seals shall be as indicated on the Drawings. Scoring of the seals shall not be permitted. Details of the seal, including corner joints and type of material to bond joints shall be submitted to the Engineer and approved before submitting samples for lot acceptance. For the production run for one or this project, a lot shall be considered all material of one size produced during one production cycle. A sample shall consist of a 3-foot length of actual seal. The samples of the joint seals shall be furnished by the Engineer with a certified copy of the test results indicating that the material complies with the specification requirements.

The seal shall be installed with an approved lubricant adhesive in accordance with the manufacturer's recommendations. The lubricant shall be delivered in containers plainly marked with the manufacturer's name or trademark, lot number and date of manufacture. A one pint sample of lubricant adhesive shall be furnished to the Engineer prior to installation.

6-02.13.1A PREPARATION OF SURFACES FOR INSTALLATION (New Section)

The grooves or recesses for expansion seals shall have parallel sides and be constructed to the proper depth. The width of the recess shall not vary more than 3/16 inch in a distance of 10 feet. The bottom shall be a true, smooth plane parallel to the surface of the roadway, curb, or sidewalk.

All surfaces to receive elastomeric expansion seal shall be free from dirt, water, oil, rust, frost, spalls, crevice, and any other loose foreign debris which may be detrimental to effective joint sealing.

It is imperative that a clean opening of 3/8 inch rounded top edges shall be produced for the specified opening and the full depth of joint required. After the joints are constructed and all foreign substances removed, the joint grooves shall be inspected for spalling, broken edges, exposed reinforcing steel and other joints shall be prepared by filling with epoxy mortar.

(a) Spalls over 1/4 inch wide and over 1/2 inch below the surface of the pavement.
(b) Spalls over 1/4 inch wide and 2 inch or more in length, regardless of the depth of spall below the surface of the pavement.

6-02.13.1A INSTALLATION (New Section)

Where indicated on Drawings, the Contractor shall install the proper seals in a neat, workmanlike manner, and to the satisfaction of the Engineer.

For ease of installation, the air temperature should be below 85°F. At joint or miter joints as shown on the Drawings, a 1/4 inch thick neoprene orelope shall be bonded to the seal ends with an approved cyanoacrylate adhesive. In order to assure proper fitting, the neoprene orelope shall be cut to the size and shape of the recess or miter. The cyanoacrylate adhesive shall be applied to outer side and top web of the seal only, to allow enough air to escape and the sponge to properly function.

The seal surface to be bonded shall be cleaned with toluene or approved solvent prior to applying adhesive. A continuous coat of adhesive shall be applied to both joint interfaces immediately prior to seal installation. Adhesive shall not be applied below 60°F. At seal installation. Adhesive shall not be applied below 60°F. The compression seal shall be placed such that the top surface facing the front of the curb shall be recessed 1/8 inch to 1/4 inch into the adjacent concrete surface.

6-02.1X PLAN FOR FALLSCREWS AND FORMS

Delete this section and replace with the following:

6-02.1X.1A STANDARDIZED FALLSCREWS AND FORMING PLANS

The Contractor shall submit to the Engineer, for approval, 6 copies of drawings showing details of the fallscrew and approved forms intended to be used. The drawings shall be returned to the Engineer to the Contractor. Drawings will not be required for footing or retaining walls 4 feet or less in height. The footing depth is not included in the footing height. If a railroad is involved, four additional sets are required for each railroad company involved. The drawings shall show the proposed details of construction such as class of materials, spacing of bars, posts, stakes, nails, strainers, collars, bolts, wedges, bearing, rate of power, and the manufacturer's recommended safe working capacity of all forms and columns wraps.

Fallscrew and forms shall not be constructed until approval has been given by the Project Engineer. Approval by the Project Engineer will not relieve the Contractor of responsibility for the sufficiency of the drawings and forms. Fallscrews, forms, and other related working drawings which are necessary for the prosecution of the work shall be designed by or under the direction of a Professional Engineer, licensed under the provisions of Title 18 RCW with the State of Washington, and shall bear his signature and seal. All assumptions, dimensions, materials properties, and other data used in making the structural analysis shall be noted on the drawing. Upon request, the Contractor shall furnish copies of the design calculations to the Engineer for information as a condition for approval. Printed specifications shall be typewritten and shall be submitted and approved by the Engineer before the construction of the fallscrew and forms is undertaken.

All drawings shall be made on sheets conforming in size to the proportions of Section 1:0-3.1 and all details shall be made clear, complete and to scale in accordance with standard drafting procedures. For calculating the strength of fallscrew, a weight of 160 pounds per cubic foot shall be assumed for green concrete.

6-02.1X.1B FORCING PLANS

Fors plan for elements, wrappers, strainers, retaining walls, columns, girders and beams, railings, and railings shall also be submitted to the Engineer for approval. Contractor shall submit other additional copies of approved forms. Upon final approval, the plan shall be stamped "Approved" dated, and returned to the Contractor.

Construction shall not proceed until approval has been given by the Engineer. Use of the approved plans for contracts on or adjacent to railroad right of way will require railroad approval. Four additional copies shall be submitted to the Engineer for railroad review and approval.

Fallscrew plans for supporting the roadway slab for the longitudinal space between prestressed concrete girders shall be submitted for approval. Other fallscrew plans shall be submitted in accordance with Section 6-02.1X.1A.

6-02.1X.2 FORMS, FALLSCREWS AND CARTS

This section is supplemented as follows:

Fallscrews are those constructed of the structural system that contain the lateral pressure exerted by concrete placed in the forms. Fallscrews are defined as the structural system that supports the vertical load of the forms, reinforcing steel, concrete, and construction live loads.

6-02.1X.2A Cart, Filling, Forms and Molds

The sixth paragraph is supplemented with the following:

The Contractor shall provide a suitable sample of each proposed fitted material for use under conditions and shall allow up to five working days for the Engineer's approval. The imported material shall not be used until approval for use.
6-02.3.17X BRACING

The following paragraph is added between the first and second paragraphs:

Bracing shall be provided between precast concrete girders to prevent movement or rotation when the diaphragms and roadway slab are placed.

Delete the table in paragraph 7 and replace with the following:

<table>
<thead>
<tr>
<th>Series</th>
<th>Girders - 2 feet-6 inches</th>
<th>Girders - 3 feet-6 inches</th>
<th>Girders - 5 feet-6 inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>07</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Supplement this section with the following:

Bracing shall be provided between precast concrete girders to prevent movement or rotation when the diaphragms and roadway slab are placed.

6-02.3.17X FORM TIES

Delete paragraphs 2 and 3 and replace with the following:

Wire form ties and taper ties will not be allowed.

6-02.3.21x DRAINAGE OF BOX GIRDER CELLS

This section is revised to read:

To provide drainage for box girder cells, the Contractor shall furnish and install short lengths of nonmetallic pipe in the bottom slab at the low point of each cell in accordance with the detail shown in the plans. The pipe shall have a minimum inside diameter of 6 inches. Pipe shall be installed in each end of the box girder cell when the difference in the plan elevation is 2 inches or less.

6-02.3.24x REINFORCEMENT

Delete this section and replace with the following. Subsections of 6-02.3.24x remain unchanged except as noted below:

The Contractor shall furnish a bar list and bending diagram to the Engineer for approval prior to fabrication.

6-02.3.24x PLACING AND FASTENING

The following is added after the first paragraph:

The reinforcing bars for the slip-formed concrete traffic and pedestrian barrier shall be tied and broached to prevent displacement of the reinforcing cage during placement of the concrete.

6-02.3.24x WELDING REINFORCING STEEL

In the formula under paragraph 2, correct the word "Equation" to read "Equation.

The first sentence of the first paragraph is revised to read:

Welding of steel reinforcing bars shall conform to the requirements in the AS 1141.4 Reinforcing Steel Welding Code and the Contract Documents.

The last sentence of the third paragraph is revised to read:

A suggested form for furnishing the required information is given in Appendix A of AS 1141.4.

Delete paragraph 13.

6-02.3.25x PRESTRESSED CONCRETE GIRDERS

The following paragraph is added between the third and fourth paragraphs:

The width of the end block under Series 14 Girders is to be reduced to 1 foot 4 inches provided that the reinforcing steel in the end block region is adjusted to maintain the clearance as shown in the contract plans.

The third sentence of the fourth paragraph is revised to read:

Great compressive strength will be determined by testing cubes in accordance with ASHTO Test T 106.

Supplement this section with the following:

All girders fabricating precast concrete products for City of Seattle projects shall be currently certified under the "Prestressed Concrete Institute Certification Program". Proof of plant certification by PCI shall be submitted along with the shop drawings by the Contractor to the Engineer.

6-02.3.25x THE GIRDER PLANT CONNECTION

The third sentence of the second paragraph is revised to read:

Low yield concrete compressive strength will be determined by testing cubes in accordance with ASHTO Test T 106.

6-02.3.25x CASTING AND DEEP PLANS

Delete paragraph 5.

Delete paragraph 6 and replace with the following:

The Contractor may provide circular block cuts for falsework hanger rods in the top flanges of all precast concrete girders. The block cuts shall be a minimum of 1 inch in diameter, spaced at 6 inches on center maximum longitudinally, and a minimum of 3 inches from the outside edge of the top flange for the Series 10 and 14 girders and 10 inches for the Series 14 girders.

6-02.3.25x HANDLING AND STORAGE

Delete paragraph 2 and replace with the following:

Long girders, and specifically those over 105 feet in length for Series 10 and over 112 feet for Series 14 girders, shall be braced laterally to prevent buckling during transportation and erection.

The bracing shall be securely attached to the top flange of the girders and shall be of sufficient stiffness in substantially prevent lateral deflection of the top flange during all handling conditions. When this bracing must be removed before the diaphragms are cast, the girders shall be carefully secured in position by other means before the bracing is removed. The Contractor is cautioned that for some delivery routes, more conservative guidelines for lateral bracing may be required.

The first sentence of the third paragraph is revised to read:

If the Contractor wishes to deviate from the vertical pickup, the pickup point, or from the bracing to prevent lateral deflection, he shall have his proposed method approved by his engineer and shall submit his method, with supporting calculations, in accordance with Section 6-02.3.16A.

6-02.3.25x MACHINERY

Items (a) through (c) are replaced with the following:

(a) Length (overall): 2 1/3 inches per 25 feet of the beam length, 2 1/3 inches maximum.
(b) Width (flanges): 0.18 inch, -0.4 inch.
(c) Width (narrow web section): 0.5 inch, -0.4 inch.
CONCRETE STRUCTURES

(d) Grider depth (overall): 41/2 inch, 1/4 inch.
(e) Flange depth: 21/8 inch.
(f) Tread position: 21/4 inch from center of gravity of tread group and individual treads.
(g) Longitudinal position of deflection points for deflected strands: 21/2 inches.
(h) Bearing recess (center recess to end beam): 41/4 inch.
(i) Beam ends (deviation from square or designated angle): horizontal: 41/2 inch measured from centerline of web to edge of flange. Vertical: 21/8 inch per foot of beam depth.
(j) Bearing area deviation from plan (in length of width of bearing): 1/16 inch.
(k) Stirrup reinforcing spacing: 1 inch.
(l) Stirrup projection from top of beam: 31/4 inch.
(m) NID steel concrete cover: 1 inch, 1/8 inch.
(n) Offset at joint (deviation from a straight line that extends 5 feet each side of joint): 21/4 inch.
(o) Differential center between grinders in a span (measured in plane at the joint): 1/3 inch per 10 feet of beam length for 7-giders, but together when the difference in center between adjacent grinders is less than 1/4 inch at the center for grinders with asphalt overlay and 1/8 inch for grinders without asphalt overlay the grider centers shall be equilibrated by an approved method.
(p) Position of inserts for structural connections: 41/2 inch.
(q) Position of lifting loops: 23 inches longitudinal, 23 inch transverse.

6-02.25(25) SHIPING

Prestrained concrete grinders shall not be shipped until tests on concrete cylinders, manufactured of the same concrete and cured under the same conditions as the griders, indicate that the concrete of the particular grider has attained a compressive strength equal to the specified design compressive strength of the concrete to the grider and attained a minimum age of seven days for 7-gidet prestrained griders and 10 days for all other prestrained concrete griders.

During shipping, the griders shall be supported within: 3 feet of the ends of the griders for Series 7, 5 and 1 and for NID prestrained griders; within 4 feet for Series 10 prestrained griders; and within 5 feet for Series 16 prestrained griders.

The contractor may deviate from the support locations listed above provided he submits his proposal, with supporting calculations, in accordance with Section 6-02.25(16).A.

Contractor's calculations must verify that the concrete stresses in the prestrained griders during shipping do not exceed that listed below:

CRITERIA FOR CHECKING RIDER STRESSES AT TIME OF LIFTING OR TRANSPORTING

Stresses at both support and bearing points must be satisfied based on the following:

(a) Specify concrete strength at time of lifting or transporting, f'cm

(b) Allowable compression stress, fce = 0.60 f'cm

(c) Allowable tension stress, ft

(a) With no bearing reinforcement = 3 times the square root of f'cm

(b) With 0.00175" diameter bars = 3.47 times the square root of f'cm. The allowable tensile stress in reinforcement is 50 ksi. (AASHTO A-313 Gr, 60)

CONCRETE STRUCTURES

(d) Prestress losses

1 day = 1 month = 20,000 psi
1 month = 1 year = 36,000 psi
1 year or more = 45,000 psi (Max.)

(e) Impact on dead load

Transporting = 202

6-02.25(24) CEMENT

The first sentence of the second paragraph is replaced by the following:

The contractor shall control the number of prestrained concrete griders that are to receive a case-in-place bonding due to embossing buckling or other reasons. The actual grider number at the embossing may vary from the "C" value by a maximum of 41/2 inch for grider lengths up to 60 feet and 41/2 inch for grider lengths over 60 feet at the time of slab pour.

6-02.25(36) SHOP DRAWINGS

The first sentence of the second paragraph is revised to read:

Before the fabrication of structural elements, the contractor shall submit for approval, in accordance with Section 6-02.25(16), complete detailed drawings of the method, materials, and equipment to be used in the prestraining operations.

6-02.25(36) ANCHORAGE

Delete paragraph 6 and replace with the following:

The contractor shall submit a certified report, prepared by himself or his agent, for each girder and type of anchorage device proposed for use showing that the anchorage assembly will develop 90% of the ultimate strength of the prestraining reinforcement.

6-02.25(27) SUPERSTRUCTURE (New Section)

The superstructure for bridges shall include all materials (except those noted below) shown in the top of the element on or below as the case may be, and between the extremities of points, including concrete Class A, reinforcing steel, prestrained concrete griders, deck slabs, diaphragms, alleys, curbs/pavers, earthquake restraints, collar bearings, concrete for prestressed and precast components, prestressed steel, expansion joints, inserts, compression shoes, elastomeric pads, bridge decks with reducers, and electrical conduit/expansion flanges excised in concrete.

EXCEPTION: Items excluded under "Superstructure" are the following:

(a) Metal traffic and pedestrian railings and posts.

(b) Steel bridge bearings, steel and reinforced concrete transverse stops.

(c) Dowels.

(d) Painting.

(e) Light poles (standards) or lampstands and other electrical-related items specified elsewhere herein except as otherwise noted above.

The superstructure contains the approximate quantities of materials as listed in the Special Provisions. The quantities listed are for major items only and are not intended to be a complete list of all items required for construction of the superstructure. The quantities are approximate and are for the convenience of the contractor in determining the volume of work involved and are not guaranteed to be accurate. The prospective bidders shall verify these quantities before submitting a bid. No adjustments other than for approved changes will be made in the lump sum contract price for "Superstructure," even though the actual quantities required may deviate from those listed.

37
CONCRETE STRUCTURES

6-02.3(28) BRIDGE DRAINS (New Section)
The Contractor shall furnish and install drains in the roadway slab, of the type specified in the Drawings and at the locations shown therein.
Drain drains shall meet the requirements of Section 9-06.19.

6-02.3(29) DOWNSPOUTS (New Section)
The Contractor shall furnish and install 4 or 6 inch standard weight steel pipe downsputs at the locations shown and as detailed in the Drawings.
The downsputs shall be full length pipe sections in all straight runs. If approved by the Engineer, the Contractor may use other types of couplings and fittings In lieu of the approved couplings and fittings shown in the Drawings, provided they are equal and are approved by the Engineer.
The portion of downsputs in or near drain pipe constructed with concrete shall be fully exposed in a grove either composed 1/2 inch thick and meeting the requirements of ASTM Designation C 143 Type No. 7, except the color requirement is waived.

6-02.3(30) DRILLING HOLES IN CONCRETE (New Section)
The Contractor shall drill holes in the existing concrete facilties as shown and noted on the Drawings. The diameter of holes shall be as follows:

<table>
<thead>
<tr>
<th>Diameter of Holes for #8 Bars</th>
<th>2-3/4&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter of Holes for #11 Bars</td>
<td>2-1/4&quot;</td>
</tr>
<tr>
<td>Diameter of Holes for #13 Bars</td>
<td>1-7/8&quot;</td>
</tr>
<tr>
<td>Diameter of Holes for #16 Bars</td>
<td>1-3/4&quot;</td>
</tr>
<tr>
<td>Diameter of Holes for #9 Bars</td>
<td>1-7/8&quot;</td>
</tr>
<tr>
<td>Diameter of Holes for #8 Bars</td>
<td>1-5/8&quot;</td>
</tr>
<tr>
<td>Diameter of Holes for #7 Bars</td>
<td>1-1/8&quot;</td>
</tr>
<tr>
<td>Diameter of Holes for #6 Bars</td>
<td>1-1/4&quot;</td>
</tr>
<tr>
<td>Diameter of Holes for #5 Bars</td>
<td>7/8&quot;</td>
</tr>
<tr>
<td>Diameter of Holes for #4 Bars</td>
<td>3/4&quot;</td>
</tr>
</tbody>
</table>

For threaded rod, 1/4" larger than the outside diameter of the rod.
The holes to be drilled in the existing concrete shall be drilled with equipment that will not fracture or damage the existing concrete which is to receive or fracture the aggregate that surrounds the hole. Jackhammers shall not be used to drill holes. The method used to drill the holes shall provide a fracture free surface in which to epoxy bond the bars and/or threaded rods.
The Contractor shall demonstrate his proposed method or methods of drilling the holes to the Engineer for approval. If the Engineer rejects the Contractor’s proposed methods, the Contractor shall use other means of drilling the holes which will give the required results.

Any damage caused by the Contractor’s methods or equipment used in drilling holes shall be repaired by the Contractor at his own expense. Tools classified as demolition tools shall not be used.

6-02.3(31) EPOXY IN DRILLED HOLES (New Section)
Reinforcing bars or threaded rods shall be secured in drilled holes in the existing concrete where indicated on the Drawings with an epoxy cement, grout or mud. The epoxy shall consist of an attractive Engineers Commercially Available Epoxy Resins such as Altivec Engineers Commercially Available Epoxy Resin for vertical bars or rods or Concrobium 1441 for horizontal bars or rods. For epoxy resins other than those specified above, the Contractor shall submit a test report from a testing laboratory approved by the Engineer verifying that the applied temperature range of the concrete, heat deflection temperature (AEM 8648), and solid shear strength (AEM 1225) are equal to or better than the epoxy resins specified.
The Contractor shall place the reinforcing steel and/or threaded rods scheduled to be embedded in the existing concrete, in the following manner:
(a) Sandblast the section of reinforcing steel and/or threaded rods, scheduled to be embedded in the existing concrete to white metal (see note below).
(b) Prime the section of reinforcing steel and/or threaded rod which has been sandblasted to white metal (see note below).
(c) Dry the drilled hole thoroughly immediately before placing the epoxy by clean, hot air, or by flame. If flame is used, only that produced with propane gas will be allowed.
(d) Place the epoxy in the drilled hole in such a manner as to prevent the formation of air pockets.
(e) Clean the primed epoxy surface of the reinforcing bar and/or threaded rod with a clean rag dipped in a solution of methyl/ethyl ketone or acetone.
(f) Insert the reinforcing bar and/or threaded rod into the drilled holes. In the horizontal drilled holes, clean the annular space between the entrance of the hole and the bar and/or threaded rod with lead wool or approved equal.

NOTE: For factory coated epoxy bars, Steps 1 and 2 shall be omitted.

6-02.3(31) REPAIR OF SMELLED AND DETERIORATED CONCRETE (New Section)

6-02.3(31A) DESCRIPTION (New Section)
The work shall consist of cleaning and repairing loose, spalled, and deteriorated concrete at locations indicated on the Drawings and in accordance with the following requirements.

6-02.3(31B) CLEANING AND PREPARATION (New Section)
The Contractor shall remove all loose, defective and deteriorated concrete by chipping with pneumatic chipping hammers, hand tools, or high pressure water jets. All cracks and cavities shall be dipped to such formation that their sides are approximately perpendicular to the exposed surface forming a smooth shoulder for at least 1/2 inch in depth. In addition to chipping, all concrete to be repaired shall be cleaned by flushing with water and compressed air jets. The cracks shall have sufficient air pressure to assure removal of all dirt, grime, oil, moss and loose particles. Cleaned surfaces shall be free of all dirt, grime, oil, moss scale, and rust before repairs are made.

Concrete shall be taken in removing concrete to prevent overbreakage. Concrete shall be carefully broken away from reinforcing bars where applicable, to prevent damage to steel reinforcement.

6-02.3(31C) REPAIRS (New Section)
The Contractor shall have the option of making the concrete repairs with the best methods available subject to the approval of the Engineer. No proposed methods are outlined below:
(a) Hand placed cement grout with approved epoxy bonding agent.
(b) Quick-set concrete as approved by the Engineer.

Hand placed and cement grout shall be used only on the smaller spalled areas with a depth of 1/2 inch or less. All repairs shall be finished to the original size and contour of the member being repaired.
Spall depths over 1 inch shall be repaired with 6 x 4 Mohs-3 aluminum fabric secured to the existing concrete with 6-8 inch ties, with anchors and 16 gauge wire ties. Welded wire fabric shall clear the new concrete by a minimum of 1/4 inch, preferably 3/8 inch. Location, spacing and type of anchor subject to approval of the Engineer.
6-02.3(33) EPOXY INJECTION OF CONCRETE CRACK (New Section)

6-02.3(33) GENERAL (New Section)

Cracks in existing concrete shall be repaired by epoxy injection where indicated on the drawings or where directed by the Engineer in accordance with the following specifications. The Contractor shall submit a procedure for epoxy injection to the Engineer for approval two weeks prior to performing this portion of the work.

The material used as a surface seal must be able to provide adequate strength and adhesion to hold injection ports firmly in place and to resist injection pressures adequately to prevent leakage during injection.

The epoxy resin system for crack injection shall be a Type I, Grade I system conforming to ASTM C91 except for the following requirements:

(a) Gel Time

20 Minutes Minimum

(b) Viscosity

200 Centistoke Medium

(c) Shrinkage

Not Required

(d) Heat Deflection Temperature

130°F. Minimum

Gel time shall not apply if continuous flow nozzle mixing injection equipment is used.

The injection equipment shall have the capability of discharging the mixed adhesive at pressures up to 200 psi and maintaining that pressure.

6-02.3(33) GUIDELINES (New Section)

Concrete cracks over 1/32-inch thick and as designated and marked by the Engineer for injection shall be repaired as follows:

(a) Before repair work begins, cracks shall be free from loose or foreign matter such as dirt or dissolved lime, silt, grime, salt or any other contaminants. Acidic and corrosive shall not be used as cleaning agents.

(b) Entry ports shall consist of tubes, trees, or other valve devices suitable for accepting epoxy injection resin under pressure and shall be provided along the crack at intervals of not less than 2 feet, beginning with the nearest to the crack. For thick sections (2 feet plus), entry ports may be spaced at distances as recommended by the manufacturer or directed by the Engineer. The holes for the entry ports shall be drilled with a hollow bit with an attached vacuum to remove dust from becoming embedded in the crack.

(c) Prior to injection of the crack, the surface sealing system shall be applied to the face of the crack and around entry ports to attain a seal capable of withstanding the applied injection pressure. For through cracks, the surface seal shall be applied to all accessible faces.

The surface seal shall be allowed to gain adequate strength before proceeding with the injection. However, prior to epoxy injection, crack sheets shall be applied to determine if the crack is capable of epoxy injection (all detected cracks not of adequate means that crack is injectable). If not injectable, entry port shall be temporarily abandoned and procedure repeated at adjacent ports. At a later time, previously non-injectable cracks should be given a second air injection test.

The injection of the adhesive into each crack shall begin at the entry port at the lowest elevation. Injection of deep cracks shall be done from the top side; shallow cracks may require injection from both sides. The injection pressure shall be increased at the first port until the injection adhesive begins to flow out of the port at the next higher elevation. The first port will advance upward and injection started at the second port until adhesive flows from the next port. The entire crack shall be injected in the same sequence. If port to port travel of epoxy adhesive is not indicated, the work shall immediately be stopped and the Engineer notified. All wide cracks where resin travel between ports will be rapid, one or two ports may be skipped simultaneously. In exceptionally large cracks, a formation (sealant pipe) over crack width, adequate temperature, humidity requirements and other variables of epoxy and fine sand shall be used as approved by the Engineer.

6-02.3(33) SUBSTANCES (New Section)

The Contractor shall submit the following documentation for approval along with the bid:

(a) Application's Qualifications: a list of projects, dates, locations, contacts, and contact's telephone number for successful epoxy resin repairs on concrete structures.

(b) Epoxy Injection Adhesive: After award of contract, the epoxy manufacturer shall provide material specifications and test report.

6-02.3(34) BUILDING NEW CONCRETE TO EXISTING CONCRETE (New Section)

Surface to which new concrete is to be bonded shall be rough and clean. Loosen rust, dust and dirt shall be removed by abrasive blasting or wire brushing followed by thorough washing with high pressure water jet prior to application of new materials. Oil or film of any sort that may reduce the bond of the new material to the old concrete will not be permitted.

Building surfaces between old and new concrete shall be treated in the following manner after the free water has dried from the area.

The surface shall be coated with epoxy resin forming a 10-15 mil thickness. The epoxy surface shall air dry for a minimum of 24 hours before new concrete is placed. If the concrete has absorbed the adhesive, as evidenced by a dull appearance, apply another coat. The new concrete shall then be placed above the previously coated surface.

Epoxy resin shall conform to the requirements of ASTM C91 for Type I, Grade I, Class A, B, or C depending on the temperature of the existing concrete. The shrinkage test in ASTM C91 is not required. Refer to Section 9-56 of the Standard Specifications.

6-02.4 MEASUREMENT

Delete this section and replace with the following:

Measurement for Concretes (Concrete) shall be by the cubic yard in place. Measurements will be to the nearest inch of the structure as shown on the drawings unless authorized otherwise in writing by the Engineer. Claims in the case of continuous concrete will be made based on the established elevation of the bottom of the footing or slab and no deduction will be made for pile heads, reinforcing steel, structural steel, bolts, wax rings, #10 rebar, columns, batters, bridge decks, joint fillers, joint boxes, miscellaneous hardware and conduit and drain pipes under 2 inches diameter.

Class D or IX concrete, when used in the masonry of undersea concretes, will be paid for on the basis of the actual volume deposited as determined by the average cross-sectional area of the hole of the
cofferdam except that no payment will be made for the volume so determined which is outside of an area which is bounded by vertical planes 1 foot outside of the exact lines of the wall. The limiting vertical planes shall be parallel to the location of the next basalt above and adjacent to the wall as shown on the drawings.

Measurement for "Reinforcing Bar" will be by the pound in place as calculated from the drawings. No allowance will be made for splices, hooks, wire clips or other fastenings, which must be furnished by the Contractor. When rebar is extended beyond the end of the wall, the lesser end shall be included in the measurement; the excess portion shall be disregarded. When steel plates are required for construction joints which are not shown in the drawings, and which are specified for the Contractor's convenience, no allowance will be made for the additional steel required.

Measurement for "Superstructure" will be by linear yard. Separate measurement will not be made for these quantities described in Section 6-02.327 as being included with the "Superstructure."

When a bid item for "Superstructure" is included on the Bid Form, no measurement will be made for concrete or reinforcing steel placed in the areas defined as superstructure.

Measurement for "Reinforcing Bar, Epoxy Coated" will be by the pound before epoxy coating is applied, as set forth above for uncoated steel reinforcing bars.

Measurement for "Wire Mesh (Gage) (Mesh Size)" will be by the square yard for the area covered as calculated from the drawings. No extra allowance will be made for required splicing of mesh.

Measurement for "Expansion Joint (Type)" or "Expansion Seal (Type)" will be made at or between the adjacent expansion joints where there is a bid item for "Superstructure." Otherwise, Measurement for "Expansion Joint (Type)" or "Expansion Seal (Type)" will be per linear foot along the slope including length along waler joints.

Measurement for "Dowels, Galvanized Steel Pipe (Diameter)" will be by the linear foot along the center line of the pipe through fittings, except when there is not an item for dowels in the Bid Form, in which case no separate payment will be made.

Measurement for "Drill Holes for Dowels" will be by the linear foot of holes drilled.

Measurement for "Repair of Spalled and Delaminated Concrete" will be by linear yard.

Measurement for "Injection of Concrete Crack" will be by linear yard.

Measurement for gravel backfill for drains will be by the cubic yard as Mineral Aggregate (Type) per Section 1-06.11.

6-02.5 REBAR

Delete this section and replace with the following:

Cementation for the cost necessary to complete the work described in Section 6-02 will be made at the unit contract prices bid for the work described in Section 6-02.62

(1) "Concrete (Class) (One)," per cubic yard.

(2) "Reinforcing Bar," per pound.

(3) "Wire Mesh (Gage) (Mesh Size)," per pound.

(4) "Expansion Joint (Type)," per linear foot.

(5) "Expansion Seal (Type)," per linear foot.

(6) "Dowels, Galvanized Steel Pipe (Diameter)," per linear foot.

(7) "Superstructure," per linear foot.

(8) "Drill Holes," per linear foot.

(10) "Repair of Spalled and Delaminated Concrete," per linear yard.

(11) "Epoxy Injection of Cracks," per linear yard.

(12) "Bridge Drains," per each.

The unit contract price for "Concrete (Class) (One)" shall include all costs for the work required to furnish and install structural concrete in place including all forms, concrete, expansion joint material, and construction of any holes including gravel backfill. The unit contract price will not include concrete in the superstructure when this is covered by a separate bid item.

The unit contract price for "Reinforcing Bar" or "Steel Reinforcing Bar, Epoxy Coated" shall include all costs for the work required to furnish, fabricate, cost, and place the steel reinforcement as specified, and to provide a bar list/being diagram. In structures of reinforced concrete where there are no structural steel bid items, each size metal pipe as expansion joints, bearing assemblies, and holes will be paid for at the unit contract price for reinforcing steel unless another item is included in the Bid Form, in which case the cost of the reinforcing steel in the superstructure shall be incidental to the bid item "Superstructure."

The unit contract price for "Wire Mesh (Gage) (Mesh Size)" shall include all costs required to furnish and place the mesh as specified.

The linear yard contract price for "Superstructure" shall include all costs for the work required to furnish and install all items described herein to be complete as specified. No separate payment will be made for these items described in Section 6-02.327 as being included with the "Superstructure." All costs in connection with lifting, transporting, and smoothing grinders including figures, shores for leveling, grout cutting and leveling, rebar for shields, cutting, blending, grinders and shakers, and special construction features shall be included in the lamp as contract price for "Superstructure."

The unit contract price for "Expansion Joint (Type)", shall include all costs to furnish and install the complete expansion joint system as specified, including hardware and rebar joints. Refer to Section 6-04.1, paragraph 7 herein.

The unit contract price for "Expansion Seal (Type)" shall include all costs for the work required to furnish and install the expansion seal in place. All costs in connection with the expansion seal to the dead load uplift, grout cutout, rebar and displacement, both during construction and in use, including rebar joints, shall be included in the unit contract price for "Expansion Seal (Type)."

The unit contract price for "Dowels, Galvanized Steel Pipe", shall be full compensation for all costs in connection with furnishing and installing the dowels, including shop drawings, field measuring, galvanizing, and other items necessary to make a complete construction as specified.

The unit contract price for "Drill Holes" shall include all costs for the work required to perform the drilling as specified.

The unit contract price for "Repair of Spalled and Delaminated Concrete" shall include all costs for the work specified in Section 6-02.327.

The unit contract price for "Epoxy Injection of Cracks" shall include all costs for the work specified in Section 6-02.327.

All necessary items not specifically listed as a contract bid item in the Bid Form, and payment is not otherwise provided, shall be considered to be included in the various items comprising this improvement. No separate payment will be made.

Concrete excavation, forming, stripping, and cofferdams will be paid in accordance with Section 2-04.

Gravel backfill for walls and gravel backfill for ditches shall be paid as Mineral Aggregate (Type) in accordance with Section 6-01.5.

Structural rework will be paid in accordance with Section 2-02.

The unit contract price for "Bridge Drains" shall be full compensation for all materials, labor, and equipment necessary to install drain and grade to structure. Dose shall be Veneer Grate.
SECTION 6-03 - STEEL STRUCTURES

6-03.3(8) SHOP PLANS
Delete paragraph 2 and replace with the following:
The Contractor shall submit shop detail plans in accordance with Section 1-03.3, except that for grade separation structures which carry a railroad over a highway, additional sets are required for each railroad company involved. Sheets returned for correction shall be corrected, and the required number of corrected sheets shall be submitted for approval. No material shall be fabricated until the plans have been approved by the Engineer.

6-03.3(9) SUBSTITUTIONS
The second sentence is revised to read:
Should the substitution of header numbers be allowed upon the Contractor's request, the substitution shall be at no additional cost to the Owner.

6-03.3(14) PAINTWORK
This section is revised to read:
All paintwork and forms shall conform to the requirements specified in Section 6-02.

6-03.3(20) APPLICATION
All paint shall be applied by brushing unless other methods are specifically stated in the Special Provisions or authorized in writing by the Engineer. Painting shall be done in a system prescribed by competent painters yielding a minimum thickness in accordance with Section 6-07.3(6) of the Standard Specifications.

6-03.3(28) ASSEMBLING AND BOLTING
Delete paragraph 8 and replace with the following:
Where bolted connections are shown in the Drawings or specifically authorized, all bolts, nuts, and washers shall conform to the specifications for material and assembly of structural bolts using high strength steel bolts as provided in Division 1, Design, Article 10.3, and Division 11, Construction, Articles 10.3 and 10.17 of the current AASHTO Standard Specifications for Highway Bridges.

6-03.4 MEASUREMENT
Delete paragraph 1 and replace with the following:
Structural carbon steel, structural low alloy steel, and structural high strength steel will be measured by the pound.

6-03.5 REMARK
Delete first 3 bid items and replace with the following:
(1) "Structural Carbon Steel" per pound.
(2) "Structural Low Alloy Steel" per pound.
(3) "Structural High Strength Steel" per pound.
Delete paragraphs 2, 3, 4, and replace with the following:
The contract bid price per pound for the items listed above shall be full compensation for all costs in connection with furnishing all materials, labor, tools and equipment necessary for manufacture,
6-04 - TIMBER STRUCTURES

6-04.360 BOLTS, WASHERS AND OTHER HARDWARE

Delete paragraph 4 and replace with the following:

When flat head bolts are specified, washers shall be used under the nuts only. Details for flat head bolts shall be as shown on the Drawings.
P = \frac{200(HA)}{W} \text{ for double-acting hammer or}
\frac{300(A)}{W} \text{ for single-acting hammer}

Where P = \text{safe bearing pressure in pounds},
W = \text{weight in pounds of driving parts of hammer},
H = \text{drop of hammer or stroke of ram, in feet},
A = \text{area of platen in square inches},
g = \text{steam pressure in pounds per square inch at the hammer},
\beta = \text{average penetration in inches per blow for the last 5 to 10 blows for gravity hammer and the last 10 to 20 blows for steam or air hammers}

* For closed and diesel hammers (double acting) the energy (W) is to be determined from the bounce chamber reading. Bounce chamber gauge is to be calibrated for each project.

**6-05.3(3)c PLACING CONCRETE**

The first paragraph is repeated by adding the following after the second sentence:

Such vibration shall extend 25 feet below the top of the pile or to the bottom of the pile, whichever is less.

**6-05.3(3)c INTERPRETATION OF BEARING CAPACITY (New Section)**

Bearing capacities of prestressed concrete piling shall be determined by the formulas under Section 6-05.3(3)B.

**6-05.4 MEASUREMENT**

Delete paragraphs 2 and 3, and replace with the following:

Measurement for furnishing concrete pile (untreated or new treatment) shall be the number of linear feet actually driven below cutoff.

Measurement of composite piles made with 2 or more pile sections spliced together as 1 pile shall be the number of linear feet actually driven below cutoff for each type of pile used. Measurement is to be made in accordance with the requirements of Section 6-05.3(3)B.

Delete paragraphs 5, 6, and 7, and replace with the following:

Composite pile made with an untreated timber lattice section and a reinforced concrete upper section spliced together will be considered as one pile. Measurement will be the number of linear feet actually driven below cutoff for each type of pile used. Measurement for furnishing concrete piling will be as follows:

Prestressed concrete and posttensioned concrete piling: Measurement will be the number of linear feet actually driven below cutoff.

Cast-in-place concrete pile: Measurement will be the number of linear feet actually driven.

Measurement for furnishing steel piling will be the number of linear feet actually driven below cutoff.

**6-05.5 PAYMENT**

Delete paragraph 2 and replace with the following:

Payment shall be made for the unit contract price per foot for "Furnishing and Driving (Spliced) Best Piles" which price shall be full compensation for furnishing and driving best piles, and furnishing and installing a pile tip when pile tip is specified for the permanent piles, preceding when specified is specified for the permanent piles, to the bearing capacity or penetration required by the Engineer and for pulling the piles or cutting them off, as required, and for removing them from the site or for delivering to the Buyer for salvage when ordered by the Engineer.

This price shall also include all costs in connection with moving all pile driving equipment or other necessary equipment to the site of the work and for removing all such equipment from the site after the piles have been driven. If, after the best piles have been driven, it is found necessary to eliminate the driving piles altogether or any part thereof, the additional compensation shall be allowed for removing the pile driving equipment to and from the site of the work.
6-06.5 PAINTING

Supplement paragraph 1 with the following item:

(3) "Metal Railings (Type)," per linear foot.
The Contractor shall construct sidewalk drains where indicated on the Drawings or where designated by the Engineer.

Where shown on the construction plans for sidewalks or directed by the Engineer, 4-inch approved drain pipe shall be placed under the sidewalk in 1 length and extended across the planting area to the roadway gutter line, or if existing, through curb. See the Standard Plans.

The slope of the 4-inch drain pipe will be established in the field by the Engineer at the time of excavating for the sidewalk construction.

Sidewalk drain pipe will be paid for on a basis of linear feet for inlet depths at the gravel pocket.

The unit contract price shall include all labor, tools, drain in accordance with the details shown on the Standard Plans, including an excavation at the inlet end of the pipe to make a gravel pocket corresponding to that shown on the Standard Plans, Section 1/4, there is a minimum of 3 feet in length parallel to the back of the sidewalk.

One end of the drain pipe shall terminate at a gravel drain behind the sidewalk. The opposite end of the drain pipe shall terminate at the gutter line or face of the curb. Where curb exists or new curb is to be installed under the contract, the curb side terminus of the drain pipe shall be covered in an 8-inch x 24-inch reinforced cement concrete curb block of the depth indicated on Standard Plan No. 281.

The gravel drain shall be 12 inches x 12 inches and of the length indicated on the Drawings.

Clearances between water mains and drains shall be maintained per Section 1-07.17(1).

### 7-01.4 MEASUREMENT

Delete this section and replace with the following:

Measurement for "Pipes, Perforated, (Type), (Size)"

Measurement for "Branched Filter Material" will be per cubic yard based on the next line cross section indicated on the Drawings.

Measurement for "Filter Fabric" will be per square yard installed. Measurement will not be made for extra fabric required to meet overlap requirements.

Measurement for "Sidewalk Drain, 4-Inch, Type 281" will be by the linear foot of drain pipe.

Measurement for "Transit Drain, Type 281," will be by the linear foot of drain.

### 7-01.5 PAYMENT

Delete this section and replace with the following:

Compensation for the cost necessary to complete the work described in Section 7-01 will be made at the unit contract prices only for the pay items listed or referenced below:

1. "Pipes, Perforated, (Type), (Size)," per linear foot.
2. "Branched Filter Material" per cubic yard.
3. "Filter Fabric" per square yard.
4. "Sidewalk Drains, 4-Inch, Type 281" per linear foot.
5. "Transit Drain, Type 281" per linear foot.

The unit contract price for "Pipes, Perforated, (Type), (Size)"

The unit contract price for "Branched Filter Material"

The unit contract price for "Filter Fabric"

The unit contract price for "Transit Drains, Type 281" shall include all costs for the work required to furnish and install the pipe.

The unit contract price for "Branched Filter Material"

The unit contract price for "Filter Fabric" shall include all costs for the work required to furnish and install the filter fabric.

The unit contract price for "Transit Drains, Type 281" shall include all costs for the work required to furnish and install the filter fabric.
SECTION 7-04 - STORM SEwers

Delete Section 7-04 in its entirety. Refer to Section 7-17.

SECTION 7-05 - MANHOLE, GRATE INLETS, DROP INLETS, AND CATCH BASINS

Delete the title and content of Section 7-05 in its entirety and replace with the following:

SECTION 7-05 - MANHOLE, GRATE BASINS, AND INLETS (New Section)

7-05.1 DESCRIPTION (New Section)

This work shall consist of excavation, shoring, foundation preparation, bedding, backfilling, compacting and disposal of surplus material for the construction of manholes, catch basins and inlets.

All work, including excavation, foundation preparation, backfilling and compacting for the construction of manholes, catch basins, and inlets shall meet the general construction requirements of Section 7-17.

7-05.2 MATERIALS (New Section)

Materials shall meet the requirements of the following sections of these Specifications:

- Reinforced Concrete
- CIP
- Grouting
- Concrete Manhole Units
- Concrete Block
- Clay Brick
- Steel Fittings
- Concrete Manhole Components
- Precast Concrete Manholes
- Trenches
- Joists
- Rubber Gasket

Manholes, catch basins and inlets shall be constructed of pre-cast units in accordance to Standard Plans. Any deviations from Standard Plans will be subject to a shop drawing submitted by Contractor and approved by the Engineer. Concrete blocks or clay bricks may be used for adjustment of the casing to final street grade.

Joints between manhole elements shall be rubber gasket.

7-05.3 CONSTRUCTION REQUIREMENTS (New Section)

7-05.3.1 FOUNDATION PREPARATION (New Section)

7-05.3.1A EXCAVATION (New Section)

Excavation of manholes and catch basin excavations shall conform to the requirements for trench excavations in Section 7-17.3.1A.

7-05.3.1B BASE PREPARATION (New Section)

Adequate foundation shall be obtained by removal of unstable material and replacement with well graded granular material, or with course ballast rock, or by such other means as provided for foundation preparation of the connected sewer, or be provided by the Special Provision. Where water is anticipated, a one-piece waterproof membrane, so placed as to prevent any movement of water into the fresh concrete.

7-05.3.2 CURING FOR PRECAST BASE SECTION (New Section)

Unless otherwise provided in the Special Provisions or directed by the Engineer, manholes and catch basins constructed with precast base sections shall be placed to grade upon a 4-inch thickness of isothermal aggregate Type V per Section 7-05 along with 4 parts of portland cement, per cubic yard of aggregate, with sufficient water added to form a stabilized layer. The mixed material shall be
placed across the entire width of the base excavation and leveled so as to provide bearing contact with the entire bottom area of the precast base section.

7-05.3.3 BEDDING FOR CAST-IN-PLACE BASE SECTION (New Section)

Molds shall be constructed of cast-in-place bases shall be poured to grade upon undisturbed earth or any concrete 4 inches of mineral aggregate Type 2 to be compacted in place prior to pouring the base. The Mineral Aggregate shall be placed across the entire width of the excavation and leveled. The base shall be poured to thickness as specified in the Standard Plans.

7-05.3.4 MARKERS WITH NONMELTING BASE (New Section)

The nonmelting concrete base markers shall be constructed as shown in the Standard Plans. The marker base sections shall be formed and cast in place around the existing large diameter pipe.

7-05.3.5 DIMENSIONS (New Section)

Molds, catch basins, or inlets shown on the Drawings shall conform in all respects to the applicable requirements in the corresponding Standard Plans for each type specified.

7-05.3.6 PRECAST MARKERS (New Section)

7-05.3.6.3A PRECAST BASE (New Section)

The base section shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment, and ensuring that all entering pipes can be inserted on proper grade.

All lift holes shall be thoroughly wetted and then completely filled with mortar, and smoothed both inside and out to ensure watertightness. All joints between precast sections shall be rubber-studded joints.

Precast sections shall be placed and aligned to provide vertical sides and vertical alignment of the ladder run. The completed section shall be rigid, true to dimension, and watertight.

In precast section sections where steel rebar has been provided in lieu of lift holes, the holes shall be covered flush with the inside wall surface after the section has been completed. No sharp corners shall be left at any junction.

Spalling occurs as a result of the slow removal, the spalled area shall be restored in a workable manner to a uniform smooth surface with mortar.

7-05.3.6.1 CAST IN PLACE BASE (New Section)

The first precast section shall be placed on the nonmelting base structure before the base has been taken initial set, and shall be carefully adjusted to true grade and alignment with all inlet pipes properly installed so as to form an integral, watertight unit; or the section shall be mortared into a suitable groove provided in the top of the nonmelting base. The first section shall be uniformly supported by the base concrete, and shall not bear directly on any of the pipes.

All lift holes and all pipes between precast elements and cast-in-place bases or structures shall be thoroughly wetted, completely filled with mortar, and smoothed both inside and out to ensure watertightness.

Precast sections shall be placed and aligned so as to provide vertical sides and vertical alignment of the ladder run. The completed section shall be rigid, true to dimension, and watertight.

7-05.3.7 VACANT

7-05.3.8 SHIP FABRICATED CORRUGATED METAL MARKERS (New Section)

Shop fabricated corrugated metal markers shall be constructed in strict accordance with the Drawings and shop drawings as approved by the Engineer, and shall conform to all applicable provisions of these Specifications.

108
7-05, 7-05(14) RELOCATE EXISTING CATCH BASIN OR INLET (New Section)

Work required for relocation of existing catch basins or inlet shall include necessary excavation to ensure that no damage is caused, replacement of existing catch basins or inlet, the frame and grate or cover and transporting the new location where shown on the drawings or directed by the Engineer. The excavation, placement, backfill, and compaction shall be in accordance with Section 7-05.

7-05, 7-05(15) REBUILD EXISTING CATCH BASIN (New Section)

Where noted on the drawings, the Contractor shall rebuild existing catch basins to accommodate a new pipe or grate. Work required to rebuild catch basins includes excavation, the removal of the existing frame and grate, leveling bedding, upper portion of catch basin chamber, and installing a new cone section, leveling bedding and new frame and grate. Excavation, backfill, and compaction shall conform to the applicable portions of Section 7-05.7. Salvage shall be in accordance with Section 7-05.37.

7-05, 7-05(16) BACKFILL (New Section)

Backfill around the manhole above the pipe zone shall consist of selected native material and shall conform to the applicable provisions of Section 7-05.33. "Backfilling Sewer Structures." Compaction of backfill shall be by means of mechanical rollers to 95% of maximum density in accordance with Section 7-05.32.1 "Compaction of Backfill.

Backfill and compaction of backfill around a catch basin shall provide adequate foundation support for shallow inlet and outlet connection pipe, and shall meet requirements for backfill and compaction around a manhole as stated above.

7-05.4 MEASUREMENT (New Section)

Measurement for "Manhole (Type)" will be per each.
Measurement for "Extra Depth (Type)" Manhole," will be the vertical foot for all depth in excess of 10 feet measured from the invert of the outlet pipe to the top of the casing.
Measurement for "Replaced Manhole," will be per each.
Measurement for "Catch Basin (Type)" will be per each.
Measurement for "Inlet (Type)" will be per each.
Measurement for "Rebuilt (Item)" will be per each.
Measurement for "Relocated (Item)" will be per each.

7-05.5 PAYMENT (New Section)

Compensation for the cost necessary to complete the work described in Section 7-05 will be made at the unit contract prices bid only for the items listed or mentioned below:

(1) "Manhole (Type)," per each.
(2) "Extra Depth, (Type) Manhole," per vertical foot.
(3) "Replaced Manhole," per each.
(4) "Catch Basin (Type)," per each.
(5) "Inlet (Type)," per each.
(6) "Rebuilt (Item)," per each.
(7) "Relocated (Item)," per each.

The unit contract price for "Manhole (Type)" shall include all costs for furnishing and installing manholes complete to finish street grade, including excavation, bedding, mortar, non-shrink grout, brick, block, castings, chemicing, ladder, steps, connections to pipelines and backfill with suitable native material, for a manhole depth up to and including 10 feet.

The unit contract price for "Extra Depth, (Type) Manhole" shall include all costs for the work required to construct the portion of a manhole in excess of 10 vertical feet deep.

The unit contract price for "Replaced Manhole," shall include all costs to complete the manhole chemicing work as specified in Section 7-05.37.31 when performed in an existing manhole.

When a newly constructed manhole and cover casting has been completed to the finished grade set by the Engineer, and is later required to be adjusted up or down to a revised grade by the Engineer, the adjustment shall be paid in accordance with Section 7-05.

The unit contract price for "Catch Basin (Type)," shall include all costs for the work required to furnish and install the catch basins including inserts, excavation and backfill with native material, adjustment brick and block, mortar, non-shrink grout, plaster, and castings.

The unit contract price for "Inlet (Type)," shall include all costs for the work required to furnish and install the inlet including excavation, brick, block, mortar, and castings.

When directed by the Engineer, "Mineral Aggregate Type 17 on other material acceptable to the Engineer shall be used as backfill and paid for per Section 4-01.5.

Payment for "Extra Excavation," will be per Section 2-03.
Payment for foundation material, when required by the Engineer, will be paid as "Mineral Aggregate (Type)" according to Section 7-05.5.
SECTION 7-06 - CONCRETE PIPE ANCHORS

7-06.3 MEASUREMENT
Delete this section and replace with the following:

7-06.4 MEASUREMENT
Payment for "Pipe Anchor," will be by each.

7-06.5 PAYMENT
Compensation for the cost necessary to complete the work described in Section 7-06 will be made at the unit contract price bid for the following items when included in the Bid Plans:

1) "Pipe Anchor," per each.

The unit contract price for "Pipe Anchor," shall include all costs for the work specified in Section 7-06.

SECTION 7-07 - CLEANING EXISTING DRAINAGE STRUCTURES

7-07.3 MEASUREMENT
Delete this section and replace with the following:

7-07.4 PAYMENT
Delete this section and replace with the following:

All work described in Section 7-07 shall be considered incidental to the various bid items comprising this improvement. No separate payment will be made.
7-08  MISCELLANEOUS PIPE CONNECTIONS (New Section)

SECTION 7-08  MISCELLANEOUS PIPE CONNECTIONS (New Section)

7-08.1 DESCRIPTION (New Section)
This work shall consist of excavation, foundation preparation, bedding, backfilling and connecting for the construction of miscellaneous sanitary sewer and drain appurtenances other than those described in Sections 7-06 and 7-17.

7-08.2 MATERIALS (New Section)
Pipe used for connections as herein described shall conform to the applicable requirements in Section 9-05.

7-08.3 CONSTRUCTION DETAILS (New Section)

7-08.3.1 EXCAVATION AND BACKFILL (New Section)
Trench excavation and backfill shall be as specified in Section 7-17.

7-08.3.2 CONNECTIONS TO EXISTING STORM AND SANITARY SEWERS (New Section)
When making a connection to an existing storm drain, sanitary sewer line or manhole, the Contractor shall excavate and expose the existing facility where shown on the drawings. In the event there is no existing tee or eye, refer to Section 7-17.2.3 for the necessary excavation.

7-08.3.3 PIPE LAYING, JOINTING AND TESTS (New Section)
Pipe laying, bedding, jointing and backfilling, and pipe connections shall conform to the applicable requirements of Section 7-17. Testing for acceptance as provided in Section 7-17.3.4) will not be required.

7-08.3.4 CATCH BASIN CONNECTIONS (New Section)
Catch basin connections are pipe lines connecting outlets of catch basins to a sewer, storm drain, or other facility. Both the alignment and the slope shall be as shown on the drawings. The direction of the outlet connection shall be as directed by the Engineer. In no case will 90-degree bends be allowed.

7-08.3.5 INLET CONNECTIONS (New Section)
Inlet connections are pipe connections from drainage inlets to catch basins or other approved outlets. Inlet connections shall be laid grade from catch basin outlets or other connections to straight alignment and be on a uniform slope. Where a straight alignment is not feasible and curves are necessary, the curved alignment shall be made by deflecting each pipe into a smooth curve. Bends shall not be used. Deflection shall not exceed that necessary to maintain a watertight connection at each pipe joint.

7-08.3.6 DROP CONNECTION (New Section)
All drop connections, used in connection with different types of manholes to allow for abrupt drop in elevation of the sewer line, shall be constructed of ductile iron pipe in accordance with Standard No. 231. Drop connections shall be constructed at the location indicated on the drawings and shall match the given design invert elevations.

7-08.4 MEASUREMENT (New Section)
Measurement for "Catch Basin Connection," will be by the linear foot of pipe installed between the tee or eye in the receiving main pipe and the inside face of the catch basin.
Measurement for "Inlet Connection," will be by the linear foot of pipe installed between the inside face of the inlet, and the inside face of the catch basin.
Measurement for "Drop Connection," will be by the vertical foot from the invert at the head to the invert at the base.

7-08.5 PAYMENT (New Section)
Compensation for the cost necessary to complete the work described in Section 7-08 will be made at the unit contract price bid only for the pay items listed or referenced below:
(1) "Pipe, Catch Basin Connection, (Material) (Clay), (Size)," per linear foot.
(2) "Pipe, Inlet Connection, (Material) (Clay), (Size)," per linear foot.
(3) "Drop Connection, (Size)," per vertical foot.

The unit contract price for "Pipe, Catch Basin Connection, (Material) (Clay), (Size)," and "Pipe, Inlet Connection, (Material) (Clay), (Size)," shall include all costs for the work required to furnish and install the pipe including connections to catch basins or inlets, excavation, backfill, and compaction.

The unit contract price for "Drop Connection, (Size)," shall include all costs for the work required to furnish and install the complete drop connections including the concrete footing, ductile iron soil pipe, and fittings at the drop connection and the ductile iron pipe to open to undisturbed native soil.
SECTION 7-09 PIPE AND FITTINGS FOR WATER MAINS

7-09.1 DESCRIPTION
Delete paragraph 1 and replace with the following:
The work included under Sections 7-09 through 7-14 and the materials included in Section 9-30 shall apply to the construction of water distribution and transmission mains and appurtenances for both temporary and permanent installation.

Specification references made herein for manufactured materials such as pipe, valves, and fittings refer to designations for American Water Works Association (AWWA), United States of America Standards Institute (USASI), American National Standards Institute (ANSI) or to American Society of Testing and Materials (ASTM) which are in effect on the date of advertisement for bids.
The Contractor shall only install new unused materials suitable and approved for potable water supply.

7-09.2 MATERIALS
Delete paragraph 1 and list and replace with the following:
Materials shall meet the requirements of Section 9-30 as modified herein.

SECTION 7-10 TRENCH EXCAVATION, REELING, AND BACKFILL FOR WATER MAINS

7-10.1 DESCRIPTION
Supplement this section with the following:
The specifications in this section apply to the construction of water distribution mains and appurtenances for both temporary and permanent installation under ordinary conditions.

Trench base and sides shall conform to the requirements of Section 7-04.02.

7-10.10(1)(A) FOUNDATION MATERIAL (New Section)
Foundation material shall include all materials placed below the bedding of the pipe to replace unsuitable foundation materials.

7-10.2 MATERIALS
Delete this section and replace with the following:
Materials specified as "Mineral Aggregate (Type)" shall be in accordance with Section 9-03.16.

7-10.3 GENERAL
Delete this section and replace with the following:
Material excavated from trenches and plied adjacent to the trench, or in a roadway or public thoroughfare, shall be piled and maintained so that the toe of the slope of the material is at least 2 feet from the edge of the trench. Such material shall be piled in such manner as will cause a landslide or inconvenience to public travel, and provisions shall be made for moving traffic where such is necessary. Free access shall be provided to fire hydrants, water valves, and meters, and clearance shall be left to enable free flow of storm water in gutters, other conduits, and natural watercourses. Free access shall be maintained to all other utility control valves, meters and vaults.

7-10.30(5) GRADE AND ALIGNMENT
Delete paragraph 2 of this section and replace with the following:
Unless otherwise specified in the Drawings or Project Manual, the depth of trenching for water mains shall be such that the minimum depth of cover of 36 inches over the top of the pipe for 8-inch and smaller water mains. Depth of cover over larger water mains shall be in accord with the Standard Plan for Locations for Underground Utilities. Deeper excavations may be required due to localized grades or conditions.

7-10.30(6) EXISTING UTILITIES
Supplement this section with the following:
In the event of conflict, the Contractor shall remove and restore existing catch basins, sumps, and other sewerage and drainage facilities. All
TRENCH EXCAVATION, BEDDING, AND BACKFILL FOR WATER MAINS

Rustoration shall be constructed to correct City Standards. Mainline sewer and storm drains shall not be disturbed, translated, removed or shall be otherwise altered or relocated. Watermain and storm main shall be left as is or small holes shall be left open. Existing water main and fittings encountered during trench excavation and to be removed. While excavation is required by the Engineer shall be removed and disposed of by the Contractor. All costs for these items shall be considered to be incidental to the various bid items comprising this contract and no separate payment will be made.

Ends of abandoned water main shall be plugged filling with Class V (3A) concrete for a minimum longitudinal length of 12 inches. All costs for these items shall be considered to be incidental to the various bid items comprising the contract and no separate payment will be made.

When utility owner services occupy the same space as the project trench, the Contractor, in order to avoid damage and the subsequent costs of repair, may, if necessary, with three days notice, that the Seattle Water Department cut the services ahead of the excavating machine and reconnect them after the machine passes. The expense of cutting and reconnecting will be charged to the Contractor.

The Contractor shall carefully do all necessary excavation to fully expose such services. If the Contractor elects to excavate the trench without first exposing the services, the Contractor shall be responsible for all damage to the services by reason of this operation and shall immediately notify the Engineer and arrange for replacement of all damaged services in accordance with Section 1-07.17.

It is anticipated that the Contractor will encounter private water service utilities (water service lines running between the Seattle Water Department main and private residences during work operations of this Contract) and therefore do appear on the drawings and will not be footed located by the Seattle Water Department. It shall be the Contractor's responsibility to ascertain the location and protect these private utilities from damage.

If it is necessary to provide temporary water supply connections due to conflict between existing private water service pipes and the new water main, it shall be the responsibility of the Contractor to provide temporary services. All costs incurred by the Contractor in providing temporary water service shall be considered incidental to the contract and no separate payment will be made.

If it is necessary to provide temporary water supply connections due to conflict between existing private water service pipes and the new water main, it shall be the responsibility of the Contractor to provide temporary services. All costs incurred by the Contractor in providing temporary water service shall be considered incidental to the contract and no separate payment will be made.

In all cases, private water service lines disturbed by the Contractor shall be repaired by the Contractor at the Contractor's own expense. The Contractor shall notify the Engineer of any such damage and shall begin repairs immediately and work continuously until water service is restored.

TRENCH EXCAVATION

Delete this section and replace with the following:

The Contractor shall perform all excavation of every description and of whatsoever materials encountered in the performance of this Contract as required by the Special Provision. All excavations shall be made by open cut unless otherwise specified in the plans and specifications. The position of all trench shall be accurately located on the Standard Plan for the Engineer. The position of all trench shall be accurately located on the Standard Plan for the Engineer. Standard excavating equipment shall be adjusted as necessary to excavate the narrowest trench possible.

The length of trench excavation in advance of the pipe laying shall be kept to a minimum, and in no case shall it exceed 300 feet unless otherwise specified adversely by the Engineer.

The Contractor shall exercise care in excavating the trench and maintaining it so that no damage shall occur to any foundation, structure, pole line, pipe line, or other facility because of slope of slopes, or from any other cause. If, at the request of the Contractor, there is disturbance of the ground such as to endanger other property, the Contractor shall immediately take remedial action at his expense. In act of construction or installation of the trench or in such excavation as may relieve the Contractor from liability for damages or costs that result from trench excavation.

Cut shall be taken not to expose the depth indicated. But in no case shall this be more than 12 inches above the depth indicated. But in no case shall this be more than 12 inches or the depth indicated. But in no case shall this be more than 12 inches.

Grouting and other excavations made shall be cleared to prevent surface water from flowing into the excavation. Drawings, material suitable for backfilling shall be piled in an orderly manner a sufficient distance away from the edges of trench to avoid overloading and to prevent slides or cave-in. Unstable material, or that in need to the needs for subsoils or backfill, shall be removed and disposed of by the Contractor.

Excavations for utilities and other structures shall be sufficient to provide a minimum of 12 inches between their surfaces and the sides of the excavation.

In the event the Contractor elects to use pipe bedding, or to use mineral aggregate of any type below the pipes to facilitate dry ditch construction, all costs for furnishing and placing the mineral aggregate shall be borne by the Contractor.

Trench and wall holes shall be kept desolate until the pipe has been laid, jointed, coated and backfilled.

TRENCH EXCAVATION, BEDDING, AND BACKFILL FOR WATER MAINS

DELETION

Delete paragraph 1 and replace with the following:

Soil excavation shall cover the removal and disposal of rock. Ledge rock that contains systematic drilling and blasting for its removal, and boulders exceeding 1/2 cubic yard in volume. Ledge rock, boulders, or stones shall be removed to provide a minimum clearance of 6 inches under the pipe. Redi rock excavation is classified in Section 2-03.17.

Delete paragraph 3 and replace with the following:

Material removed shall be replaced with selected waste materials from adjacent trenches or with Mineral Aggregate Type 1 in accordance with Section 9-03 and as designated by the Engineer.

CUSHING AND SKEETING—SEEKING (New Section)

The Contractor shall adequately shore trenches to protect the work, existing property, utilities, pavement, etc., and to provide safe working conditions in the trench. The method of shoring shall be according to the Contractor's design. The Contractor may elect to use a combination of sheeting and overbreak, tunneling, boring, sliding trench shields or other methods of accomplishing the work, provided the method meets all applicable local, state, federal and safety codes. Images resulting from improper cradling or from failure to cradle shall be the sole responsibility of the Contractor.

All cradling and sheeting shall be removed from the trench. Removal shall be accomplished in such a manner as to fulfill the above requirements. Shoring or side support disturbed by cradling or sheeting removal shall be re-established. If a movable box is used in lieu of cradling or sheeting, and the bottom cannot be kept above the springline of rigid pipe or the crown elevation of flexible pipe, the bedding or side support shall be carefully re-established behind the movable box prior to placing backfill.

The use of horizontal sheeting below the barrel of a pipe or the use of the pipe as support for trench bedding shall not be permitted. The use of horizontal sheeting below the barrel of a pipe or the use of the pipe as support for trench bedding shall not be permitted.

When, in the opinion of the Engineer, the withdrawal of sheeting from the trench will result in damage to adjacent utilities or other property, the Engineer may order all or a portion of the sheeting to be left in place, in which case it shall be cut off as directed by the Engineer.

DELETION AND REPLACEMENT OF UNSTEABLE MATERIAL

Delete paragraph 1 and replace with the following:

Whenever in excavating the trench for water mains the bottom of the trench exposure past, soft clay, silt, ochre, or other unstable foundation material, each material shall be removed to the depth directed by the Engineer and backfilled with fill material. Foundation material shall be Mineral Aggregate Type 1, or as directed by the Engineer.

Delete paragraph 2 and replace with the following:

Material removed from the trench that is unstable for backfill shall be removed and hauled to a waste site. If surplus native backfill material is not available within the limits of the project, as
TRENCH EXCAVATION, BENDING, AND BACKFILL FOR WATER MAINS

7-10

Determined by the Engineer, the Contractor shall furnish material of the type designated by the Engineer in accordance with Section 7-10.

7-10.309A SURFACING MATERIALS (New Section)

Surfacing material shall be trench excavation and determined to be suitable for use elsewhere on the project by the Engineer shall be used per Section 7-03.310D.

Surfacing material not used elsewhere on the project and unsuitable material shall be wasted in accordance with Section 7-10.311I.

7-10.309A BENDING PIPE

Delete this section and replace with the following:

Class B bending material, when specified or required by the Engineer, shall be Mineral Aggregate Type 9 in accordance with the requirements of Section 9-03.

Class B bending for ductile from water main shall not entirely be required. When required, bending material shall be Mineral Aggregate Type 9 in accordance with Section 9-03.

Class B bending shall include the use of 6 inches below the pipe, around the pipe and up to 6 inches above the pipe.

No trench boring will be required for Class B bending. It shall be compacted by vibrating.

Care should be taken to prevent any damage to the pipe or its protective coating.

7-10.309B FLEXIBLE PIPE

Delete this section.

7-10.309B REEDING FOR FOUNDATIONS ENCASING, TAPED COVER, OR SPECIAL COVER PIPE (New Section)

When specially protected pipe is installed, it shall be banded in Class B bending as specified in 7-10.309A.

Banding of specially protected pipe shall be conducted at all times in such manner as to prevent damage and contamination in the protective coating or wrap.

Placing of Class B bending about the pipe shall be done only in the presence of the Engineer after his final inspection and approval of the specially coated or wrapped pipe. Any damage to the special coating of wrap shall be repaired by the Contractor at the Contractor's expense, as directed by the Engineer.

7-10.309B2 REEDING FOR POLYVINYL CHLORIDE (PVC) PIPE (New Section)

PVC Pipe shall be banded in Class B bending in accordance with Section 7-10.309A.

7-10.310 BACKFILLING TRENCHES

Delete this section and replace with the following:

Prior to backfilling, all forms, hames and debris shall be removed from the trench. Shoveling used by the Contractor shall be removed just ahead of the backfilling unless it is ordered by the Contractor to be left in place. Backfill up to 6 inches over the top and sides of the pipe shall be coarse and compacted, after until all large rocks capable of damaging the pipe or its coating have been removed from the backfill material.

In backfilling the trench, the Contractor shall take all necessary precautions to protect the pipe from any damage or shifting. The Contractor shall backfill from the side of the trench to a surface elevation depth of 2 feet above the center of the concrete pipe and 1 foot above ductile iron pipe before starting compaction.

7-10.310 BACKFILLING TRENCHES

During all phases of the backfilling operations and testing, as outlined herein, the Contractor shall protect the pipe installation, provide for the maintenance of traffic as may be necessary, and provide for the safety of property and persons.

The Contractor shall use suitable native excavated material for trench backfill unless specified by the Engineer that the native material is unsuitable. The Engineer will require excavated native material to demonstrate its suitability for use as backfill. Native material will be considered suitable for trench backfill if it meets the requirements set forth in Section 2-03.3(4). Unsuitable backfill material shall be removed from the site, disposed of, and replaced with Mineral Aggregate Type 5 or other imported material as designated by the Engineer.

The Contractor shall take any necessary steps to protect the excavated material from becoming contaminated with excessive moisture. Any material that becomes unsuitable due to the Contractor's failure to take adequate measures to provide protection from moisture shall be replaced at the Contractor's expense with Mineral Aggregate Type 5 or other material as the Engineer may accept.

Sufficient material shall be spread to the drying future as shown on the drawings, or as the Engineer may direct, and shall be invested to provide a uniform thickness of the native material. Compaction is required, and it shall be performed prior to placing the borrow material.

7-10.310I COMPACTION OF BACKFILL

Delete this section and replace with the following:

Trench backfill shall be spread in layers and be compacted by mechanical means of the impact type approved by the Engineer. Water settling will not be permitted. After the initial backfill is placed the compacting backfill material shall be placed in successive layers not exceeding 1 foot in loose thickness, and each layer shall be compacted to the density specified below:

(a) Informed areas such as street and sidewalk areas shall be compacted to 95% of maximum dry density.

(b) Undeveloped areas or landscape areas shall be compacted to 90% of maximum dry density.

Compression control tests shall be performed as specified in Section 2-03.3(40).

The procedure and equipment to be used for backfill compaction shall be demonstrated on a test section of pipeline to be designated by the Engineer.

The Engineer will sample excavated material to determine suitability of the native material for backfilling use. If native material is found to be unsuitable and within the tolerance range of material characteristics, the Contractor will be required to use the native material for backfilling. The Contractor shall take any necessary steps to protect the excavated material from becoming unsuitable due to the critical condition listed. Any material becoming unsuitable due to the Contractor's failure to take adequate measures to protect the material from moisture shall be replaced with Mineral Aggregate Type 5 or other material as the Engineer may accept, by the Contractor at his own expense.

The Contractor shall indicate test pits in the backfill as directed by the Engineer for the purpose of testing the backfill compaction. At the option of the Engineer, density tests may be taken on a lift of compacted backfill immediately prior to placing the next lift. All costs in connection with sampling test pits and from stabilized and during field density tests shall be considered as incidental to the backfill and no separate payment will be made.

If the required compaction density has not been obtained, the Contractor shall remove the backfill from the trench and recompact using an improved technique, header compaction, equipment or none. The Contractor shall indicate the density of compaction obtained from stabilized and during field density tests.

The Contractor will then be permitted to proceed with backfilling and compacting the remainder of the pipeline under the approved compaction procedure.

In the event field density tests taken during the course of construction show the specified compaction is not being obtained because of changes in soil or any other reason, the Contractor will be required to resubmit his compaction procedure. In no case will excavation and repacking operations be allowed to proceed until the specified compaction is attained.

The handling of surplus excavated material from the excavation to other areas of the project or disposal of the material to be considered as incidental to the unit price of such equipment and type of pipe installed.
TRENCH EXCAVATION, BEDDING, AND BACKFILL FOR WATER MAINS

7-10.4 MEASUREMENT
Delete this section and replace with the following:
Measurement for "Solid Rock Excavation," shall be per Section 2-01.4.
Measurement for "Mineral Aggregate (Type)," shall be per Section 4-01.4.
Measurement for "Extra Excavation," and "Bedding (Class), (Slime) Pipe," shall be per Section 7-17.4.

7-10.5 PAYMENT
Delete this section and replace with the following:
Payment for "Bedding (Class) (Slime) Pipe" will be per linear foot.
The unit price for "Mineral Aggregate (Type)," shall be in accordance with Section 4-01.5.
Payment for "Extra Excavation" and "Bedding (Class) (Slime) Pipe" shall be per 7-17.5.
Payment for "Solid Rock Excavation" shall be per 7-01.5.

If no bid item is in the Bid Form for "Mineral Aggregate" of the type designated by the Engineer, "Solid Rock Excavation," or "Extra Excavation," the Contractor shall perform the work as directed by the Engineer, and payment will be made in accordance with Section 7-01.4.

No separate payment will be made for excavating the trench, cribbing, sheeting, sheeting, placing and compacting the native backfill material, bedding and placing exposed malleable native material elsewhere on the project, or bedding and disposing of excess materials offsite. These costs shall be considered as being included in the unit bid price for each class, size, and type of pipe.

Where unexpected objects, such as stumps, railroad ties, etc., are encountered in the trench excavation, and such unexpected objects cause the Contractor delays or require extra work or equipment for its removal, payment will be in accordance with Section 7-09.4. When the presence of these objects is indicated on the Drawings or Special Provisions, no separate payment shall be made.

No separate payment will be made for furnishing and installing chairs and construction of existing utilities and services. These items shall all be considered as incidental to the work of constructing the water main, and all costs thereon shall be included in the payment as specified in Section 7-11.5.

PIPED INSTALLATION FOR WATER MAINS

7-11.1 GENERAL
Delete paragraph 1 and replace with the following:
Pipe shall be installed in accordance with the manufacturer's printed specifications and instructions, and in the standards of the AWWA for installing the type of pipe used. The Contractor shall provide all tools and equipment, including any special tools required for installing each particular type of pipe used unless modified or changed as on the Drawings or in the Special Provisions.

Pipe sections shall be joined in such a manner as not to damage the lining or coating. Any damage to the lining or coating shall be repaired by the Contractor at the Contractor's expense. All necessary coating for outside water main pipe accessories shall be made with epoxy-coal tar. Inside parts of the pipe accessories shall be touched up with aepoxy vanish. Newton Vanish is the preferred type. The method of splicing or joining the pipe base must allow both vertical and horizontal movement of the pipe for the protection of the gasket.

Water main installation shall not proceed until line and grade checks have been made and conditions for connection fittings have been made in accordance with Section 7-11.3009A.

The Contractor shall install only new, unused materials.

Short lengths of pipe supplied by the manufacturer shall be used whenever possible to provide the proper spacing of valves, tees, or special fittings.

Clearances shall be maintained between water mains and other utilities per Section 1-07.171.

7-11.2 MATERIAL
Delete this section and replace with the following:
Material shall be as specified in Section 9-30, as modified herein.

7-11.3009 HANDLING OF PIPE
Supplement paragraph 1 with the following:
Methods of handling shall be corrected by the Contractor if the Engineer determines that these methods are damaging to the pipe.

Supplement paragraph 3 with the following:
Ductile iron and cast iron pipe, while suspended above grade, shall be run with a light hammer to detect cracks.

Delete paragraph 4 and replace with the following:
Drill or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations, and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned, and relaid. A clean white brush shall be used for this purpose and for brushing to remove foreign matter prior to joining of pipe ends. At times when pipe laying is not to progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by the Engineer to ensure cleanliness inside the pipe.

Supplement this section with the following:
Pipe shall be stacked in such a manner as to prevent damage to the pipe, to prevent dirt and debris from entering the pipe, and to prevent any movement of the pipe. The bottom tiers of the stack shall be kept off the ground or subsoils, rails or other similar supports. Pipe on succeeding tiers shall be alternated by bell and spigot end. Under 4-inch 4-inch in pipe shall be placed between tiers and checks shall be placed at each end to prevent movement. For safety each size of pipe shall be stacked separately.

Handling and shipping of covered or multilayered polyethylene tape coated ductile iron pipe while being transported and in the field shall be in accordance with the AWWA Standard Specifications 0-090, Section 2.14, and as specified herein.
PIPE INSTALLATION FOR WATER MAINS

Pipe, at all times, shall be handled with equipment such as stout wide canvas slings and wide padded saddles designed to prevent damage to the coating. Bars, cables, chains, hooks, wire hogs or narrow pipe shall be carefully loaded on proper sized saddles not less than 12 inches in width. Pipe sections shall be supported on the ground and secured against each other and the whole load shall be securely fastened together and to the cars to prevent movement in transit.

In truck shipments, the pipe shall be supported in wide cradles of suitable padded timbers bolted down on the supporting surface to fit the contours of pipe. All chains, cables or other equipment used for fastening the load must be carefully padded.

The Engineer will inspect the pipe and coating after delivery to the job site, while the pipe is stored along side the trench, prior to installation by the Contractor. The Contractor shall also inspect the coating on delivery at the job site. All pipe shall be supported from the slings, before the pipe is lowered into the trench. If either the pipe or coating is damaged, the Contractor will be required, at his own expense, to repair the damage to the satisfaction of the Engineer prior to installation.

Pipe stored along the trench side shall be supported by padded wooden timbers placed under the pipe to hold the pipe off the ground, or by other means satisfactory to the Engineer.

7-11-3035 CUTTING PIPE
Delete this section and replace with the following:
Whenever it becomes necessary to cut a length of pipe, the cut shall be made by abrasive saw or by a special pipe cutter. All pipe ends shall be square with the longest dimension of the pipe and the outside shall be beveled and otherwise smoothed so that good connections can be made without damage to the gasket. Threads shall be clean and free of deposits. Such cutting of ductile iron pipe shall not be allowed.

7-11-3065 LAYING OF PIPE ON CASING
Supplement this section with the following:
Whereas deflections at pipe joints and laying radius for various pipe lengths are specified in the Drawings and Special Previsions or, if not, shall conform to the manufacturer’s and AWWA Specifications for the given type of pipe.

7-11-3066 LAYING DUCTILE IRON PIPE WITH POLYURETHANE ENCASMENT
Delete the title and section and replace with the following:
7-11-3066A LAYING AND JOINTING - MECHANICAL AND RUBBER GASKET (ROSH OR) JOINT PIPE (New Section)
The installation of mechanical joint pipe and rubber gasket joint pipe shall be in accordance with AWWA C600.

7-11-3066B LAYING AND JOINTING POLYURETHANE ENCASMENT PIPE (New Section)
Pipe with polyurethane encasement shall be installed in accordance with AWWA C615. The method used for encasing the pipe shall be approved by the Engineer. All deflections in the polyurethane encasement shall be in accordance with Sections 7-10,309, and 7-10,310(1), and 7-10,311.

7-11-3066C LAYING AND JOINTING MULTI-LENGTH TAPER COATED PIPE (New Section)
Pipe shall be bolted from the trench side into the trench by means of a wide canvas or leather slings, the end of chains, cables, straps or other equipment likely to cause damage to the lining or to the coating of the pipe will not be permitted. Dragging or sliding of the pipe will not be permitted. The Contractor shall allow inspection of the coating on the under side of the pipe while suspended from the
Boll and dry joint ends shall be thoroughly cleaned before assembly, and a vegetable soap solution shall be brushed on the inside of the ball joint prior to assembly.

**7-11.307C STEEL CASTING PIPE INSTALLED UNDER RAILROAD TRACES (New Section)**

Where shown on the Drawings, the Contractor shall install steel casing pipe for the water main by boring, sawing, or digging without damage to existing structures, roads, highways, railroad track or subway. All workmanship shall be performed in conformance with the latest edition of the ASME Standard Qualifications Procedure to perform the type of work required. The quality of welding shall be in accordance with ASME, Section III, Article 20000. Before placing the casing and water main, the Contractor shall submit to the Engineer, for approval, an outline of his construction procedure together with a listing of the equipment for the work. The work, or any part of the work, may be stopped by the Engineer for further examination at any time. Special care shall be taken during the installation of the pipe to ensure that no settlement of the pipe occurs. All water main, whether by design or by settlement induced by the placement of the pipe shall be the responsibility of the Contractor. The Contractor shall repair all areas so affected, as directed by the Owner after the completion of the work. All work shall be completed in a workmanlike manner and all required materials and equipment shall be available at the scheduled time.

**7-11.307D STEEL CASTING SEAL AND SPACERS (New Subsection)**

Casing seals provide a moisture-proof seal that is resistant to heat, cold, vibration, tension, abrasion, fluids, displacement, and expansion and contraction of the casing and the water main. Casing seals are designed according to the manufacturer's instructions.

The Crossbar Insulators (Spacers) shall be composed of polyethylene fiber or any other material that meets the requirements of the Engineer. Insulators shall be installed per manufacturer's instructions. The Crossbar Insulators (Spacers) shall be installed per manufacturer's instructions. Casing seals and Crossbar Insulators (Spacers) shall be located as shown on the Drawings.

**7-11.309A CONNECTIONS TO EXISTING MAINS**

Delete this section and replace with the following:

No water system valves on existing mains shall be operated by the Contractor.

The Seattle Water Department will make all connections to main water mains and pipelines, and will operate all valves to establish shutdowns and subsequent reconnections. Draining of existing water mains will be done by SED staff.

Prior to pipe laying and in the presence of the Engineer, the Contractor shall uncover the existing water main at each point of connection in order to determine any necessary adjustments to the proposed location, and conditions of the existing water mains. Water main and appurtenances must be installed completely per contract, and approved, prior to connections being scheduled or made.

The Seattle Water Department reserves the right to (1) require notification of connection inspections by the Contractor, and (2) make such inspections as the Contractor shall determine, at any time after the inspection, the Contractor be reinstalled. The response and notification times for reinstallation are as follows:

Approval to connect to the water main and appurtenances being installed completely and satisfactory tested per contract documents including street, sidewalk, and drainage work in accordance with all laws, rules and regulations. Water main and appurtenances include all pipe, fittings, all blocking except temporary blocking, all hydrants, hydrant pads, backflow assemblies, valves, streetcars, chambers, corrosion protection, and coating systems.

Tests are for pressure and water quality, and the requirements are specified elsewhere in this document.

Scheduling of connections with the Engineer is the Contractor's responsibility. After approval of the water main has been received, the Contractor shall request that the Engineer schedule the shutdown of existing water mains required to complete the connection. The Contractor's project unit shall be submitted to the Engineer for approval. The Contractor shall inform the Seattle Water Department of the schedule and shall be subject to Seattle Water Department approval. All required materials and equipment shall be available at the scheduled shutdown. Notifications of the scheduled shutdown will be made by Seattle Water Department personnel to all affected customers. The Seattle Water Department will furnish connection fittings, as shown on the Drawings. In addition, prior to and after connection of the new main, the Seattle Water Department will:

(a) Reactivate water mains.
(b) Cut, remove, and dispose of pipe sections as necessary to install the new materials.
(c) Deactivate the pipe, as required, to perform Seattle Water Department connections.
(d) Install required fittings.
(e) Reactivate and flush the water mains.

All fittings not specifically called out as being furnished by SED, and other materials and equipment required to complete the connection shall be furnished by the Contractor. The Contractor shall use and use equipment required to move and place the component parts of the connection into position. All temporary and permanent blocking shall be done by the Contractor. The Contractor shall make all necessary excavations, shortens and backfills and provide any equipment and support required to move and place the component parts of the connection into position. All temporary and permanent blocking shall be done by the Contractor. The Contractor shall make all necessary excavations, shortens and backfills and provide any equipment and support required to move and place the component parts of the connection into position. All temporary and permanent blocking shall be done by the Contractor. The Contractor shall make all necessary excavations, shortens and backfills and provide any equipment and support required to move and place the component parts of the connection into position. All temporary and permanent blocking shall be done by the Contractor. The Contractor shall make all necessary excavations, shortens and backfills and provide any equipment and support required to move and place the component parts of the connection into position. All temporary and permanent blocking shall be done by the Contractor. The Contractor shall make all necessary excavations, shortens and backfills and provide any equipment and support required to move and place the component parts of the connection into position. All temporary and permanent blocking shall be done by the Contractor. The Contractor shall make all necessary excavations, shortens and backfills and provide any equipment and support required to move and place the component parts of the connection into position. All temporary and permanent blocking shall be done by the Contractor. The Contractor shall make all necessary excavations, shortens and backfills and provide any equipment and support required to move and place the component parts of the connection into position. All temporary and permanent blocking shall be done by the Contractor.
The Seattle Water Department will make excavations for the service connections, furnish and install service connections, backfill, compact the trench, and complete temporary patching. The Contractor shall make all repairs for the temporary patching and the permanent street restorations over all trenches per Section 5-10.

The Seattle Water Department normally will schedule and make all service connections within 20 working days after the work is approved and in service.

Where the plans show 4-inch, 6-inch and 8-inch service connections, the Contractor shall furnish and install service connections, backfill, compact the trench, and complete temporary patching. The Contractor shall furnish and connect 1-inch or 2-inch 4 TD valves shall be installed in the service connection box. The 4 TD valves shall be returned to the Contractor after installation of the water service by the Water Department.

The Contractor shall install valve boxes, on water service valves, at the time the water service valve is installed. Valve boxes disturbed by the Seattle Water Department during water service installation will be reboxed by the Seattle Water Department. The Contractor shall adjust all valve boxes to final grade prior to final surface restoration, at no additional cost to the Seattle Water Department.

All costs for furnishing and the installation of service connecting pipe 4-inch and larger shall be considered to be included in the cost of Pipe, Watermain (Material), (Labor), (Mile), Including Fittings, and to separate payment will be made.

Where existing services are to be transferred from old to new mains, the Contractor shall plan and coordinate the work with the Seattle Water Department so that service will be resumed with the least possible inconvenience to consumers. Service tee locations will be field determined by the Seattle Water Department.

The Contractor shall not remove or abandon old pipe until all service connections have been transferred to the new mains or temporary service has been provided. Adequate provisions shall be made by the Contractor during construction for the care and protection of mains or services in use.

7-41.300(5) TEMPORARY WATERMAINS AND SERVICES (New Section)

When called for in the Drawings, the Seattle Water Department will install and maintain temporary water mains and services in each manner as to provide constant adequate water supply to consumers and to avoid impeding vehicular and pedestrian traffic and access to adjoining properties.

The Contractor’s schedule shall allow adequate time for the Seattle Water Department to install these facilities. A minimum of 2 weeks written notice shall be provided to the Engineer for scheduling and completion of the temporary water main and service work.

The Seattle Water Department will make all required excavation, backfill, and compaction as well as furnishing the necessary equipment and pipe for temporary water mains.

All temporary water mains will be chlorinated, flushed, and a satisfactory bacteriological sample obtained by the Seattle Water Department prior to placing in service.

7-41.300(10) TENDER T Gan

Delete this title and section and replace with the following:

7-41.300 LOCATING PIPE

Locating pipe shall be installed directly over all PVC pipe with minimum 3/8 feet of cover. The locating pipe shall be bonded by electrostatic seals to all ductile iron fittings, valves and valve boxes to form an electrically continuous system.

7-41.310 HYDRAULIC PRESSURE TEST

Delete this section and replace with the following:

All water mains and appurtenances shall be tested as soon as possible after they are laid, backfilled, and prior to bacteriological testing.

128

7-41.11A TESTING EXTENSIONS FROM EXISTING MAINS

Delete paragraph 1 and replace with the following:

All labor, equipment, pumps, gauges, plows, saddles, corporation stops, miscellaneous hose and piping, necessary for performing the test shall be furnished and operated by the Contractor.

Pressure recorders and charts, which will be furnished by the Seattle Water Department, shall be used to record the tests.

At points where pressure reaction and movement may occur, such as at bends, tees, and plugs, the pipe shall be properly blocked or braced. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking and remove it after testing.

When the Seattle Water Department has water available for testing, it will be furnished without charge. Where water is not available from the Seattle Water Department, the Contractor shall provide water, from an approved source, for testing. To prevent contamination of water from the new main from flowing back into the line supplying the water, two check valves or a double check valve assembly shall be used on the full line.

Ductile iron water mains and appurtenances shall be tested hydrostatically to 300 psi for pipe 12 inches in diameter and smaller, and 150 psi for pipe 16 inches in diameter and larger unless otherwise specified.

Polyvinyl Chloride (PVC) water mains (CI-200) and appurtenances 12 inches in diameter and smaller shall be tested hydrostatically to 200 psi.

Test pressure for other pipe shall be as noted in the Special Provisions.

The test pressure shall be applied at the low end of the section of water main being tested. All air in the pipe shall be vented prior to test.

The hydrostatic test pressure shall be maintained until the Engineer has determined that the section of pipe, valves, and fittings are watertight. If there are no visible leaks and the test pressure is maintained without piping for 15 minutes with a pressure drop of less than 15 psi, the main will be accepted as a watertight installation. When testing short (less than 18 feet) lengths of small pipe or when testing brake pipe, maintaining the test pressure without piping for 5 minutes with less than 5 psi drop in pressure will be evidence of a satisfactory test.

Sections to be tested shall normally be limited to 1,000 feet in length. Included in each of the Contractor’s crews, he shall have all the necessary men, the tools, and the material. Pipe testing shall not be continued more than an additional 1,000 feet until the first section has been tested successfully.

Hydrometric tests shall be performed on every complete section of water main between valves, or as directed by the Engineer. Each side of each valve shall withstand the same test pressure as the pipe, with no pressure active in the section of pipe beyond the closed valve.

Any leak shall be made with the brake auxiliary gate valves opened and pressure against the brake valves. After the test has been completed, each gate valve shall be tested by closing each in turn and releasing the pressure beyond. This test of the gate valve will be acceptable if there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The Contractor shall verify that the pressure differential across the valve does not exceed the rated test pressure of the valve.

Any visible leakage detected shall be corrected by the Contractor regardless of the allowable leakage specified above. Should the test section fail to meet the pressure test successfully as specified, the Contractor shall, at his expense, locate and repair the defects and then retest the pipeline.

Prior to filling the line to the height of the reservoir to furnish the pressure test, the Contractor shall have all equipment set up completely ready for operation and shall have successfully performed the test to assure himself that the pipe is in a watertight condition.

Defective materials or workmanship discovered as a result of hydraulic field test shall be replaced by the Contractor at his own expense. Whenever it is necessary to replace defective material or correct the workmanship, the hydrometric test shall be re-run, at the Contractor’s expense, until a satisfactory test is obtained.
When an existing water main is extended with new pipe to a new valve and the distance from the existing pipe to the new valve is 18 feet or less, the section of new pipe installed between the new valve and the end of the existing main will be made by the Seattle Water Department with pressurized, pre-chlorinated pipe, and no hydrostatic test will be required. When the required hydrostatic tests are conducted in the new main section beyond the installed new valve in the closed position, the normal pressure of the existing main may be present against the other side of the new valve.

Delete paragraph 3 and replace with the following:

The short length of pipe between the temporary cap or plug end with the new valve in the closed position, with no hydrostatic pressure active on the opposite side of the valve, shall be subjected to the required test pressures. The same test shall be made against the other side of the valve when that section of pipe is tested with no hydrostatic pressure active in the short section of pipe toward the existing main pipe. The final connection to the existing main shall be made by the Seattle Water Department with pressurized, pre-chlorinated pipe, and no hydrostatic test will be required.

7-41.1X(12) DISTRIBUTION OF WATER MAINS

Supplement this section with the following:

The Seattle Water Department laboratory will perform the bacteriological test and report the results to the Engineer. Results will be available 48 hours after samples are delivered to the Seattle Water Department laboratory. The Seattle Water Department may require bacteriological samples at any time.

7-41.1X(13A) FLUSHING

Delete paragraph 1 and replace with the following:

Sections of pipe to be disinfected shall first be flushed to remove any solid or contaminated material that may have become lodged in the pipe. If no hydrant is installed at the end of the main, a tap shall be provided by the contractor large enough to develop a velocity of at least 2.5 feet per second in the main. One 2-1/2 inch hydrant opening will, under normal pressure, provide this velocity in pipe sizes up to and including 12 inches. Once new water main, taps required for chlorination, flushing, or a temporary or permanent release of air shall be furnished and installed by the contractor. Each flushing or chlorination termination shall be furnished with a backflow preventer from the flushing point. If required, taps on existing mains, for the purpose of chlorination or flushing, will be furnished and installed by the Seattle Water Department.

7-41.1X(13B) REQUIREMENT OF CHLORINE

Delete this section and replace with the following:

Before being placed into service, all new mains and required portions of, or extensions to, existing mains shall be chlorinated so that a chlorine residual of not less than (20) ppm remains in the water after standing 24 hours in the pipe. The initial chlorine content of the water shall be not less than (20) ppm/1.

7-41.1X(14C) FORM OF APPLIED CHLORINE

Delete this section and replace with the following:

Objectives shall be applied by one of the methods which follow, to give a dosage of not less than (20) ppm/1 of available chlorine.

7-41.1X(15D) RULES CALCULATION HYPERCHLORINE

Delete this section and replace with the following:

For each length of pipe in laid, sufficient high test calcium hypochlorite (65-70% calcium hypochlorite) shall be placed in the pipe to yield a dosage of not less than (20) ppm/1 available chlorine, calculated on the volume of the water which the pipe and appurtenances will contain.

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Pipes Installation for Water Main 7-11

7-41.1X(12) CHLORINE - BURING ONCE MORE IN WATER

Delete this section and replace with the following:

A mixture of water and high-test calcium hypochlorite (65-70% CaOCl) may be substituted for the chlorine gas-water mixture. The dry powder shall first be made as a paste and then diluted to a 1 percent chlorine solution by adding water to give a total quantity of 1.5 gallons of water per pound of dry powder. This solution shall be injected in one end of the section of mains to be disinfected while filling the mains with water.

The amount of chlorine (CaOCl) required to give 50 ppm (mg/l) for 100-foot lengths of various diameters of pipe are in the table below:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Volume (ft³)</th>
<th>Water (gallons)</th>
<th>Solution 12% CaOCl</th>
<th>Cl-Mg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 in.</td>
<td>60.3</td>
<td>0.007</td>
<td>1/2</td>
<td>3</td>
</tr>
<tr>
<td>6 in.</td>
<td>116.4</td>
<td>0.088</td>
<td>3/4</td>
<td>5</td>
</tr>
<tr>
<td>8 in.</td>
<td>208.8</td>
<td>0.132</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>10 in.</td>
<td>306.7</td>
<td>0.200</td>
<td>1-1/3</td>
<td>5</td>
</tr>
</tbody>
</table>

7-41.1X(12C) DURHAM HYPERCHLORITE

Delete this section and replace with the following:

Sodium hypochlorite, commercial grade (12-2%) or in the form of liquid household bleach (5-8%) may be substituted for the chlorine gas-water mixture. This liquid chlorine compound may be used full strength or diluted with water and injected into the main in correct proportion to the fill water so that dosage applied to the water will be at least (25) mg/l.

7-41.1X(12D) POINT OF APPLICATION

Delete this section and replace with the following:

The preferred point of application of the chlorinating agent is at the beginning of the pipeline extension or any valve section of 1 ft, and through a corporation stop inserted in the horizontal aids of the pipe. The water injector for delivering the chlorine-bearing water into the pipe should be supplied from the water connecting the water supplying the line with the pipeline extension. Alternate points of application may be used when approved or directed by the Engineer.

7-41.1X(13A) DATE OF APPLICATION

Delete this section and replace with the following:

Water from the existing distribution system, or other source of supply, shall be controlled to flow very slowly into the newly-laid pipeline during application of the chlorine. The rate of chlorine gas-water mixture in dry gas and shall be in such proportion as to maintain the newly-laid pipe that the dosage supplied to the water will be at least (25) mg/l.

Sodium hypochlorite, commercial grade (12-2%) or in the form of liquid household bleach (5-8%) may be substituted for the chlorine gas-water mixture. This liquid chlorine compound may be used full strength or diluted with water and injected into the mains in correct proportion to the fill water so that dosage applied to the water will be at least (25) mg/l.

7-41.1X(13B) PREVENTING REVERSE FLOW

Delete this section and replace with the following:

To prevent contaminated water from the new mains being disinfected from flowing back into the existing distribution system, 2 check valves or a double check valve assembly shall be used on the line supplying the water.
7-11.12.1K RETENTION PERIOD
Delete this section and replace with the following:
Treated water shall be retained in the pipe at least 24 hours. After this period, the chlorine residual at pipe extremities and at other representative points shall be at least 1.0 mg/L.

7-11.12.2M CHLORINATING CONNECTIONS TO EXISTING WATER MAINS AND WATER SERVICE CONNECTIONS
Delete this section and replace with the following:
The chlorinating procedure to be followed shall be as specified in Section 9 of the American Water Works Association Standard WQ-61, except that all pipe and fittings shall be seeded with a strong chlorine solution at least as strong as the treatment liquid to be used. (6-22-81).

7-11.12.2N FILLING, CLEANING AND TESTING
Supplement this section with the following:
Filling the water main shall be followed by flushing to remove excess chlorine from the hydrant and hydrant branch.

Delete paragraph 3 and replace with the following:
Before placing the lines into service, a satisfactory report shall be received on samples collected from representative points in the new system. Samples shall be collected and bacteriological tests analyzed and reported by the Seattle Water Department.

7-11.12.1C CONCRETE TREATMENT BLOCKING
Delete paragraph 1 and replace with the following:
Concrete treatment blocking, as indicated on the Drawings and Standard Plans, shall be placed at bends, tees, wyes, reducers and as designated by the Engineer. Blocking shall be signed by the Engineer to indicate the location and extent to be followed in accordance with Section 7-11.12(11). Blocking shall be Class 5 (4-7/16) concrete mix poured in place.

7-11.12.1A BLOCKOFF ASSEMBLIES
Delete this section and replace with the following:
Water main blockoff assemblies shall be constructed in accordance with the Drawings and Standard Plans. A standard water box shall be installed in non-traffic bearing areas; a Type IV Ring and Cover shall be used for all other installations subject to vehicle traffic. Gore shall be taken in locating the water box or ring and cover such that it complies with all applicable codes or to any other location subject to drainage or sewage contamination. Gore shall be set to conform to finished grade. Backfilling and compaction shall be in accordance with Sections 7-10.3(b) and 7-10.3(c).

Drilling and tapping into the water main will be performed by the Contractor except in the event of installation on a changed (irregular) water main, in which case the Seattle Water Department will make the connection.

7-11.12.1E CORROSION PROTECTION OF DISSOLVED IRON PIPE (New Section)
Where called out on the Drawings, the pipeline contractor furnishing the pipe shall comply with the following:

Install Electrical Continuity Bonds: The Contractor shall furnish and install electrical bonds, as specified herein, at all mechanical couplings and all rubber gasket joints. The Contractor shall take special precautions to avoid disturbing bonds, electric cable, and wires for test stations and other cathodic protection equipment connected to, or installed near the pipeline.

Install Electrolysis Test Stations: The Contractor shall furnish and install the Electrolysis Test Stations where shown, and as detailed on the Drawings.
Measurement for "Pipe, Water Main (Material), (Class), (Size), including Fittings", will be per linear foot based on the slope distance (true point to point). The price of beginning or ending of measurement in any particular run of pipe shall be the vertical intersection of the center line of the intersecting pipe, or with the beginning or ending of any new pipe laid. No deductions will be made for the linear length of fittings, valves, couplings, etc., contained within the measured length. At changes in pipe size connected by a reducer, the joint of measurement shall be taken as the midpoint of the reducer. See Standard Plan.

Measurement for "Blocking, Grout Concrete" will be by the cubic yard of concrete placed as computed by the Engineer.

Measurement for "Mitsoff Assembly, (Size)" will be per each installed.

Measurement for "Pipe, Mitsoff, (Material), (Class), (Size)" will be per linear foot actually installed from the water main tap to the center of the Mitsoff riser.

Measurement for "Steel Casting Pipe, (Size) Diameter, Tapered, Jacked or Augered" will be per linear foot actually installed.

Measurement for "Station, Electrolysis Test," will be per each installed complete.

7-41.5 PAYMENT

(a) Payment will be made at the unit contract price bid for each of the following bid items as are included in the bid: (1) "Pipe, Water Main, (Material), (Class), (Size), including Fittings" per linear foot.

(b) "Blocking, Grout Concrete" per cubic yard.

(c) "Mitsoff Assembly, (Size)" per each.

(d) "Pipe, Mitsoff, (Material), (Class), (Size)" per linear foot.

(e) "Steel Casting Pipe, (Size) Diameter, Tapered, Jacked or Augered" per linear foot.

(f) "Station, Electrolysis Test," per each.

The unit contract price for "Pipe, Water Main, (Material), (Class), (Size), including Fittings" shall be full compensation for the costs of all materials, equipment, and labor required for the excavation, laying, backfilling, and connecting native material. The costs of or placing excess native material, drainage, flooding, testing, and distressing of the pipe line. Watermain shall include, but are not limited to, the pipe, all fittings, all pipe supports, locating wire, and any tests called for in the Special Provisions. Where required, the costs of sand or foam backfilling between the water main and other pipes shall also be included.

All costs in connection with furnishing and installing the mechanical joint sleeves and sleeves and backfilling gasket supports including pipe hanger rods with nuts, single pipe rolls, steel rings, reinforcing bars, nuts, bolts, washers, couplings, gaskets, trench excavation, shoring, backfilling, connections, removal of surplus excavation and all other incidental work, shall be included in the unit contract price per linear foot for the new "Pipe, Water Main, (Type)," as described in the Proposal. No separate payments will be made for the hydraulically field tests, temporary caps, pipe fittings, plugs, core shots, temporary backfill excavation, and the cost of all labor, materials, tools, equipment, and temporary required to complete the test shall be considered as incidental to the pipe line construction.

Special fittings used but not called for on the Drawings will be paid for at the supplier’s invoice cost plus 15 percent for overhead and profit. Special fittings called for on the Drawings but not used will be deducted from the Contractor’s final estimate based on the current cost of the supplier of fittings used on the Improvement.

The unit contract price for "Blocking, Grout Concrete" shall include all costs to place concrete blocking of the proportions required, including excavation, trenching, conduit, sheave rods, steel plates, concrete form work, finishing, removal and disposal of excavation not required for backfill, and any other work that may be necessary for constructing the blocking in place as specified.
VALUES FOR WATER MAINS

SECTION 7-12 - VALUES FOR WATER MAINS

7-12.1 DESCRIPTION
Supplement this section with the following:
The Contractor shall install only new, unused materials.

7-12.2 MATERIALS
Delete this section and replace with the following:
Materials shall be as specified in Section 9-30, as modified herein.

7-12.3 CONSTRUCTION DETAILS
Delete paragraph 1 and replace with the following:
Valve installation shall include valve boxes, valve box extensions, operating nut extensions, lides and plastic foam rings, per the Standard Plans.

Valve chambers or vaults and vehicle crossings shall be installed by the Contractor as required by the Drawings and/or Special Provisions.

All valves shall be inspected upon delivery in the field to ensure proper working order before installation and shall be free of all rust and dirt. They shall be set and joined to the pipe in the manner as set forth in the ASCE Standards for the type of connecting ends furnished. The valves shall also be carefully inspected for injury to the outer protective coatings.

At all places where the coating has been removed or scraped off, the damaged area shall be thoroughly cleaned to expose the iron base installation. The cleaned area shall then be coated with zinc chromate primer. After coating with the primer, the entire valve shall be field painted with two or more coats of Kynon Redox No. 61206 or approved equal.

An Operating Nut Extension shall be installed when the ground surface is more than 30 inches above the valve operating nut. The Operating Nut Extension shall extend from the top section of the Standard Valve Box and shall clear the bottom of the lid by a minimum of 6 inches. When required, it shall be furnished and installed by the Contractor.

7-12.2(1) INSTALLATION OF VALVE PASSAGE HOSES
Delete this title and section and replace with the following:

7-12.2(1) PRECAST VALUE CHAMBERS (New Section)
The concrete base shall be poured-in-place or precast. Pour-in-place base shall be allowed to attain sufficient strength to support the chamber (usually 2 or 3 days), as directed by the Engineer. Precast chambers shall be set on the base in conformance with the slotted valve extending the water main.

The water main shall be wrapped with 3-inch thick plastic foam material at those areas where the main intersects the chamber wall. Any remaining space between the chamber wall and the plastic foam material shall be filled with cement mortar or precast bricks. In no case shall the water main rest on the chamber wall.

Mortar shall be in accordance with Section 9-30.3(5).

7-12.2(2) CHAMBERS MADE WITH PRECAST CONCRETE BLOCKS (New Section)
Circular or rectangular chambers may be made with solid precast concrete blocks. The base shall first be poured in place. After the base has reached sufficient strength (usually 2 or 3 days), the walls may be constructed of concrete blocks with water-tight cement mortar joints.

Circular chambers shall be constructed with curved masonry blocks. The chamber top shall be tapered in to the dimensions shown on the Standard Plans.

VALUES FOR WATER MAINS

7-12.3(3) CAST-IN-PLACE CHAMBERS (New Section)
Cast-in-place chambers may be constructed by using forms and pour cement. Placing of walls is not required other than the molding of porous spouts (rock pockets) and bolt holes. Forms shall be removed for inspection of concrete.

7-12.3(A) SETTING RINGS AND COVER (New Section)
The cast iron frame and cover shall be set to grades furnished by the Engineers. Provisions for future adjustment of frame to changes in grade shall be made by constructing a minimum of 2 courses of brick with mortar joints between the top of the chamber and the bottom of the casing. Brick for this purpose shall be standard clay or concrete brick 2-1/4 inches thick. Bricks shall be placed in accordance with Section 9-30.5(9).

7-12.3(B) SETTING VALVE BOX (New Section)
Cast iron valve boxes shall be set to position during backfilling operations so that they will be in a vertical alignment with the gate valve operating stop. The lower casing of the unit shall be supported by a plastic foam collar not less than 2 in thickness, and shall be placed in place by carefully controlled backfill. The casing shall rest directly upon the body of the gate valve or upon the water main. The upper casing of the unit shall be placed in proper alignment and to such an elevation that its top will be at final grade.

Concrete shall be as specified in Section 7-10.3(11).

Plastic foam collars shall be as specified in Section 9-30.5(2).

7-12.3(C) LADDER (New Section)
Ladders shall conform to the requirements of Section 9-30.4(10).

7-12.4 MEASUREMENT
Supplement this section with the following:
Measurement for "Valve Chamber, (Type)", "Valve Chamber, Special, (Slab)" and "Valve Box, Cast Iron" will be per each.

7-12.5 PAYMENT
Delete this section and replace with the following:
Payment will be made at the unit contract price for each of the following bids items included in the Bid Plans:

(1) "Valve, Gate, (Slab)," per each.
(2) "Valve, Butterfly, (Slab)," per each.
(3) "Valve, Gate or Butterfly, (Slab)," per each.
(4) "Tapping Sleeve, (Slab) x (Slab) and Tapping Gate Valve, (Slab)," per each.
(5) "Valve Chamber, (Type)," per each.
(6) "Valve Chamber, Special, (Slab)," per each.
(7) "Valve Box, Cast Iron," per each.

The unit contract price for "Valve, (Type), (Slab)" shall include all costs for the work required to furnish and install the valve, including painting, jointing, disassembling, hydromast testings, operating nut and extensions.

137
When the Dopping Sleeve and Dopping Valve will be installed by the Seattle Water Department, payment at
the unit bid price for the Dopping Sleeve and Valve shall include furnishing the sleeve and valve at
the construction site designated, trench excavation, backfill with native material and compaction.

The unit contract price for "Valve Box, Cast Iron" shall include all costs to furnish and install all of the
cut concrete, brick and block, or cast-place chamber, including foundations, adjustment bricks, castings and lid,
plastic cushion, mortar plastering, valves, support piers, water proofing materials and steps or ladders.

The unit contract price for "Valve Box, Cast Iron" shall include all costs to furnish and install the
valve box, including plastic foam cushion.

SECTION 7-14 HYDRAULICS

7-14.1 DESCRIPTION

Delete this section and replace with the following:

These specifications are to be used in conjunction with the AWWA Standard C204 for dry barrel fire
hydrants for ordinary water works services.

The Contractor shall install only new, unused materials.

7-14.2 MATERIAL

Delete this section and replace with the following:

Materials shall be as specified in Section 9-30, as modified below.

7-14.3(01) SETTING HYDRAULICS

Supplement paragraph 3 with the following:

The Contractor shall also check the threads on the proper and base parts for proper pattern and service
capability.

A concrete shear block, as shown on the hydrant detail, shall be constructed if the hydrant is not in a
concrete sidewalk. Construction materials, and finishing shall conform with Section 8-44, Concrete
Concrete Sidewalk. The shear block shall be set to the grade of the future sidewalk.

7-14.3(02A) HYDRANT RESTRAINT

Delete this section and replace with the following:

Hydrants shall be restrained with two 3/4 inch diameter steel shackles rods as shown on the Drawings.
Hydrants will be set at the ends, or where rod couplers are needed. "All Thread" rod will not be
allowed. Shackles rods will be completely coated pursuant to Section 9-30.15.

7-14.3(03) RESETTING EXISTING HYDRAULICS

Delete this section and replace with the following:

Where, on the Drawings, an existing hydrant is shown for adjustment to conform to new street alignment
or grade, the hydrant shall be reset without disturbing the location of the hydrant lateral tee at the
main.

The hydrant shall be shackled as specified in Section 7-14.3(02A).

This work shall be in accordance with the specifications for resetting new hydrants.

7-14.3(04) MOVING EXISTING HYDRAULICS

Delete this section and replace with the following:

When an existing hydrant is shown on the Drawings to be moved, a new tee shall be inserted in the main,
and the open part of the abandoned tee shall be accurately plugged and checked or blocked. The hydrant
shall be shackled as specified in Section 7-14.3(02A). The work shall be done in accordance with the
specifications for setting new hydrants.

On charged mains, the furnishing and insertion of the new tee, and the plugging and blocking of the
existing tee, will be by the Seattle Water Department as specified in Section 7-11.309.A.
When a new hydrant is shown on the drawings to be connected to an existing main, the new hydrant shall be installed as indicated. The hydrant shall be installed as specified in Section 7-14-3009A. All work shall be in accordance with specifications for new work.

Connection and insertion of new tee and sleeve shall be by the Seattle Water Department as specified in Section 7-11-3009A.

When a new hydrant is shown on the drawings to be connected to an existing main at an existing hydrant tee, the hydrant shall be installed as indicated and shall be shutoff as specified in Section 7-14-3008. All work shall be in accordance with specifications for new work. The connection shall be by the Seattle Water Department as specified in Section 7-11-3009A.

MASONRY WALLS FOR HYDRANTS (New Section)

Walls indicated on the drawings, the Contractor shall furnish and place a broken concrete slab wall around hydrants in accordance with the Standard Plan. Broken rock may be used in place of broken concrete.

The broken concrete slab shall be a minimum of 3-1/2 thick and not less than 3 feet x 1-1/2 feet in size. The slab shall be set in level layers of the same thickness, and the exposed faces shall be as smooth as the shape and size of the slab will permit.

The backfill behind the wall shall be Mineral Aggregate Type 2, in accordance with Section 9-03.

MEASUREMENT

Delete this section and replace with the following:

Measurement for "Hydrant, 6-Inch Connection, Vertical," and "Hydrant, 10-Inch Connection with Vertical Extension," will be per each.

Measurement for "Reconnect Hydrant," "New Hydrant," and "Reconnect Hydrant" will be per each hydrant reset, moved or reconnected.

Measurement for "New Hydrant on Existing Main (New Tee)" and "New Hydrant on Existing Main (Existing Tee)" will be per each.

Measurement for "Reconnect Wall, for Hydrant" will be per square foot of face of wall constructed.

Measurement for "Hydrant Extension, Vertical, 24-Inch and Under," and "Hydrant Extension, Vertical, Over 24-Inch" will be per each in place, and will include the casing, bolts, nuts, washers and gaskets.

PAYMENT

Delete this section and replace with the following:

Payment will be made for each of the following bid items that are included in the Bid Form:

(1) "Hydrant, 6-Inch Connection, Vertical," per each.

(2) "Hydrant, 10-Inch Connection with Vertical Extension," per each.

(3) "New Hydrant on Existing Main (New Tee)," per each.

(4) "New Hydrant on Existing Main (Existing Tee)," per each.

(5) "Reconnect Hydrant," per each.

(6) "New Hydrant," per each.
SECTION 7-15 - SERVICE CONNECTIONS
Delete Section 7-15 in its entirety and replace with the following:
The Seattle Water Department, at no cost to the Contractor, shall make all taps for service connections, and for supplying, disinfecting, and installing the service pipe.

SECTION 7-16 - FLOW CONTROL SYSTEMS (New Section)

7-16.1 DESCRIPTION (New Section)
This work shall consist of excavation, shoring, foundation preparation, bedding, coating, backfilling, and connecting for the construction of a flow control structure and detention pipe for storm water storage. The flow control structure shall consist of neoprene structure with a flow control device.

7-16.2 MATERIALS (New Section)
Materials shall meet the requirements of the following sections of these specifications:

Neoprene Components .................................. C-12
Corrugated Steel Pipe .................................. C-20(D)
Corrugated Aluminum Pipe .............................. C-16(D)
Frame and Gate ......................................... C-35, D-11

7-16.2(1) FLOW CONTROL STRUCTURE (New Section)
The Flow Control Structure shall be made from a standard neoprene section, diameter as indicated on the drawings and the Standard Pipe for flow control structures.
Where surface water is to enter directly through the cover of the flow control structure, the cast iron and grate shall be as per Standard Plan 304 and the present grate shall be as per Standard Plan 246 and b, but 9 for the diameter of the chamber. In all other cases, Standard Plan No. 290 ring and cover shall be used with a present grate conforming to Standard Plan Series 50 with a 20-inch road opening. Neoprene sections, castings and grates shall meet the requirements of Section 7-03.

The Control device and connection shall consist of PVC pipe connected with an orifice, a pipe connection, and a sheet steel with a steel chain. The diameter of the control device and connection shall be the same as the diameter of the outlet pipe as indicated on the plans. The PVC pipe used for the cross and connection shall meet the specifications of ASTM D2660 Schedule 80. The PVC material used for the orifice plate and the sheet gate shall be plate material meeting the specifications of ASTM A536 Class 1517. The orifice plate material shall be 0.060-inch thick. The sheet gate material shall be 0.075-inch thick. The material used for the sheet gate shall be used as the sheet gate. The sheet gate chain shall be 12 gauge galvanized steel straight link chain.

7-16.2(2) ALUMINUM DETENTION PIPE (New Section)
Aluminium detention pipe shall be helical corrugated aluminium pipe up to 48 inches in diameter and smaller corrugated pipe over 48 inches, meeting the requirements of Aluminium Association Type I and American Alloy 300-76 structural plate with the conditions as indicated on the plans. The surfaces in contact with concrete shall be painted. The paint shall conform to Federal Specification TT-P-665 (Prime, zinc, zinc chromate, Alkyl Vehicle).

7-16.2(3) STEEL DETENTION PIPE (New Section)
Steel detention pipe shall be galvanized helical corrugated steel pipe up to 48 inches in diameter and smaller corrugated pipe over 48 inches, meeting the requirements of American Association Type I, asphalt coated to requirements of American Association Type I with the gauges as indicated on the drawings. The end plate and all end plate reinforcement shall be structural steel plate of the type and thickness as designated on the drawings.

7-16.3 CONSTRUCTION REQUIREMENTS (New Section)

7-16.3(1) GENERAL (New Section)
All work including excavation, foundation preparation, bedding, pipe laying and jointing, backfilling, connecting for the construction of detention pipe and flow control structure shall be in accordance with Section 7-03 and 7-17.
7-16.3(2) FLOW CONTROL STRUCTURE (New Section)

The PVC orifice plate shall be fusion welded to the PVC cross with an orifice of the diameter indicated on the drawing and drilled in its center.

The PVC shear pin shall be 3/4 inch in diameter and shall be fastened with a PVC connector pin and stainless steel washer.

One end of the shear gate chain shall be attached to the shear gate and the other end shall be attached to a galvanized anchor bolt embedded in the leveling block. The chain shall be slack when the gate is closed.

After pipe or castings have been placed in their final position, openings in the walls of the flow control structure shall be grouted into place to prevent a smooth, flush inner and outer surface.

7-16.3(3) DETENTION PIPE (New Section)

Joint coupling bands shall be of the type specified in Section 7-05.1(13)A and 7-05.1(17)A.

Seams in pipes and bands shall be gasketed in accordance with CSA B253 Designation M39.

The end plate shall be welded to the end of the detention pipe with a watertight continuous weld.

The end of the detention pipe inside the flow control structure shall be ground smooth of all burrs and sharp edges.

Alkali-free concrete shall be placed with a grout to remove contaminants and then painted with two coats of paint as specified in Section 7-16.3(2).

Bedding for the detention pipe shall be Class A, using Mineral Aggregate Type No. 22 as specified in Section 7-17.3(135).

7-16.3(4) THE CONNECTION TO CORRUGATED PIPE (New Section)

Drainage pipes connected to corrugated detention pipe shall be made through a shop fabricated tee as shown on the drawings and shall be installed in accordance with Section 7-17.3(135). The tee shall be made to conform to size of detention pipe and sized to accept only rubber joint pipe.

7-16.4 MEASUREMENT (New Section)

Measurement for "Flow Control Structure, (Diameter)," shall be by each structure, complete in place.

Measurement for the "Pipe, Detention, (Material) (Si/Mr)," shall be by linear foot for the actual length of pipe installed.

Measurement for outlet pipe shall be in accordance with Section 7-08.

7-16.5 PAYMENT (New Section)

Compensation for the cost necessary to complete the work described in Section 7-16 will be made at the unit contract price bid for the processes listed or referenced below:

1. "Flow Control Structure, (Diameter)," each.

2. "Pipe, Detention, (Material) (Si/Mr)," linear foot.

The unit contract price for "Flow Control Structure, (Diameter)," shall include all costs for the work required to furnish and construct the flow control structure including excavation, backfill, gravel bedding or foundation material, the PVC connection pipe and flexible adapter coupling.

The unit contract price for "Pipe, Detention, (Material) (Si/Mr)," shall include all costs for the work required to furnish and install the pipe, steel grating smooth the inlet pipe opening, grouting the in the flow control structure, and cleaning and painting the aluminum, or steel surfaces as specified.
Supplement this section with the following:

Wherever a trench is excavated in ground roadway, sidewalk, or other improved areas, the surface improvement removal and restoration shall be limited to maximum pay with limits shown on Standard Plan 584.1 or to the requirements specified in Section 7-62.3(3), whichever is greater. If the contractor damages or disturbs the adjacent improvements outside the maximum pay with as described above, he shall be required to remove and replace those areas at no cost to the Owner.

Vertical trench width in a ground roadway, sidewalk, or other improved area shall not exceed the maximum trench width shown on Standard Plan 584.1. If the Contractor exceeds this width, he will be required to provide as his own expense any approved backfill material required outside the trench limit.

Excess excavated trench material shall be removed and disposed of off-site per Section 1-04.12, or if deemed suitable by the Engineer, shall be placed elsewhere on the project in embankments or other improvements as directed by the Engineer.

The control of ground water shall be such that seeping of the bottom of excavations, or formation of "suck" conditions or "bulb" during excavation shall be prevented. Backfiling systems shall be designed and operated so as to prevent removal of the natural soils.

During excavation and installation of pipelines, and placement of trench backfill, excavations shall be kept free of water. The Contractor shall control surface runoff so as to prevent entry or collection of water in excavations. The static water level shall be drawn down a minimum of 1 foot below the bottom of the excavation as to maintain the unglazed state of the foundation. The bottom of any fill or backfill to the required density. The backfilling system shall be installed as designed, with adequate erosion control, and backfill material and erosion control is not reduced to the extent that would damage or endanger adjacent structures or property.

Before backfilling is started, the Contractor shall submit to the Engineer a statement of the method, installation and details of the backfilling system to be proposed to use. Open or cased pipes shall not be used as primary backfilling for excavations deeper than 3 feet below the static water table.

The release of ground water to its static level shall be performed in such a manner as to maintain the unglazed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flooding or movement of structures, pipelines and sewers.

Supplement this section with the following after paragraph 9:

That portion of cribbing or sheeting extending below the spillline of rigid pipe, or below the crown elevation of flexible pipe, shall be left in place unless satisfactory means of recontrolling bedding or side support, disturbed by cribbing sheets removal, can be demonstrated. If a possible hole is used in lieu of cribbing or sheeting, and the bottom cannot be kept above the spillline of rigid pipe or the crown elevation of flexible pipe, the bedding or side support shall be considered reconditioned behind the moveable box, prior to placing backfill.

The use of horizontal cradling below the barrel of pipe or the use of the pipe as support for trench backfilling will not be permitted.

Supplement this section with the following after paragraph 12:

The trench bottom will be considered to meet this requirement, with or without stabilization, when it has strength sufficient to support a length of pipe to be used without additional weight to support the pipe. The trench shall be backfilled to a sufficient length to support the pipe to a point where additional weight equal to the weight of one length of pipe is placed on it.

Where foundation material is required, it shall consist of a material of adequate Type 2, or such other material as directed by the Engineer. The width of this area of support shall be at least 1 foot per foot of pipe length, but in no case shall be less than 2 feet. The area of support shall be placed at the point where the additional load on the pipe is to be placed.

Where it is determined by the Engineer that the native material is of such character that it is not likely to be transported by moving ground water, the requirements for gradation to assure uniform void space will not apply.

Where the trench bottom is found to be unsatisfactory by the Engineer, or when the piping grade is located at a depth of 4 feet or when the horizontal alignment of the pipe is changed more than 1 inch after the initial trench is excavated, the additional excavation shall be considered as extra excavation.
SANITARY SEWERS

7-17.2(1)(A) UNEXPECTED OBJECTS (New Section)

Unexpected objects, such as stones, railroad ties, buried pavement, etc., encountered in the trench excavation shall be removed and disposed of by the Contractor. Removal of unexpected objects will be considered incidental to pipe installation unless one or more of the following conditions are met:

(a) The object(s) cannot be removed by the same equipment or excavation method as used.
(b) The trench width or depth must be increased by 2 feet or more.

In the event that any of the above conditions are met, removal of the object will be paid for in accordance with Section 1-09.4.

7-17.2(1)(B) TRENCH EXCAVATION IN SOLID ROCK (New Section)

Solid Rock Excavation shall cover the removal and disposal of solid rock as defined in Section 1-06.1(1).

Materials removed shall be replaced with suitable excavated native materials from adjacent trenches, roadway excavation, or from imported mineral aggregate of the type specified by the Engineer. Replacement material, when required, shall be in accordance with applicable bid items in the Bid Form or Section 1-09.4.

7-17.2(1)(C) SURFICIAL MATERIAL (New Section)

Surficial material obtained from trench excavation and determined to be suitable material for use elsewhere on the project by the Engineer shall be used per Section 2-03.X(10).

Surficial materials not needed elsewhere on the project and unsuitable material shall be wasted pursuant to Section 2-01.2.

7-17.2(1)(D) PUMP BEDDING

Delete the last sentence of paragraph 1.

Supplement Section 7-17.2(1) with the following:

7-17.2(1)(D) PUMP BEDDING FOR RIGID PIPE (New Section)

Bedding shall be classified as Class A, Class B, Class C, and Class D. The requirements and limits for the various classes of bedding are as shown in Standard Plan 200.

Where unanticipated excavation has been made below the stabilized grade, the Contractor shall provide, place and compact suitable bedding material to the proper grade elevation at his own expense.

Bedding shall be placed in at least three lifts: The first lift (to provide at least a 4 inch thickness under any portion of pipe 36 inches in diameter and larger) shall be placed before the pipe is installed, and shall be spread evenly so that the pipe is uniformly supported along the barrel. Subsequent lifts, which are not to exceed 12 inches in thickness, shall be placed with sufficient time allowed for compaction. Each lift shall be brought up together on both sides of the pipe and shall be carefully worked under the pipe in a manner similar to that stated in Section 2-03.X(10).

Class C bedding shall meet the requirements outlined for Class B bedding except that bedding material shall be to the spring line of the pipe.

Class D bedding shall consist of carefully excavating the trench to proper grade, overexcavating at the bell sections, and placing and compacting suitable native material around the pipe and backfilling in accordance with Section 7-17.2(3), Class B bedding, as described, shall be considered as incidental to the various items comprising the improvement. No separate payment will be made.

SANITARY PIPES

7-17.2(2) SEEKING FOR FLEXIBLE PIPES (New Section)

Material for bedding of flexible pipe such as PVC, ABS, and corrugated metal pipe shall be Class B with the bedding material consisting of Mineral Aggregate Type II. The bedding shall be placed in not more than two lifts: The first lift, to provide at least a 4 inch thickness under any portion of pipe 36 inches in diameter and larger, shall be spread evenly so that the pipe is uniformly supported. Subsequent lifts, which are not to exceed 12 inches in thickness, shall be fully compacted. Each lift shall be brought up together on both sides of the pipe and shall be carefully worked under the pipe. No separate payment will be made.

A further 6 inch lift of moderately compacted material shall be placed over the crown of the pipe.

7-17.2(3A) SEWER LINE AND GRADE

Delete this section and replace with the following:

Surficial line and grade control shall be provided by the Engineer in a manner consistent with acceptable practices. The Contractor may use either the "laucher board" method or the "liner beam" method to control pipe alignment and grade. Any other procedure shall have the written approval of the Engineer.

When using the "laucher board" method the Contractor shall transfer line and grade into the ditch where they shall be carried by means of a true grade line supported on firmly set laucher boards at intervals of not more than 30 feet. Not less than three laucher boards shall be in use at one time. Grade shall be constantly checked and in event the laucher boards do not line up, the work shall be immediately stopped, the Engineer notified, and the cause remedied before proceeding with the work.

When using a liner beam to set pipe alignment and grade, the Contractor shall constantly check position of liner beam from surface tube provided by the Owner to ensure liner beam is still on alignment and grade. In event the liner beam is crooked or out of position, the Contractor shall stop work and make necessary corrections to the liner beam equipment and pipe installed.

7-17.2(3B) PIPE LAYING

Supplement this section with the following:

Clearances between sewer or drain pipe and water main shall be maintained per Section 1-07.17(1).

7-17.2(3C) PIPES AND CONNECTIONS

Delete this section and replace with the following:

All fittings shall be capped or plugged with a plug of an approved material, gasketed with the same gasket material as the pipe unit or shall be fitted with an approved mechanical stopper or shall have an integrally cast bell-end plug. The plug shall be able to withstand all test pressures without leaking and when later removed, permit continuation of piping with joints similar to joints in the installed line.

7-17.2(3C) FITTINGS (New Section)

Unless otherwise specified, cast fittings shall be provided in the sewer and drain mains for side outlets, catch basin connections and service drains. Same shall be 8 inches inside diameter except plugs for use on the sewer, which shall be 6 inches inside diameter except otherwise shown in the Project Manual or on the Drawings. All fittings shall be of sufficient strength to withstand all handling and installation normally encountered. All fittings shall be of the same material as the pipe, except as otherwise specified, and all fittings shall be properly interconnected during the installation of the pipe. The fittings to the pipe shall be free from cracks and shall adhere tightly to each jointing surface.

7-17.2(3C) CUSH-INS ON EXISTING PIPES (New Section)

Where indicated on the Drawings, or by the Engineer, the Contractor shall perform work to cut a hole and install a tee on an existing sewer or storm drain pipe.

Concrete Pipe To Existing Concrete Pipe: Installing tee on Concrete Pipe shall be accomplished by core cutting a bell with a band saw and installation of an approved PVC tee insert with a combination rubber and metal saddle. Installing tee on existing concrete pipe any other way is unacceptable. Other types of fittings, or a saddle type tee manufactured for that size of pipe 15 inches and smaller on which the tee is being installed.

169
SANDY RIVER

Pipe sizes of 12 inches and larger on which the tee is being installed shall accommodate a length of concrete pipe cut to size that can be placed in the core drilled hole with its bell aligned against the outside face of the existing pipe and the barrel end inserted flush to the inside face of the existing pipe. The Contractor shall thoroughly clean the bedding between the tee and the existing pipe so that the surfaces are free of dirt or grit, grime, oil or other contaminants that may reduce the bond of the grout to the surfaces. Both surfaces shall be coated with Conccrete 300 L and an approved equal. The alignment between the tee and the core drilled surfaces shall be tightly packed with non-shrink grout. The connection shall be neatly finished inside and outside the existing concrete pipe.

Butt Joint To Existing Pipe: The existing concrete pipe shall be core drilled with a hole large enough to accommodate the barrel of the specified size of butterfly iron pipe and provide a gap between the butterfly iron pipe and the existing pipe for application of grout. A length of butterfly iron pipe shall be cut so that it can be placed in the core drilled hole with its bell aligned against the outside of the existing pipe and the barrel not protruding beyond the inside face of the existing pipe. The Contractor shall clean the outside of the butterfly iron pipe, removing loose particles (dirt, soil, oil, or film of any sort) that may reduce the bond of the grout to the pipe. After core drilling, the exposed surface of the existing concrete pipe shall be rough and clean. Both surfaces shall be coated with Conccrete 300 L and an approved equal. The alignment between the pipe and core drilled surfaces shall be tightly packed with non-shrink grout. The connection shall be neatly finished inside and outside the existing concrete pipe.

The existing butterfly iron pipe shall be core drilled or used as a welding method cutting a full size hole and insert a tapping saddle type tee manufactured for their pipe or on which the tee is being installed. The contact area between the saddle and the pipe shall be thoroughly cleaned of all dirt, grease, grime or other foreign matters to ensure continuous contact by the straps.

Concretized Steel To Existing Concretized Corrugated Metal Pipe: In concretized steel and aluminum pipes, a hole would be drilled or used to avoid sharp calcinations on the bending. The flame plate of the fabricated tee shall be concretized to match concretization of the pipe to which it is attached. A groove gasket or approved seal shall be inserted between the outside face of the existing pipe and the flame plate of the tee and connected by bolt. Concretization protection shall be provided if the pipe section of the tee is non-concretized aluminum pipe.

The incoming pipe and the tee shall be connected with stainless steel rigid welded flexible coupling. If the pipe section of the tee is aluminum, corrosion protection shall be provided by inserting an anode from the inside by extending the gasket 1 inch beyond the edge of the stainless steel coupling.

This work shall also include necessary excavation, allowing to expose the existing pipe, installing the flexible, having the connection and completing of surfaces. All excavation small diameter pipe made of reinforced concrete or vitrified clay shall be fully exposed for inspection.

The excavation shall be backfilled and compacted per Section 7-17,102(3) Excavation of Trench Backfill. Maximum depth shall be determined by inspection control test specified in Section 7-17,102(4) Excavation of Trench Backfill. The Contractor shall notify the Sewer Utility at 625-4335 at least 24 hours prior to beginning test in operations. Sewer Utility will inspect the existing pipe before drilling and the cut-in tee during installation.

If the exposed existing pipe is found cracked or defaced, Sewer Utility will either fill in new pipe or repair the damage at no cost to the Contractor provided the damage was not caused by the Contractor’s operations. If Sewer Utility relies in a pipe with a tee already on it, no fitting will be required.

SANDY RIVER

7-17,103 Jointing of Disconformal Pipe

Delete this section and replace with the following:

7-17,103 Jointing (New Section)

Where it is necessary to break out or connect to an existing sewer during construction, only cast iron having the same inside diameter will be used in reconnecting the sewer. Where Mild Steel is used between pipes with a slit in the wall thickness, the Contractor shall use a flexible metal coupling, adapter of coupling, and make a watertight joint. Couplings shall be of the type manufactured by "Maucr," "Mitco," "Smith-Blair," or approved equal.

190

SANDY RIVER

7-17,102(2) (Section)

Delete this section and replace with the following:

7-17,102(2) Jointing (New Section)

Where it is necessary to break out or connect to an existing sewer during construction, only cast iron having the same inside diameter will be used in reconnecting the sewer. Where Mild Steel is used between pipes with a slit in the wall thickness, the Contractor shall use a flexible metal coupling, adapter of coupling, and make a watertight joint. Couplings shall be of the type manufactured by "Maucr," "Mitco," "Smith-Blair," or approved equal.

151
(a) Capable of attaining the degree of compaction specified in Section 7-17.3(b).
(b) Within reasonable tolerance of optimum moisture content.
(c) Reasonably free of organic material, clay, frozen loam, rocks or pavement chunks more than 6 inches in maximum dimension, or other deleterious matter.

Unsuitable backfill material shall be removed from the site, disposed of per Section 1-06.12, and replaced with Mineral Aggregate Type 17 or such other imported material as designated by the Engineer.

The Contractor shall take any necessary steps to protect the excavated material from becoming contaminated with excessive moisture. Any material that becomes unsuitable due to the Contractor's failure to take adequate measures to protect it from moisture shall be replaced at the Contractor's expense with Mineral Aggregate Type 17 or such other material as the Engineer will accept.

Where it is required that a blanket of select material or back run gravel be placed on top of the native backfill, the backfill shall be placed to each elevation as shown on the drawings, or as the Engineer may direct, and shall be levied to provide for a uniform thickness of the native material. Compaction is required.

7-17.3(b) (New Section)
Trench backfill shall be spread in layers and be compacted by mechanical tampers of the impact type approved by the Engineer. The backfill material shall be placed in successive layers with the first layer not to exceed 2 feet above the pipe, and the following layers not exceeding 12 inches in loose thickness, with each layer being compacted to the density specified below.

(a) Improved areas such as street and sidewalk areas shall be compacted to 95% of standard dry density.
(b) Unimproved areas or landscape areas shall be compacted to 90% of standard dry density.

Compaction control tests shall be performed as specified in Section 2-03.3.14(k).

The procedure and equipment to be used for backfill compaction shall be demonstrated on a test section of pipeline to be designated by the Engineer.

The Contractor shall excavate test pits in the backfill as directed by the Engineer for the purpose of testing the backfill compaction. All costs in connection with excavating test pits and from stability time during field density test shall be considered as incidental to the backfill and no separate payment will be made.

If the required compaction density has not been obtained, the Contractor shall remove the backfill from the trench and recompact using heavier compaction equipment or pass means. This process shall be continued until the density has been obtained. The Contractor shall then be permitted to proceed with backfilling and compacting the remainder of the pipeline under the approved compaction procedures.

In the event routine field densities taken during the course of construction show the specified compaction is not being obtained because of changes in soil types or for any other reason, the Contractor will be required to retest and recompact the backfill. In no case will excavation and pipelaying operations be allowed to proceed until the specified compaction is attained.

7-17.3(c) (New Section)

(a) Flare all pipe outlets with suitable test plugs. Brace each plug securely.
(b) All gauge pressures in the test should be increased by the amount of groundwater pressure at the center of the pipe.
(c) Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.
(d) After an internal pressure of 4.0 psig is obtained allow at least 5 minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.
(e) After the 5 minute period, disconnect air supply.
(f) When pressure decreased to 3.5 psig, start stop watch. Determine the time in seconds that is required for the internal air pressure to reach 2.5 psig. This time interval should then be compared with the time required by specification as computed below.

(g) Let rise and length of all pipes under test to table similar to the one that follows. The ground to be tested in one operation shall be the reach between two consecutive manholes.

(h) By the use of Nonagons, compute K and C. Use scales d and L, read K and C, and enter these values in the table.
(i) Add all values of K and all values of C for pipe under test.
(j) If the total of all values is less than one, enter the total of all values into the space for "Time Required by Specification."
(k) If the total of all values is greater than one, divide the total of all values by the total of all values to get t. In this case with the Nonagons, use scales C and C, and read t.
### NOMOGRAPHS FOR THE SOLUTION OF \( K = \cdot011d^2L \) AND \( C = \cdot0003882dL \)

\[ t_q = K + C \]

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**Fig. 1**

TIME REQUIRED BY SPECIFICATION

TOTAL \( K \)

TOTAL \( C \)
7-17.3.1 TELEVISION INSPECTION

Delete this section and replace with the following:

The Engineer will inspect and videotape, using closed circuit television, all sewers and storm drains 6 inches through 48 inches in diameter. Pipe larger than 60 inches in diameter will be inspected visually after testing. Inspection and videotaping will be performed at least twice once as part of the final acceptance process, and a second time approximately 6 to 11 months after the final acceptance.

Approximately 1200 linear feet of sanitary pipe can be videotaped and inspected per day. Except for projects having less than 1200 linear feet of sanitary pipe, 1200 linear feet of pipe will be the maximum length of pipe per day the Engineer will schedule for TV inspection. On projects having more than 1200 linear feet of pipe per day the Engineer may require the Contractor to make up the difference in pipe per day by full day per 1200 linear feet of pipe to be inspected. Inspection inspection and videotaping shall not be made until after manholes have been cleaned and the pipe cleaned and air tested. On projects with less than 1200 linear feet of pipe, the entire work shall be substantially completed prior to the final acceptance videotaping and inspection.

On projects having more than 1200 linear feet of pipe, TV inspection may be performed prior to the work being substantially complete. The Contractor shall notify the Engineer when pipe sections are ready for TV inspection. The Engineer will require a minimum of 5 working days notice in order to schedule the inspection. The Contractor is requested to be present during all TV inspections and videotaping. The Contractor shall also provide whatever assistance may be necessary to ensure vehicular access and access for the Owner's equipment when making TV inspections.

Should video inspection during the final acceptance process discover any pipe or component which has been laid or installed in nonconformance with the Specifications, the Contractor shall, upon order of the Engineer, correct by replacing or by restoring and replacing, at the Contractor's expense, that portion of the pipe found deficient. After the Contractor has made the necessary corrections to the deficient portion of the pipe, the repairs will be verified by additional television inspection. This process will continue, if necessary, until the entire work is finally accepted by the Engineer.

6 to 11 months after the final acceptance, the sewer or storm drain will again be inspected and videotaped. This video tape will then be compared to the video tape made at final acceptance to determine if any additional deficiencies have occurred. Should there be evidence of incipient faults as compared to the original installation, in the opinion of the Engineer, repair or replacement or repairs, the Contractor shall, upon order of the Engineer, correct those deficiencies as required under the Contractor's own expense. After the necessary corrections have been made by the Contractor, the corrections will be verified by additional television inspection.

If the Contractor calls for an initial TV inspection, and the pipe is not clean or has any surface deficiencies that the line cannot be fully inspected, the inspection will be charged to the Contractor, and the cost withheld from money due to the Contractor.

7-17.4 MEASUREMENT

Delete this section and replace with the following:

Measurement for "Extra Excavation" will be by the cubic yard of material actually removed below the pipe bedding, in accordance with the standard trench width shown on the Standard Plans. Measurement for "Wedding (Class) (Slam) Pipe" will be by the linear foot of pipe actually laid. Measurement will be from center to center of standard manhole or to the inside face of structures.

Measurement for pipe will be by the linear foot of pipe laid and properly aligned, and shall be along the centerline of the pipe through the town. Measurements will be from center to center of any reinforced manholes or to the inside face of structures or manhole caps chamfered or to the end of pipe where it dead ends beyond manholes. Measurement will be to the nearest 6 ft foot.

No measurement will be made for trench excavation and backfill except for foundation material, extra excavation, and backfill material.

Measurement for foundation material shall be by the cubic yard of material Type 2 required to fill the voids made by extra excavation and shall be based on net section width of trench and depth and length as computed by the Engineer, per Section 1-04.5.1.

SANITARY SEHOME

Measurement for "Steel Casing Pipe, (Slam) Tanged, Jacked or Augered," will be by the linear foot of pipe actually installed.

Measurement for "Pipe, (Material), Jack/Auger/Tanged, (Slam)" will be by the linear foot of pipe actually installed.

Measurement for tress shall be by each for each size installed.

Measurement for feet cut into existing pipe shall be by each for each size installed.

Measurement for imported Mineral Aggregate, when ordered for trench backfill in lieu of native material by the Engineer, will be by the cubic yard based upon the standard maximum trench size with which it is specified in Section 7-17.2.1A and the Standard Pipe, and the depth designated by the Engineer. Measurement for imported Mineral Aggregate will be determined at the Owner's expense. The quantity of backfill material shown in the Bid Form is an estimate only, and shall not, under any circumstances, be considered to indicate the quantity which may actually be required.

7-17.5 PAYMENT

Delete this section and replace with the following:

Payment will be made at the unit contract price for each of the following bid items as are included in the Bid Form:

2. "Wedding, (Class), (Slam) Pipe," per linear foot.
3. "Pipe, (Material), (Class), (Slam)," per linear foot.
4. "Steel Casing Pipe, (Slam), Tanged, Jacked or Augered," per linear foot.
5. "Pipe, (Material), Jack/Auger/Tanged, (Slam)," per linear foot.
6. "Tress, (Material), (Slam)," each.
7. "Pipe, (Slam), Gat-In Backing (Material) Pipe," each.

The unit contract price for "Extra Excavation" shall include all costs to move excavated material, haul and dispose of the material.

The unit contract price for "Wedding, (Class), (Slam) Pipe," shall include all costs for the work required to furnish and install the pipe of the type and size specified, and including the following:

(a) Trench excavation (except "Extra Excavation"); haul, stockpiling, backfill, and compaction of native material.
(b) Removal and off-table disposal of excess excavated native material, or placement of suitable excess excavated native material elsewhere on the project.
(c) Grading, sheeting, and deserting.
(d) Removal and disposal of existing pipe encountered in required trench excavation and backfill.

The cost of the Owner's labor and equipment for the videotaping during the final acceptance process and the videotaping 6 to 11 months later to recheck the pipe condition will be borne by the Owner unless additional videotape inspection is necessary to verify corrections or replacement of deficient pipe. The cost of additional videotape inspection and videotaping to verify repairs or replacement pipe will be borne by the Contractor. The Contractor shall also be responsible for all costs incurred in any television inspection performed solely for the benefit of the Contractor.

The unit contract price for "Steel Casing Pipe, (Slam) Tanged, Jacked or Augered," shall include all costs for the work required for design, materials, tools, and equipment necessary to complete the work as specified in Section 7-17.2.1A, including installation and removal of the trenching pit and sheeting.
The unit contract price for "Pipe, (Material), Jack/Auger/Trench, (ft/m)" shall be as specified per Section 7-14,320.

The unit contract price for "Pipe, (Material), (ft/m)" shall include all costs for the work required to furnish and install the pipe as specified including including pipe.

The unit contract price for "Pipe, (Material), (ft/m)" shall include all costs for making gasket including pipe, cutting, excavation, backfilling, compaction, installing tee and adapter if necessary, if necessary. All labor, material, and labor shall be paid as per Mineral Aggregate Type 17 or such other imported material acceptable to the Engineer.

Foundation material when required shall be paid as per Mineral Aggregate Type 2 or such other imported material acceptable to the Engineer.

The work of clearing and preparing for bidding, excavation, and furnishing caps and plugs for the costs shall be considered as incidental to the bid items for the appropriate type of pipe as listed in the Bid Form. All work required for proof testing as specified herein shall be considered as incidental to the bid items for the appropriate type of pipe as listed in the Bid Form.

The Contractor will provide all necessary water for construction and testing purposes, according to the requirements of Section 7-07.

SECTION 7-18 SIDE SEWERS (New Section)

7-18.1 DESCRIPTION (New Section)

This work shall consist of excavation, shoring, foundation preparation, bedding, jointing, backfilling, compacting and testing the construction of Side Sewers.

A side sewer is considered to be that portion of a sewer line that will be constructed between a main sewer line and a residence or other building for the purpose of conveying sewage or stormwater. The work shall include any of the internal piping or connecting appurtenances, the installation of which is controlled by a municipal code, ordinance or regulation.

The general requirements for construction of sewers in other sections of these specifications shall apply for construction of side sewers unless they are inconsistent with any of the provisions of this section. Where there is a conflict, the specifications shall apply alike to all side sewers or public rights-of-way and private property.

7-18.2 MATERIALS (New Section)

7-18.2(1) PIPE (New Section)

Pipe materials shall meet the requirements for the following categories:

- Cast Iron Pipe - 9-05.7(1)
- PVC Pipe - 9-05.10
- Ductile Iron Pipe - 9-05.13
- Solid Wall PVC Pipe - 9-05.4
- Ductile Iron Sewer Pipe - 9-05.11
- PVC Sewer Pipe - 9-05.9

All pipe shall be clearly marked with type, class, and/or thickness, as applicable. Lettering shall be legible and permanent under normal conditions of handling and storage.

7-18.2(2) JOINTS (New Section)

Approved jointing shall be flexible jointing.

Flexible jointing shall be constructed to include rubber, synthetic rubbers, and plastic materials specially manufactured for the joint, pipe size, and joint intended and shall be furnished by the manufacturer of the pipe to be used. Jointing materials shall meet the requirements of Section 7-18.2(1) Ductile Iron.

7-18.3 FITTINGS (New Section)

These, valves, hoods, couplers, adapters, and transition sections shall conform to the requirements of Sections 7-18.2(1) and 7-18.2(2).

7-18.4 CONSTRUCTION REQUIREMENTS (New Section)

7-18.4(1) GENERALL (New Section)

Side sewer construction shall conform to the Standard Plan and all applicable ordinances or regulations with respect to equipment, protective measures, size of pipe, depth of cover, number of men per pipe, permissible connections, inspection, and testing.

Side sewer locations shown on the Drawings shall be subject to relocation in the field after construction starts. Regardless of the location of the location, the Contractor shall place the tee or tee branch in the main sewer line at the location designated by the Engineer.

The Engineer will mark and indicate the depth for the lowest elevation of end pipe at the street grade or property line.

Side sewers shall be laid below the water main and shall meet requirements for minimum separation in accordance to Section 1-05.17(1A).
7-18 SIDE SEwers (New Section)

7-18.30 SIDE SEwers NOT SHOWN ON THE PLANS (New Section)

In cases where side sewers are not shown on the drawings, an owner, upon approval of the Engineer, may apply for side sewer, provided however, that the Ewe sewer, if constructed, and the engineer is allowed for connecting, is still underground and provided further that substantially all the necessary equipment for accounting, backfilling and connecting is furnished, installed and guaranteed by the bidder. The Engineer shall complete the side sewer construction at his own unit contract price.

The Contractor shall not be required to construct side sewers for which applications are received after completion of construction and removal of equipment from the block containing the applicant's property.

Under such a condition, the Contractor may construct the side sewer by negotiating the conditions and prices with the applicant and look to his fee for payment.

If the Contractor elects to construct a side sewer after completion of work in the block and after removal of his equipment, then, and so do at his bid price, payment will be made by the Owner in the normal manner under the contract.

7-18.31 SIDE SEwers SHOWN ON THE PLANS (New Section)

7-18.31.10 PROTECTION OF EXISTING SIDE SEwers (New Section)

Where a newly-constructed pipe line crosses above or beneath an existing side sewer which is shown on the drawings, it shall be the responsibility of the Contractor to protect the existing side sewer from damage in the process of construction. Damage to the existing side sewer shall be replaced by the Contractor at no cost to the City.

7-18.31.20 REPAIR AND RE-LAY EXISTING SIDE SEwers (New Section)

The Contractor shall complete the work in accordance with Sections 7-17. All jointing shall be made in accordance with Section 7-18.30(C).

7-18.32 EXCAVATION AND BACKFILL (New Section)

Excavation and backfilling for side sewers shall conform to the requirements of Section 7-17, excepting that the backfill in access of that required to hold the pipe in true alignment shall be placed prior to inspection.

7-18.33 PIPE Laying and Jointing (New Section)

Pipe laying and jointing, except as hereafter provided, shall conform to the requirements of Section 7-17.

7-18.34 LINE AND GRADE (New Section)

Side sewers shall be laid to a line and grade between the main sewer tee branch or eye branch and the right-of-way margin, as to best serve the property relative to the following conditions, as may be directed by the Engineer:

(a) Where no vacant property is located in the street grade, the invert elevation of the side sewer and pipe at the right-of-way margin shall be one foot higher than the elevation of the main sewer at the location of its tee or eye branch.

(b) Where the lot is occupied property is higher than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be one foot higher than the elevation of the grade at the location of its tee or eye branch.

(c) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(d) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(e) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(f) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(g) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(h) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(i) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(j) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(k) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(l) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(m) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(n) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(o) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(p) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(q) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(r) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(s) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(t) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(u) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(v) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(w) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(x) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(y) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

(z) Where the lot is occupied property is lower than the street grade, the slope of the side sewer and pipe at the right-of-way margin shall be maintained such that the invert elevation of any proposed storm drain pipe shall be lower than the invert elevation of the main sewer at the location of its tee or eye branch.

7-18.35 JOINING (New Section)

Where it is necessary to break out an existing side sewer during construction due to grade conflict with a newly constructed pipeline, new pipe will be used to reconnect the side sewer. Where joints cannot be made due to dissimilar pipe material or dissimilar wall thickness, the Contractor shall use a flexible, metal-backed coupling to make a watertight joint. Couplings shall be those manufactured by "Hose," "Terne," or "Bell-Hose" or approved equal.

7-18.36 FITTINGS (New Section)

All fittings shall be factory-produced and shall be designed for installation on the pipe to be used. Fittings shall be of the same quality and material as the pipe used, except when installing a PVC insert on existing pipes.

The maximum deflection permissible at any one fitting shall not exceed 45 degrees (one-eighth full). The maximum deflection of any combination of two adjoining fittings shall not exceed 45 degrees (one-eighth full) unless straight pipe of not less than 2 1/2 feet in length be installed between such adjacent fittings, or unless one of such fittings be aypes branch with a cleanout provided on the straight leg.

Side sewers shall be connected to the tee, eye, or cleaner provided in the public sewer where such is provided, utilizing approved fittings or adapters. Where no tee, eye, or cleaner is provided or available, connection shall be made by core drilling and installing an approved tee, as specified in Section 7-18.30(B).

7-18.37 CLEANOUTS (New Section)

Not less than one cleanout shall be provided for each side sewer and/or each total change of grade or alignment, except that one cleanout shall be required at the connection of the side sewer to the public sewer. A suitably located cleanout in the house piping or plumbing may be considered as a cleanout for the side sewer.

Cleanouts shall be placed at intervals of not more than 100 feet in straight runs. Cleanouts in the line shall be filled a one foot branch at the side sewer.

The extension of house sewer cleanouts to grade will be optional with the house owner. When installed to grade, cleanouts shall be full side sewer diameter and shall be extended to a point not less than 6 inches below finished ground surface and shall be plugged with a removable stopper which will prevent passage of dirt or water. When specified, the Contractor shall install an approved cap to provide ready access to the cleanout stopper.

7-18.38 INSPECTION AND TESTING (New Section)

Excavation and backfilling for side sewers shall conform to the requirements of Sections 7-17, excepting that no backfilling for any section of that required to hold the pipe in true alignment shall be placed prior to inspection.

Pipes installed and backfilled without visual inspection shall be excavated and exposed for inspection at the Contractor's expense.

161
7-18.3(18) TESTING (New Section)

All side sewers shall be tested after backfill. Side sewers that are reconstructed or repaired to a length of 10 feet or more shall be tested for water tightness. Testing of newly reconstructed sections of side sewers shall be performed. Testing shall be performed in the presence of the Inspector in accordance with Section 7-17.3(4).

All side sewers constructed in conjunction with the main sewer shall, for purpose of testing as specified in Section 7-17.3(4), have a 6-inch tee fitting pipe placed at the point where the side sewer crosses the street or other public right-of-way. The tee opening shall be positioned perpendicular to the side sewer slope, unless otherwise directed by the Engineer.

When the new side sewer is connected to a new main sewer installed under the same contract, and the side sewer is not located simultaneously with the test of the main sewer, the Contractor shall furnish and place, at his own expense, a test tee in the first pipe out of the main sewer, so that an inflatable rubber ball can be inserted for testing the side sewer and thus permit separate tests.

When the new side sewer is connected to an existing main sewer, the Contractor shall furnish and place 2 test tees: one immediately adjacent to the main sewer and a second where the side sewer crosses the street or right-of-way margin. Such test tees will be paid per Section 7-18.5.

The ends of side sewers or test tee openings shall be plugged watertight with materials and by method acceptable to the Engineer.

7-18.3(7) MISCÉLLANEOUS REQUIREMENTS (New Section)

7-18.3(7)(A) LINE AND CONNECTIONS (New Section)

Side sewer in public right-of-way or utility easement shall be not less than 6 inches in diameter unless otherwise specified. Side sewers on private property shall be not less than 6 inches in diameter. No roof drain, area drain, or subsurface drain shall be connected to a side sewer which is connected to a separate main line sanitary sewer.

Roof drains or private service drains in areas of combined sewer systems shall be run in a separate pipe to the property line before connecting into the side sewer.

7-18.3(7)(B) PROXIMITY TO WATER SUPPLY LINES (New Section)

Clearance between side sewers and water mains shall be maintained as specified in Section 1-07.17(1).

7-18.3(7)(C) PLUGS (New Section)

Any unused openings to the side sewer shall be closed with a watertight plug fastened in place.

7-18.3(7)(D) SEPTIC TANKS AND CESSPOOLS (New Section)

No side sewer shall be constructed through or adjacent to a septic tank or cesspool tank. If the conditions prohibit any other location, the Contractor shall show the cesspool or septic tank by such means as the Engineer may direct, and by such payment as may be specified or agreed upon.

7-18.3(8) RESTORATION, FINISHING AND CLEANUP (New Section)

The Contractor shall restore, and/or replace all pavement cutting, sidewalks, landscaping, or other disturbed surface improvements to their original condition in such manner as to meet the requirements of applicable ordinance. All surplus materials and temporary structures, as well as all excess excavation shall be removed and the entire site of Contractor operations shall be left in a neat and clean condition.

When the course of the work requires any disturbance of private property, the Contractor shall comply with the requirements of Section 1-07.24.
SECTION 7-19 SEWER CLEANOUT (New Section)

7-19.1 DESCRIPTION (New Section)

This section of these specifications shall apply to the construction of sewer cleanouts as shown on the Standard Plan.

7-19.2 MATERIALS (New Section)

All materials incorporated into the total cleanout structure shall meet the requirements of the various applicable sections of these Specifications.

7-19.3 CONSTRUCTION DETAILS (New Section)

Pipe joints shall be the type specified in Section 7-17.3(f).

The trench excavation shall be made in such a manner as to provide an undisturbed base upon which the pipe shall be placed. bedding around the pipe and under the pipe connecting to the pipe shall be thoroughly compacted as directed. Construction shall otherwise conform to the requirements shown on the Standard Plan.

7-19.4 MEASUREMENT (New Section)

Measurement for "Sewer Cleanout, (Size)," shall begin at the weep hole and extend to the lambend casing, as shown on the Standard Plan.

7-19.5 PAYMENT (New Section)

Payment will be made in accordance with the following bid item, except on side sewers:

(1) "Sewer Cleanout, (Size)," per each.

The unit contract price per each for "Sewer Cleanout", shall be full compensation for furnishing and placing the weep, sewer pipe, pipe bands, pipe plug casting, and concrete collar as indicated on the Standard Plan.

ADJUSTMENT OF NEW AND EXISTING UTILITY STRUCTURES TO FINISH GRADE

SECTION 7-20 - ADJUSTMENT OF NEW AND EXISTING UTILITY STRUCTURES TO FINISH GRADE (New Section)

7-20.1 DESCRIPTION (New Section)

The work covered by this section consists of adjusting existing manholes, catch basins, inlet boxes, valve chambers, water meter bases, manholes, and similar utility structures encountered during the work to a new grade elevation. The work shall include adjustment by removing or installing ring extensions, by removing and installing adjustment bricks, by removing and rebalancing a portion of the existing structure; or by any combination of the preceding methods.

Publicly-owned utility structures shall be adjusted to finished grade by the Contractor. Privately-owned utilities are generally in the streets and road rights-of-way pursuant to franchises or to rights-of-way claimed under the laws of the United States of America, or the State of Washington and elsewhere, these utility agencies will be responsible for all adjustments and relocation of their own facilities. It is the intent of this section to schedule the work so that utility adjustments by others can be accomplished without undue delay.

The requirements of this section apply to utility structures constructed from present concrete sections, concrete brick or blocks, and cast-iron pipe.

7-20.2 MATERIALS (New Section)

Material used in the adjustment of existing utility structures shall meet the requirements for new construction specified in the section applicable to the line being adjusted.

Adjustment ring extensions shall meet the requirements of Section 9-05 and Stantan Plan No. 231.

Epoxy, used to secure malleable castings for ring extensions to existing frames shall be Sylvan 691, Malleable Casting Epoxy, or equal as approved by the Engineer.

7-20.3 CONSTRUCTION REQUIREMENTS (New Section)

7-20.3(l) ADJUSTMENT OF MANHOLDS, GUTTER BINS AND SIMILAR STRUCTURES (New Section)

7-20.3(1)(a) GENERAL (New Section)

The Engineer will establish approximate grade elevation for the tops of existing utility structures requiring adjustment. The final adjustment and grade elevation shall be established from adjacent roadway surfaces, forms, or other similar base as may be provided by the Engineer.

Except where adjustment is to be made by ring extension the Contractor shall, as applicable, in any particular case, remove the necessary portion from around the casting; remove the casting and install or remove adjustment bricks or sections from around the utility structure, remove such portion as may be necessary, and rebalance the structure to meet the new grade elevation. Permission manual shall be kept to the minimum amount necessary to facilitate the adjustment. Adjustment to finished grade elevation by whatever method is required shall result in a finished structure meeting the requirements for new construction as specified in Section 7-05.3(e).

When ring extensions are specified the ring extension shall be spooled securely to the existing frame.

The surfaces of the frame that are to receive the epoxy shall be thoroughly cleaned prior to the application of the epoxy.

After the utility structure has been adjusted to grade, all voids around the structure shall be backfilled and compacted with selected native material or, if desired by the Engineer, an imported material aggregate. Thereafter the casting shall be secured in place with a concrete or asphalt mix, as applicable, and the structure made watertight by plastering with a mortar cement.

Adjustment to final grade of water meter bases encountered within the planting strip and sidewalk area shall be made by the Contractor.

Adjustment of water meter boxes necessitate adjustment or relocation of the water meter, the water meter shall be adjusted or relocated by the Seattle Water Department. The Contractor shall then make final adjustment of the water box.
7-20 ADJUSTMENT OF NEW AND EXISTING UTILITY STRUCTURES TO FINISH GRADE

7-20.3(2) ADJUSTMENT OF DRAINS (New Section)
The final adjustment and grade of cast iron frames for new and old inlets to be adjusted to grade will be established from the form or adjacent pavement surfaces. The final adjustment of the top of the inlet will be performed in smaller manner as that described for manholes. In asphalt concrete paving projects using curbs and gutters, that portion of the cast iron frame not embedded in the gutter section shall be solidly embedded in concrete edge. The concrete shall extend a minimum of 6 inches beyond the edge of the casting and shall be left 1/2 inch below the top of the frame so that the weathering elements do not damage the joint between the cast iron frame and the concrete pavement. The existing concrete pavement and edge of the casting shall be painted with hot asphalt cement.

Adjustments in the inlet structure shall be constructed in the same manner and of the same material as that required for new inlets. The inside of the inlets shall be plastered.

7-20.3(3) ADJUSTMENT OF MOMENTS AND CAST IRON FRAME AND COVER (New Section)
Moments and moment coverings shall be adjusted to grade in the same manner as for manholes.

7-20.3(4) ADJUSTMENT OF VALVE BOX CASTINGS (New Section)
Adjustment of valve box castings shall be made in the same manner as for manholes.

7-20.3(5) FURNISHING CASTINGS (New Section)
Where adjustment of existing utility structures is required and the drawings or the Engineer directs the existing castings be replaced, the Contractor shall furnish new castings of the type specified. All castings shall be cleaned and delivered, as directed by the Engineer, to the utility which owns the casting.

7-20.4 MEASUREMENT (New Section)
Measurement for "Adjust Existing (Item)," will be by each.

Measurement for "Adjust by Shifting," will be by the vertical foot of adjustment, from original grade to finish grade.

Measurement for "Utility Casting (Type)," will be by each.

7-20.5 PAYMENT (New Section) (9/29/66)
Compensation for the cost necessary to complete the work described in Section 7-20 will be made at the unit contract prices bid only for the pay items listed or referenced below:

(1) "Adjust Existing Manhole, Catch Basin or Valve chamber," each.
(2) "Adjust Existing Inlet," each.
(3) "Adjust Existing Moment Frame and Cover," each.
(4) "Adjust Existing Valve Box," each.
(5) "Adjust Existing Manhole, Catch Basin or Valve Chamber With Ring Extension," each.
(6) "Adjust Existing Inlet With Ring Extension," each.
(7) "Adjust Existing Moment Frame and Cover With Ring Extension," each.
(8) "Adjust Existing Valve Box With Ring Extension," each.
(9) "Adjust Existing Handhole," each.
(10) "Adjust by Shifting," per vertical foot.
(11) "Utility Casting (Type)," each.
7-20
ADJUSTMENT OF NEW AND EXISTING UTILITY STRUCTURES TO FINISH GRADE

The unit contract price for "Adjust Existing (Item)" shall include the costs for all work specified in Section 7-20 except as provided for under Item 3.2, Section 7-20.5, necessary to raise or lower the top edge of the utility casting, and structure, from the original grade elevation to a new finished grade elevation, a distance equal to or less than 20 inches.

When "Adjust Existing (Item) With Ring Extension" is specified, the unit contract price shall also include the cost of the ring extension specified in place.

When adjustment of an existing utility casting or structure requires a change in grade elevation greater than 20 inches, payment will be made at the unit contract price for "Adjust by Shifting," the price for which shall include the costs for all work necessary to modify the existing structure and complete the adjustment to the required grade elevation.

The unit contract price for "Utility Casting, (Type)" shall include the costs for all work required to furnish and install new castings of the type specified when existing castings are to be replaced.

Costs for adjustment to finished grade of water meter boxes, excluding adjustment of the water meter itself, shall be included in the prices bid for the various bid items shown in the bid form, and no separate payment will be made.

If a bid item for adjusting existing utility structures is not included on the Bid Form and such work is performed, payment will be made per Section 1-01.4.

Mineral aggregate ordered as backfill in lieu of native material will be paid by the cubic yard per Section 4-04.1.

Restoration of the roadway surface shall be in accordance with the applicable section covering the work involved.

The costs for asphalt or cement concrete used to secure castings prior to paving shall be considered incidental to the work and no separate payment will be made.

All work required to adjust casting to finished street grade of all newly installed utility structures listed in the Bid Form shall be considered to be incidental to the bid items for the appropriate type of utility structure listed in the Bid Form.

SECTION 8-01 ROADSIDE SEEDING
Delete this title and replace with the following:
SECTION 8-01 EROSION CONTROL

8-01.2 MATERIALS
Supplement this section with the following:
The terms "Planting Soil" and "Top Soil" as used herein shall be synonymous.

8-01.3(1) CULTIVATION
Delete this section and replace with the following:
Areas to be cultivated shall be indicated on the Drawings or specified in the Project Manual. Areas shall be cultivated to a minimum depth of 6 inches and shall provide a reasonably firm but friable seed bed. Cultivation shall take place no sooner than 2 weeks prior to seeding. When planting soil, fertilizer, or soil conditioners are required, they shall be incorporated into the top 6 inches of subgrade by rototilling.

Cultivation of the soil may be by farm disc, harrow, or other suitable equipment approved by the Engineer. Cultivation shall be done at right angles to the natural flow of water on the slope unless otherwise ordered by the Engineer.

Prior to the cultivation, the Contractor Remove all visible rocks, cinders and debris 3 inches or larger in any dimension. Any exposed tree roots in cut slopes shall be neatly pruned at the finished grade of the slope and the cut treated with an approved sealer.

All costs incurred in performing the work specified shall be incidental to and included in each other erosion control bid items included in the Bid Form.

8-01.3(2) TOPSOIL
Supplement Section 8-01.3(2) with the following:
All damage occurring to existing roadsides, shoulders, walks, curbs, lane, planting areas or other existing adjacent structures or dress due to the Contractor's operation in grading and placing the top soil shall be repaired by the Contractor at his own cost and expense to the satisfaction of the Engineer.

8-01.3(2) TOPSOIL TYPE C (New Section)
Topsoil Type C shall be native topsoil obtained from a source provided by the Contractor outside of the Project Site. Topsoil Type C shall meet the requirements of Section 8-01.3(2) and Section 9-12.1(2).

8-01.3(4) SEEDING
Supplement this section with the following:
The rate of application for seed and mulch shall be as specified in Sections 9-14.2, and 9-14.4(2) respectively.

8-01.3(9) FERTILIZING
Delete this section and replace with the following:
Fertilizer of grade 10-05-50 fumigating shall be applied in accordance with the procedures and requirements for seeding in Section 8-01.3(8) at the rate of 10 pounds per 1,000 square feet.
8-03.11.3 EROSION CONTROL

Delete this section and replace with the following:

Compensation for the cost necessary to complete the work described in Section 8-03 will be made at the unit contract price bid only for the pay items listed or referenced below:

1) "Erosion Control, Seeding" per square foot.
2) "Erosion Control, Hydro-Seeding" per square foot.
3) "Erosion Control, Mulching" per square foot.
4) "Erosion Control, Matting (Type)" per square foot.
5) "Erosion Control, Silt Fence," per linear foot.

Payment for the type of erosion control specified above will include the costs for all work specified in Section 8-03 necessary to complete the type of erosion control work specified.

The unit contract price per square foot for seeding, planting, matting, blader, or tacking agents, when included in the bid fees, separately or in any combination, shall be full compensation for furnishing all materials, labor and equipment, and all items required to complete the work as specified.

The unit contract price per square foot for seeding, when included in the bid fees as a separate pay item, shall be full compensation for furnishing all labor, tools and equipment necessary to sow and trim the areas as specified.

Removal of clear plastic covering, when such material is specified as a method of erosion control, will be paid as extra work pursuant to Section I-03.4.

Payment for sodding as a type of erosion control shall be in accordance with Section 8-02.

Payment for furnishing and placing planting soil (top soil) will be as specified in Section 8-02.

8-03.14 MEASUREMENT

Delete this section and replace with the following:

Measurement for top soil (planting soil) shall be as specified in Section 8-01.

Measurement for sod as a type of erosion control will be as specified in Section 8-02.

Measurement of erosion control by seeding, hydro-seeding, mulching or, when required, the application of fertilizers, lime and soil blader or fencing agents will be by ground slope measurement in square feet of actual seeding, fertilization, mulch, or application of soil blader or fencing agent completed and accepted in accordance with the contract documents.

Measurement of sodding, including clear plastic covering, will be by the square foot measurement of surface area covered and accepted in accordance with the contract documents.

Sodding will be measured by horizontal measurement of area covered in square feet.

Measurement of sheet boards will be by the linear feet of 2-inch by 8-inch rough finished lumber installed.
SECTION 8-02 - ROADING PLANTING

Delete Section 8-02 In its entirety and replace with the following:

SECTION 8-02 - ROADING PLANTING

8-02.1 DESCRIPTION

This work shall consist of furnishing, planting, and maintaining for a 365 calendar day landscape establishment period each tree(s), shrub(s), ground cover, seedings, and sod as specified in the Contract Documents. Work shall be performed as shown on the Drawings and in accordance with these Specifications, accepted horticultural practices, and as directed by the Engineer.

Trees, shrubs, ground cover, seedlings, and sod will hereafter be collectively referred to as, "plants" or "plant material".

Plant material quantity, size and condition, and spacing shall be as indicated in the Drawings or Project Manual.

All landscaping work shall be performed by a licensed Landscaping Contractor registered in the State of Washington.

8-02.2 MATERIALS

The materials for this work shall meet the requirements of the following listed sections of these Specifications:

- Planting Soil, Type A
- Planting Soil, Type B
- Special Soil Mix
- Planting Soil, Type C
- Planting Soil, Type D
- Perlite
- Bulk Soil
- Mulch
- Tree Material
- Irrigation Water
- Fertilizer
- Grid Blocks
- Labeling
- Herbicides
- Bulbs
- Bins
- Tree Grates

Requirement for plant species and varieties shall be in accordance with the latest edition of "Standardized Plant Names" as prepared by the American Credit Organization on Horticulture Nomenclature.

8-02.3(1) RESPONSIBILITY FOR CONSTRUCTION

The Contractor shall provide adequate and proper care of all plant material and landscape work done on the project from the date of installation to the end of the 365 calendar day landscape establishment period. The 365 calendar day landscape establishment period will begin on the day the planting and other Landscape-related work 5 is approved by the Engineer. All plant material shall be handled with care and attention to avoid injury to the plant material.

The Contractor shall be solely responsible for the survival of all plant material from the time of installation to the end of the 365 calendar day landscape establishment period, with the exception of third party damage or vandalism occurring after the start of the 365 calendar day landscape establishment period.

8-02.3(2) WEED CONTROL PLAN

Before starting any work as defined in Section 8-02 and 8-03, the Contractor shall submit for approval by the Engineer a weed control plan. The plan shall define the work necessary to produce a weed-free condition (no live top growth of weeds) in all planting areas. The weed control plan shall also cover the control of weeds and other vegetation required under the contract, or as directed by the Engineer.

The weed control plan shall show the scheduling of all weed control measures required under the contract including, but not limited to, hand weeding, rototilling, applications of herbicides, weed seed control, and shoulder slope weed control.

The plan shall be prepared and signed by a licensed pest control consultant and shall include methods of weed control, including proposed weed control operations, and the name and application rate of all herbicides. In order to receive approval of the weed control plan by the Engineer, the Contractor shall proceed in accordance with the approved plan. Should the plan become unacceptable at any time during the life of the contract, the Contractor shall submit and receive approval of a revised plan prior to proceeding with further work.

8-02.3(2A) CHEMICAL PESTICIDES

Application of chemical pesticides shall be in accordance with the manufacturer's recommendations and by an appropriately certified applicator shall be licensed by the State of Washington for the class of pesticide utilized. The Contractor shall furnish the Engineer evidence that all operators are licensed and the pesticide used is registered for Washington. The Contractor shall furnish the Engineer a copy of the manufacturer's recommendations for each pesticide to be used.

The Contractor shall use extreme care to ensure containment of chemicals within the areas designated. The Contractor shall assume all responsibility for securing any area unsatisfactory for planting due to reason of chemical application. Damage to adjacent areas either on or off the right-of-way shall be repaired at the expense of the Contractor, to the property owner, or both, and the cost of such repairs shall be borne solely by the Contractor. Chemicals which will leave any residue in the soil toxic to the plants materials specified in the contract for planting or those in adjacent areas shall not be used.

The Contractor shall notify the Engineer at least 24 hours prior to the application of any herbicide giving the name of the material, rate of application, and where it will be used. Applications of herbicides shall be in accordance with the recommendations of the manufacturers.

These shall be applied with the proper insecticides as necessary to control disease, infestation by harmful insects and pests, including the complete control of catterpillars.

All chemicals shall be delivered to the job site in approved containers.

8-02.3(4) PLANTING AREA PREPARATION

Area to receive plant material shall be cleaned, graded, outlined and graded prior to planting. Planting areas shall be prepared so that they are weed and debris-free at the time of planting and until Acceptance by the Engineer. Planting areas shall include all planting beds, areas around trees, and those areas indicated on the Drawings or designated by the Engineer.

Where necessary to establish the planting area's subgrade by any combination of excavation, fill or embankment construction, the work shall be performed in accordance with the requirements of Section 201.3. The elevation of the corrected subgrade shall be determined using the requirements, if any, for fill or excavation. Soil and embankments shall have a slope of not less than 1:5 at the top of the planting area. The maximum depth of fill or excavation shall be determined using the requirements, if any, for fill or excavation. Soil and embankments shall be compacted to 100% standard density, as determined by the compaction control test specified in Section 2-03.1(1A).
ROADSIDE PLANTING

Planting areas shall be culverted to a depth of 6 inches and all debris including stumps, sticks, roots and rocks or items larger than 3 inches removed before any plants are planted.

After the subsurface of the planting area has been graded and compacted, planting soil (and fertilizer and soil conditioners, when required) shall be applied over the planting area in a depth which has been determined to the work. Planting areas shall then be evenly sloped from the ridge line to a point 2 inches below the surrounding surface. The ridge line shall be the approximate center of the planting area as shown on the drawings.

The finished grade of planting soil prior to the installation of plant material shall be 2 inches from the top of the sidewalk or curb to allow for 2 inches of planting medium.

8-02.305 LAWN PLANTING

Plants shall be placed at spacings and locations shown on the Drawings. Location layout and grading shall be subject to the approval of the Contractor, subject to the approval of the Engineer, before planting or construction of each line begins.

The Engineer will make the field measurements necessary to calculate and verify quantities for payment.

The Contractor shall place the plants starting from the perimeter of the bed area and progressing to the center so that old dimensions are adjusted at the centers of any planting bed as shown on the Drawings.

Trees to be planted in natural grass areas shall be located a minimum of 10 feet from the edge of planting beds, formed line structures, and service boxes unless otherwise specified on the Drawings. Trees located along the sidewalks shall be considered approaches unless placed with existing line structures. Trees shall be placed in line with the sidewalk structures. Where location of existing and new street improvements may require changing the tree locations, the following spacing from street improvements shall prevail:

(a) Minimum distance from street light pole............. 20 feet
(b) Minimum distance from hydrant...................... 5 feet
(c) Minimum distance from driveway, alley crossing... 7 1/2 feet
(d) Minimum distance from curb......................... 3 1/2 feet

The distance given shall be measured from the centerline of the tree to the nearest face of the improvement.

8-02.306 PLANTING

Plants brought to the planting site shall be bare root, balled barry, or in containers, depending on what is specified in the planting schedule on the Drawings. Plants shall be placed in line with the sidewalk structures. Plants shall not be placed at any time before they are approved for planting by the Engineer. Plants shall not be planted during freezing weather or when the ground is frozen. Plants shall not be placed in areas that are below finished grade.

8-02.306A TREES AND SHRUBS

Plants brought to the planting site in a bare root condition shall be protected at all times to prevent the roots from drying out during planting operation. Bare root plants shall not be set in the plant holes until they are in the planting area. Planting soil shall then be worked in and around the roots, filling all voids. Filling or tamping of planting soil around roots shall be done in such a manner as not to damage the roots or soil structure.

Foliage, conforming to the details shown on the Drawings, shall be provided for all trees and shrubs.

Plant material supplied in containers shall not be removed from the containers until the time of planting at the planting location. Root of bare root stock shall not be braced, curled, twisted, or damaged. Root damage shall be removed before placing in the planting hole. In their final position, the plants shall have the same relationship to the finished grade as when growing in the nursery or container.

8-02.307 GROUND COVERS, PLANTS AND SEEDING

This section shall be supplemented by the following:

Holes for ground cover shall be 3 inches greater on all sides and under the roots or root ball. Ground cover shall be planted in containers and planted so that the soil level of the plant is 1/2 inch above the finished soil grade of the planting area. After plants have been placed, the soil shall be compacted around the root system by firm pressing around the plant.

8-02.307A PLANTING

The plant material shall be handled in such a manner that the root systems are kept covered and deep at all times. The root systems on the bare root plant material shall be dipped in a mixture of sifted soil, and water, "walling," immediately prior to planting. The root systems of container plant material shall be moist at the time of planting.

All balled material shall have all strings or cords cut and the burlap laid back from the top half of the ball after the plant is placed in its final position, and before completion of backfill. The plants supplied in containers shall be removed from the containers in such a manner to prevent damage to the root system or material to which they were planted. The plants shall not be removed from the containers by pulling on the main stem. Plants removed from their containers shall be planted without delay in the manner described for balled and burlapped plants. Plants protected in wire baskets shall be planted with the wire baskets in place. After the tree is set in place, the wire around the root mat shall be cut and folded back. Unrooted containers shall have 2 vertical cuts made in the container, no worse than one inch apart which is an approved can be placed before the root ball is removed. Plant material supplied in containers shall not be removed from the container until the time of planting at the planting location.

Unless otherwise specified, planting holes for trees shall be 12 inches greater on all sides of the diameter of the root ball or natural spread of the roots, and 12 inches under roots or root ball. Holes for shrubs shall be 6 inches greater on all sides and under roots or root ball. Any placed surface of the planting hole shall be removed by hand methods.

When trees are to be planted in concrete sidewalks, pits shall be dug at locations shown on the Drawings. The pits shall be a minimum of 6 feet diameter and have a depth of 3 feet. The planting space shall be 3 inches greater on all sides of the specified diameter. The outer 6 inches shall be removed by hand methods during planting operation and a clean trench, when required, constructed and backfilled. After backfilling, the backfill shall be formed so that the tree and root system of sufficient amount of backfill shall be placed to position the plant at the correct depth. The plant shall then be placed and the hole backfilled halfway. Fertilizer shall then be placed and mulches driven.

Strings encircling balls and burlapped plants shall then be cut and the burlap laid back from the top half of the ball.

The remainder of the hole shall be filled with water and the backfill shall be placed and compacted.

Immediately following completion of the backfill, ties and tree wrap shall be placed per Section 8-02.307A and a rain basin constructed in accordance with the details shown on the Drawings and Section 8-02.306.

Where settlement occurs, additional backfill shall be placed over exposed roots on the same working day as planting is accomplished. In their final position, the plants shall the same relationship to the finished grade as when growing in the nursery or container.

174
DECIDUOUS PLANTING

Deciduous trees shall be staked at the time of planting with a single 5/8 inch diameter deformed nail reinforcing bar at 10 feet long. The bar shall be driven into the ground parallel to the tree and at a distance of 1 to 3 inches from the tree trunk. The bar shall penetrate the undisturbed soil to a true pit of 5 feet deep, more if tree pit is more shallow. The bar and the trunk shall be joined by three ties formed of 1/4" gauge wire in one loop which crosses itself between the tree and the bar. Before placing, a suitable layer of good quality rubber bandage shall be slipped over the wire to serve as a tree trunk protector. The wire shall be tied tightly to the tree trunk in three places, 1 foot apart, to prevent vertical movement but shall be loosely applied around the trunk. A 1/4 inch space shall be allowed between the hugging ties and the tree trunk. The top tie shall be at a height of 3 feet 10 inches with 1 foot 3 inches vertical spacing between the three ties (plus or minus 1 inch).

All trees shall be staked or gapped by the Contractor in accordance with the Tree Planting Details shown on the Drawings or included in the Project Manual and the following requirements. Evergreen trees shall be staked with rubberized 2 inches x 2 inches x 3 foot long, free from knots or splits. Stakes shall be pointed for driving. Stakes that are damaged by driving shall be removed and replaced. Any tree or shrub thrown out of place by wind action or any other cause shall be re-planted by loosening the soil around the root system and re-potting the tree or shrub by adjusting the position of the root system. Proper grade shall be maintained by pushing, pulling or restraining the trunk or stem. If, in the opinion of the Engineer, damage to the root system has occurred as a result of re-planting a tree or shrub, the tree or shrub shall be replaced at the Contractor's expense.

Stakes shall be set away from the base of the tree and driven firmly into the ground so that the top of the stake is 30 inches below the finished grade level. Each stake shall be set equidistant from each other. All stakes shall be driven to a 45° angle from ground level. Trees shall then be tied off with galvanized braided wire and 1/2 inch soft black rubber bands. The soft rubber hose shall be inserted around the trunk at approximately 1-3/4 times the height of the tree.

Alternate methods of staking will be considered, and if approved by the Engineer, may be used.

FERTILIZERS

Unless otherwise specified, fertilizers for trees, shrubs and ground cover shall be 1-4-4-4 formulation, slow-release type fertilizer thoroughly and uniformly mixed into the planting soil at the following rates:

**RATE OF APPLICATION**

- **TREES**
  - 1 pound per tree diameter inch
- **SHRUBS**
  - 1/4 pound per shrub
- **GROUND COVER**
  - 1/4 pound per plant

Other fertilizers may be considered as alternatives but shall only be used upon the approval of the Engineer.

PLANTING MULCH

Unless otherwise specified on the Drawings or specified in the Project Manual, planting mulch shall consist of bark mulch meeting the requirements of Section 9-4-4-4-4. Mulching shall be applied 3 inches in depth.

SOIL AMENDMENTS

Soil amendments of the type and quantities specified shall be applied where shown on the Drawings. The soil amendments shall be thoroughly mixed with topsoil to produce a uniform blend as indicated in the Drawings or Contract Documents. All amendments shall be delivered to the site in the original unopened containers bearing the manufacturer's guaranteed chemical analysis and name. In lieu of the above, the Contractor may furnish it in bulk, and a certificate from the manufacturer indicating the above information shall accompany each delivery.

CULTIVATION AND CLEARING

Upon completion of planting all excess material shall be removed and disposed of off the project site. Planting areas shall be brought to a uniform grade finish with walks, curbs, sidewalks and driveways.

176
At the end of the plant establishment period, any plant which, in the opinion of the Engineer, does not show normal growth will be rejected. The final payment will not be made to the Contractor until all corrections and replacements have been made and approved.

8-02.2.1(3) PLANT REPLACEMENT

The Contractor shall be responsible for grading or providing enough plants for replacement of plant material rejected through the plant establishment period. Rejected plant material shall be replaced as specified in Sections 8-01.2.1(2) and 8-01.2.1(3).

All replacement plants shall be of the same species and quality as the plants they replace. Plants may vary in size reflecting one season of growth.

8-02.2.1(4) LAWN INSTALLATION

Lawn installation shall be by sodding unless "seeded lawn installation" is specifically included in the Bid Form.

In areas irrigated by a sprinkler system, lawn installation shall not begin until the sprinkler system is operational. The Contractor shall have the option of sodding in lieu of seeding for lawn installation but at an additional cost to the Owner. However, seeding in lieu of sodding will not be allowed.

Topsoil for both seeded or sodded lawns shall be placed at the depth and locations shown in the Drawings. The topsoil shall be tilled to a depth sufficient to key into the subsoil, raised to a smooth even grade without low areas to trap water and compacted, all as approved by the Engineer.

Barriers shall be erected, with warning signs where necessary, to preclude pedestrian traffic from access to the newly placed lawn during the establishment period as approved by the Engineer.

8-02.2.1(4A) SEEDED LAWNS

The following construction sequence and procedure shall be followed:

(1) Before placing of topsoil, all areas shall be cultivated to a depth of 3 inches unless otherwise specified or ordered by the Engineer. Cultivation of the soil may be done by disk, a harrow, rototill, or similar equipment. This operation shall be done at right angles to the natural flow of water on the slope.

(2) After the topsoil has been spread to the depth specified, the area shall be mechanically tilled to a depth of 6 inches, then raised by approved hand or mechanical methods to remove all large clods, rocks, debris, and litter over 1 inch in any dimension which shall be disposed of by the Contractor.

(3) The area shall then be rolled in 2 directions; the second shall be done at right angles to the first rolling. The roller shall be of a standard, lightweight, waterfilled type.

(4) The area to make it smooth and level. Add topsoil where necessary or as directed by the Engineer.

(5) The finished grade shall be 1 inch below all curbs, sidewalks, and/or other obstructions.

(6) Apply a 10-20-20 fertilizer at the rate of 12 pounds per 1,000 square feet. The fertilizer shall be applied by an approved hand or mechanical method. Application in one direction is sufficient.

(7) Rake the fertilizer into the surface soil to a depth of 1/2 to 1 inch.

(8) Roll the area in 1 direction.

(9) The seed mix and rate of application shall be as specified in the Project Manual.

8-02.2.1(4B) SEEDED LAWNS

For seed installation, the following construction and sequence procedure shall be followed:

(10) The seed mix and rate of application shall be as specified in the Project Manual.

(a) Seeds to receive sod shall be cleaned and graded, and levied to a depth of 3 inches below grade.

(b) Before placing of planting soil, areas shall be cultivated to a depth of 3 inches unless otherwise specified, or ordered by the Engineer. Cultivation of the soil may be done by disk, a harrow, rototill, or similar equipment. This operation shall be done at right angles to the natural flow of water on the slope. Planting soil shall be placed in accordance with the requirements of Section 8-02.2.1(4).

(c) Planting soil shall be evenly spread and cultivated into the top 6 inches of the existing soil, then raised by approved hand or mechanical methods to remove all large clods, rocks, debris, and litter over 1 inch in any dimension. Such clods, rocks, debris, and litter shall be disposed of by the Contractor.

(d) The area shall then be compacted by rolling in two directions. The second shall be done at right angles to the first rolling. The roller shall be of a standard, lightweight, waterfilled type. The grade after compaction shall be such that the rear zone of the soil will be flush with the final grade.

(e) The area shall be raised to make it smooth and level. Topsoil shall be added when necessary, or as specified by the Engineer.

(f) Immediately prior to placement of sod, a 10-20-20 fertilizer shall be raised into the soil at a rate of 12 pounds per 1,000 square feet. The fertilizer shall be applied by approved hand or mechanical methods. Application in one direction is sufficient.

(g) The soil and strips shall be placed within 48 hours after being cut. Dry soil shall be moistened by sprinkling prior to the laying of the sod. Sod shall be placed without waste, and have the ends staggered. The root crown shall be set to the grade of the sidewalk or curb. Joints shall be staggered and tightly fitted. On sloped areas, and shall be laid with the long dimension across the slope, parallel to the top of the slope.

(h) Rolling placement. The sod shall be rolled with a smooth, waterfilled type roller. After rolling, the soil shall be lightly watered by sprinkling. Lawns shall be uniformly level.

(i) When directed by the Engineer, the Contractor shall apply (surfacing dressing) decomposed forms of nitrogen fertilizer derived from urea-formaldehyde at the rate of 0.5 pounds per 100 square feet.

(j) The Contractor shall commence mowing immediately as specified in Section 8-02.2.1(5). Watering and fertilizing shall be the Contractor's responsibility during the lawn establishment period. Watering shall be scheduled to prevent drying of joints between the sod strips.

8-02.2.1(5) LAWN ESTABLISHMENT

Lawn establishment shall consist of providing adequate and proper care for all public and private lawn areas installed within the limits of the project. The lawn establishment period shall begin immediately after the turf has been planted and accepted in writing by the Engineer and shall extend through a minimum 30-day period or until the Actual Completion Date, whichever comes first.

During the lawn establishment period the Contractor shall provide adequate and proper care to ensure the continued healthy growth of the turf. Adequate and proper care shall include the labor, materials, and equipment necessary to keep the planted areas in a presentable condition, including but not limited to: cutting, feeding, irrigation, watering, and weed control. The Contractor shall also be responsible for the care of the damaged areas; and repairing and keeping in operation irrigation systems installed as part of this work.

During this period and as part of the lawn establishment, the Contractor shall accomplish the following minimum requirements:

(a) Mowing and trimming shall be done as often as conditions dictate. Minimum height of lawn shall not exceed 3 inches. The cutting height shall be 1/2-inch with all cuttings removed.

(b) Irrigation and edging shall be performed at least once each month or as directed by the Engineer. Cuttings and removed material shall be disposed of off the Project Site.

(c) A slow-release form of nitrogen fertilizer derived from urea-formaldehyde shall be applied at the rate of 6 pounds per 1,000 square feet. Fertilizer shall be applied between the period of October 1st and March 31st shall be 2-10-20 fertilizer formulation. Fertilizer shall be thoroughly watered in.
S-02 TERRACE PLANTING

(d) Water application shall be accomplished each week from March through September. Watering shall be done only at night or early morning. An even application of 1 inch of water shall be required over all lawn areas per week. The rate and frequency of water application may be changed, as designated by the Engineer, depending on weather and soil conditions.

(e) Temporary barriers shall be removed after the grasses have developed to a heavy sod and only on written permission from the Engineer.

All work performed under this Contract shall be performed by qualified turf management personnel and shall comply with good turf management practices.

Acceptance of lawn planting as specified herein shall be based upon uniform spread of grass at uniform grade at the time of final inspection. Areas that are bare, have a poor stand of grass, or do not have 2 uniform grades through any cause shall be re-established, re-seeded, or re-sodded and relaid by the Contractor at his expense. Dead or dying sod or sod with brown spots will be rejected.

S-02.2(16) INSTALLING REMOVABLE EvAPORI LINES IN THE CUT-OUTS (New Section)

The Contractor shall install exposed aggregate concrete cover blocks of the same type and size at the locations shown on the Drawings. Cover blocks shall be installed after the forms have been placed and the concrete mix has been placed and compacted to a finished grade 3 inches below the top surface of the aggregate cover blocks. A 2-inch bed of compacted sand shall be placed as a setting bed for the cover blocks. The top surface of the covers shall be set flush with the adjacent sidewalk and all joints between covers and sidewalk and between covers filled with a 1:2 sand and cement mixture. Records and signatures shall be kept up and disposed of off the project site. The Contractor shall ensure that sand and cement is kept in the gutters and catch basins.

S-02.2(17) GRID BLOCKS (New Section)

The Contractor shall install grid blocks of the type specified in areas shown on the Drawings or designated by the Engineer. Areas receiving grid blocks shall be excavated, graded and compacted to a standard depth of 8 inches below the top surface of adjacent sidewalks and curbs. After the subgrade has been approved, the Contractor shall install a sub-slab of sand aggregate, type 1, to a compacted average depth of 6 inches. Construction shall be to a total depth of 10 inches.

Thereafter, a 2-inch bed of 80-mm grid slab shall be spread and tamped on top of the crushed rock base. The grid blocks shall be placed on the sand bed and each block shall be adjusted and serviced. The grid blocks shall be placed with the top surface of adjacent sidewalks and curbs. Areas varying on the Drawings or the Project Manual, a concrete collar shall be constructed around each tree pit and separated from the surrounding sidewalk by a through joint. The collars shall be reinforced with two number four reinforcing bars on all sides and 1-inch by 3/4-inch angle steel on the inner side, and welded to the concrete collar with weld deposited on the concrete collar. The angle-iron frame shall be 48 inches wide and 24 inches high and shall allow for 1-inch clearance on all sides to receive the 48-inch by 48-inch tree grate.

S-02.2(19) RELocate TREE (New Section)

The Contractor shall perform the work in accordance with good nursery practice. The tree shall be relocated while in a dormant state (after October 15 or first frost and before April 15). The tree to be relocated shall be dug by hand or approved machine, use of backhoe will not be permitted. The Contractor shall ensure that the new location is free of conflicts with the existing grades and that the new location is free of obstructions and exposures. The Contractor shall ensure that the new location is free of obstructions and exposures. The Contractor shall ensure that the new location is free of obstructions and exposures.

The depth of the root ball shall be no less than 1/2 of the diameter at a depth of 10 inches. Rotted roots shall not be permitted. The root ball shall be thoroughly wrapped with burlap and laced with 1-inch polyethylene rope.

Tree removal work shall be performed with the Arboricultural present. The Contractor shall handle the tree by the root ball only. Under no circumstances shall the Contractor be allowed to lift or carry the tree by the trunk. The tree shall be carefully reset into the designated tree pit and planted in the same manner as a new tree.
The requirements of landscape establishment of Section 8-02.3(3) shall apply to relocated trees. Replacement, if necessary, shall be as set forth in Section 8-02.3(13).

8-02.4 MEASUREMENT

The pay quantities for plant materials will be determined by count of the number of satisfactory plants in each category accepted by the Engineer.

Seedling and sod installations will be measured by ground slope measurement in square yards of actual

Measurement for "Landscape Establishment," will be by linear feet.

Measurement for "Planting Soil" and "Dirt Mound" shall be per cubic yard measured in the healing

measurement at the point of delivery. The Contractor shall notify the Engineer at least 24 hours prior to the Engineer's presence for measurement at the time of delivery. No payment will be made for material delivered not witnessed by the Engineer.

Measurement for "Power Boxes (Slim)" will be by each.

Measurement for "Driveway, per square foot.

Measurement for "Ridge, (Material)" will be by the linear foot.

Measurement for "Balloon (Material)" will be by each.

Measurement for "Mound" will be by each.

Measurement for "Tree Grate" will be by each complete grate.

Measurement for "Relocate Tree" will be by each tree removed and replanted.

Measurement for "Relocate Shrub" will be by each shrub removed and replanted.

8-02.5 REMODE (New Section)

Compensation for the cost necessary to complete the work described in Section 8-02 will be made at the unit contract prices bid only for the work from list or referenced below:

(1) "Tree, Evergreen (Slim)," per each.
(2) "Tree, Deciduous (Slim)," per each.
(3) "Shrub, (Type), (Slim)," per each.
(4) "Grass Cover, (Slim)," per each.
(5) "Landscape Establishment, Minimum Bid (1 per linear yard).
(6) "Planting Soil, type per cubic yard.
(7) "Mound, per cubic yard.
(8) "Power Boxes, (Slim)," per each.
(9) "Driveway, per square foot.
(10) "Ridge, (Material)," per linear foot.
(11) "Balloon, (Material)," per each.
(12) "Mound," per each.
(13) "Tree Grate," per each.
(14) "Relocate Tree," per each.
ROADSIDE PLANTING

Any incidental work required to complete the roadside planting specified herein, but not specifically mentioned in these specifications shall be incidental to the roadside planting, and all costs therefor shall be included in the unit contract prices of the bid items.

SECTION 8-03 - IRRIGATION SYSTEM

8-03.1 DESCRIPTION

Delete this section and replace with the following:

This work shall consist of furnishing all materials and labor required to install a sprinkler irrigation system in accordance with these Specifications and the details shown on the Drawings.

The Contractor or subcontractor shall be a licensed lawn-sprinkler contractor. The sprinkler system shall be installed by a licensed lawn-sprinkler mechanic or journeyman plumber. Electrical work shall be performed by a licensed electrical contractor or subcontractor.

The Contractor shall obtain a plumbing permit from the Seattle/King County Health Department.

The Engineer will conduct periodic inspections to ensure that the Contractor is complying with the terms of the contract. The Contractor shall advise the Engineer at least 24 hours before pressure tests are to be conducted and shall have the approval of the Engineer before backfilling.

8-03.3 CONSTRUCTION REQUIREMENTS

Delete this section and replace with the following:

Work shall conform to the local plumbing code having jurisdiction. The Contractor shall apply and pay for all permits having to do with the work.

Sloped dimensions are approximate. The Contractor shall check and verify all dimensions on the site before proceeding with any work as part of the contract. Before starting work on the sprinkler system, the Contractor shall carefully note all finish grades. Finish grades changed in the course of the work shall be restored to the original grades and contours.

The Contractor shall furnish the necessary equipment for proper excavation and completion of all sprinkler work and shall make the connections to the water service. The Seattle Water Department will furnish and install service tap, meter, and meter box. Twenty days notice is required for the service tap and the service tap shall be requested through the Engineer.

Where indicated on the Drawings, piping and wire shall be installed in sleeves of plastic pipe of sufficient inside diameter to permit easy withdrawal and re-insertion of the piping or wire. The sleeves shall have a minimum of 12 inches cover for water piping and depth according to the code for electrical wires.

8-03.3(4) JOINTING

Delete paragraph 5 and replace with the following:

Due to the nature of PVC pipe and fittings, the Contractor shall exercise care in handling, loading, unloading and storing to avoid damage. The pipe and fittings shall be stored under cover, and shall be transported in vehicles with bed long enough to allow the length of pipe to lay flat, so as not to be subjected to external load at any point. Any pipe that has been damaged or dented shall be discarded until such damage has been cut out and the pipe is spliced with a coupling. Solvent welded joints shall be given at least 15 minutes set-up time before wedging or handling. Pipe shall be partially counter-loaded to prevent wedging and slipping. No water shall be permitted in pipe until a period of at least 30 hours has elapsed for solvent weld setting and curing.

Backfilling shall be done when pipe is not in an expanded condition due to heat or pressure. Cooling of the pipe can be accomplished by operating the system for a short time before backfill, or by backfilling in the early part of the evening before the heat of the day.

Before pressure testing, solvent welded joints shall be given at least 24 hours curing time.

8-03.3(7) ELECTRICAL WIRE INSTALLATION

Delete this section and replace with the following:

186
Wiring between the automatic controller and automatic valves can share a common neutral. Separate control conductors shall be run from the automatic controller to each valve. A white colored wire shall be used for the neutral as specified in the Electrical Code. A white colored wire shall be installed adjacent to and attached to the irrigation mains by plastic tape or similar means.

Wire shall be common to each valve in the system. A loop shall be provided at each valve in any line that passes over or beneath at that valve. Loop lead out of spigot wise at valves where wise do not meet.

Split line installation shall consist of electrical conductors twisted and bonded by approved pressure protection means, valve boxes, valve housings, and control valves. A minimum of 2 feet from each valve shall be left at junction boxes and automatic control valves to facilitate splicing and inspection.

Electrical service shall be provided to controller enclosure as shown on the Drawings.

8-03.301 FILLING AND TESTING

Delete this section and replace with the following:

All gauges used in the testing of water pressures shall be certified correct by an independent testing laboratory immediately prior to use on the project. Gauges shall be retained when directed by the Engineer.

Automatic controllers shall be tested by actual operation for a period of two weeks under normal operating conditions. Should adjustments be required, the Contractor shall do so according to the manufacturer's directions and test until operation is satisfactory.

Mainline Flushing: All main supply lines shall receive two fully-open flushings, to remove debris that may have entered the line during construction: the first before placement of valves; the second after placement of valves.

Mainline Testing: All main supply lines shall be purged of air and tested with minimum static water pressure of 75 psi for 60 minutes without introduction of additional service or operating pressure. Testing shall be done with one pressure gauge installed on the line, located by the Engineer. An additional pressure gauge shall be installed at the pump station directed by the Engineer. Lines which show loss of pressure exceeding 5 psi at the end of specified test periods will be rejected.

The Contractor shall correct rejected installations and retest for leaks as specified herein.

Lateral Line Testing: All lateral lines shall receive one full-open flushing prior to placement of valves and pressure regulating devices. Lines which show leaks at the end of the specified test periods will be rejected.

When conditions exist which prevent effective visual inspection of lateral lines, the Engineer may require the lines to be tested by use of pressure gauges. In that event, plastic water pressure, shall be maintained in the piping for 20 minutes through open valves and pressure regulating devices. Lines which show leaks at the end of the specified test periods will be rejected.

The Contractor shall correct and retest lateral line installations that have been rejected. Throughout the life of the contract, the Contractor shall repair, flush, and test all lateral lines that have been installed or brought up to operating pressure. The Contractor shall conduct a break, disconnection of service, and damage test. This inspection is required to ensure that the entire irrigation system is operating properly.

8-03.301 BACKFILL

Supplement this section with the following:

Trenches shall be compacted during backfilling.

186
SECTION 8-04 - CURBS, GUTTERS, SPILLWAYS AND DRAINS

Delete the title and content of Section 8-06 in its entirety and replace with the following:

SECTION 8-04 CEMENT CONCRETE CURBS, GUTTERS AND DRAINAGE (New Section)

8-04.1 DESCRIPTION (New Section)

The work shall consist of providing and installing cement concrete curbs, and curb and gutter in conformance with the Drawings, these Specifications and with the Standard Plans.

8-04.2 MATERIALS (New Section)

Materials shall meet the requirements of the following sections of these specifications.

Portland Cement ................. 8-01
Concrete Aggregate ............... 8-03
Reinforcing Rods ................. 8-07
Preformed Joint Filler ............ 8-04.1
Curing Compounds ............... 8-23

8-04.2(1) CURB (New Section)

The Portland cement concrete shall meet the requirements of Section 5-06. Concrete mix for curb shall be Class 5 (1-1/2). When placed curb in constructed, concrete shall be Class 5 (3/4). slump of the concrete mix shall not exceed 3-1/2 inches.

Curb for curbing on existing pavement shall be one part Portland cement and two parts clean sand.

8-04.2(2) REINFORCING STEEL AND STEEL DRAINS (New Section)

Drains and reinforcing steel shall be #3 deformed steel bittet bars, ASTM A15, Grade 60.

8-04.2(3) FORMS (New Section)

Forms may be of wood or metal or any other material at the option of the Contractor, provided that the forms as set will result in a curb, or curb and gutter of the specified thickness, cross section, grade and alignment shown on the Drawings.

8-04.3 CONSTRUCTION REQUIREMENTS (New Section)

8-04.3(1) GENERAL (New Section)

8-04.3(2) FORMING AND PLACING CURBS (New Section)

Forms, wood or steel, shall be staked securely in place, true to line and grade.

8-04.3(3) CURB CURVING (New Section)

A curb shall be constructed in the manner shown on the Standard Plans and at locations where curbs are to intersect or abut other curbs, windows, doors or other features of the structure. Curb construction shall be made to conform with the dimensions, grades and curvatures shown on the Drawings.

8-04.3(4) CURB PROFILES AND ELEVATIONS (New Section)

Curb profiles and elevations shall be constructed to conform with the manner shown on the Standard Plans and at locations where curbs intersect or abut other curbs, windows, doors or other features of the structure. Curb construction shall be made to conform with the dimensions, grades and curvatures shown on the Drawings.

8-04.3(5) CURB SPACING ANDジョイント (New Section)

Joists shall be constructed in the manner shown on the Standard Plans and at locations where curbs are to intersect or abut other curbs, windows, doors or other features of the structure. Curb construction shall be made to conform with the dimensions, grades and curvatures shown on the Drawings.

8-04.3(6) CURB FINISHING AND CURB JOINTS (New Section)

Curb finishing and curb joints shall be constructed in the manner shown on the Standard Plans and at locations where curbs are to intersect or abut other curbs, windows, doors or other features of the structure. Curb construction shall be made to conform with the dimensions, grades and curvatures shown on the Drawings.
8-04.3(2) CURB BLOCK-OUTS AT CURB RAMPS (New Section)
At intersections where new cement concrete curb is to be constructed and curb ramps are to be provided under the contract, the Contractor shall block out the new curb at the locations of the new curb ramps. The curb within the block-out shall be removed and the depressed curb when other than shown on the Standard Plan will be designated by the Engineer.

8-04.3(3) TYPE 410A CURB (New Section)
Separate curb shall be constructed as shown on Standard Plan 410A.

8-04.3(4) TYPE 410B CURB AND GUTTER (New Section)
Curb and gutter shall be constructed as shown on Standard Plan 410B or a comparable groove or Jenlau in accordance with applicable subgrade specifications for uncurved concrete pavement in Section 3.05, in a manner that will meet the requirements for concrete curb as specified in Section 8-04.5(1), except that the top of the gutter shall be milled crowned and filler brushed parallel to the curb.

Curb and gutter may be constructed by the extruded method only if such construction is called for in the Special Provisions. When extruded curb and gutter is called for in the Project Manual, it may be extruded on a unit, or the curb may be extruded upon the gutter section in which case width details shall be provided as specified in Section 8-04.1(10).

8-04.3(5) TYPE 410C CURB (New Section)

8-04.3(5A) CEMENT CONCRETE CURB ON EXISTING PAVEMENT (New Section)
Cement concrete curb constructed on an existing pavement shall be detailed onto the existing pavement where indicated on the drawings or designated by the Engineer, as shown on Standard Plan No. 440C.

The curb bar shall be 10 inches long placed at 18 inches on center using 1 inch drilled holes, 5 inches deep and placed in rigid portion of concrete pavement.

Holes shall be grouted with epoxy grout. When a hole is ready to be grouted, it shall be free from water, particles of concrete, and other foreign material. Care shall be taken in placing the grout to entrap as little air as possible. The grout shall be protected from rapid drying.

8-04.3(5B) CEMENT CONCRETE CURB ON NEW PAVEMENT (New Section)
Dowelled curb on new pavement shall be constructed as shown on Standard Plan No. 440C.

The pavement which shall extend to the back of the curb. The pavement where the curb is to be placed shall be roughened or otherwise treated so that a permanent bond will be assured between the curb and the pavement.

Dowels, as detailed in Standard Plan 411 shall be placed at 18 inches on center in the fresh concrete pavement.

8-04.3(6) REMOVABLE CURB (New Section)
Removable curb shall be constructed with the alignment and configuration as shown on Standard Plan 415.

8-04.4 MEASUREMENT (New Section)
Measurement for curb, or curb and gutter of the type specified will be by the linear foot along the face of the curb for the length constructed, including that portion installed through driveways and curb ramps.

Where curb ramps or driveways are "cut into" areas of existing improvements where adjacent curb will remain, no measurement for curb will be made.
SECTION 8-05 - EXTRUDED CURB (New Section)

Delete Section 8-05 in its entirety.

SECTION 8-06 - EXTRUDED CURBs (New Section)

8-06.1 DESCRIPTION (New Section)

The work shall consist of construction of extruded concrete curb at such locations as shown on the drawings and in the cross section shown on the Standard Plans.

8-06.2 MATERIALS (New Section)

Materials shall meet the requirements of the following sections of these Specifications:

- Aggregate: 9-03
- Mineral Filler: 9-03.62
- Blending Sand: 9-03.64
- Asphalt: 9-01.10
- Portland Cement: 2-01
- Reinforcing Steel: 2-05
- Curing Compound: 9-21

Extruded asphalt concrete curb shall consist of a hot mix asphalt concrete Class B mix conforming to the provisions of Section 9-06.3.

Portland cement content shall be a minimum of 5% by weight. Aggregate for concrete shall meet the requirements of Grading for Fine Aggregate as outlined in Section 9-03.12.1. Temperature curing compound as specified in Section 9-23.3 shall be used. Air-entrained concrete shall be used as outlined in Section 9-23.6 except that air content shall be a minimum of 3 percent and a maximum of 6 percent by volume.

The bars shall be deflected steel bars meeting the requirements of Section 9-07.3. The bars shall be free from rust, loose mill scale, dirt, grease or other defects affecting the strength or bond with the concrete.

8-06.3 CONSTRUCTION REQUIREMENTS (New Section)

8-06.3(1) EXTRUDED ASPHALT CURB (New Section)

The asphalt pavement shall be dry and cleaned of loose or deleterious material. Immediately after cleaning the pavement surface, a tack coat of emulsified asphalt shall be applied to the asphalt curb area of the pavement at the rate of 0.70 to 0.85 gallons per 100 linear feet of curb area, depending on the width of curb and age of pavement. Cure shall be taken to prevent applying too wide or too heavy a tack coat.

8-06.3(2) EXTRUDED CONCRETE CURB (New Section)

The pavement shall be dry and cleaned of loose or deleterious materials.

8-06.3(3) EQUIPMENT FOR LAYING CURB (New Section)

8-06.3(3A) EXTRUDED ASPHALT CURB (New Section)

The machine for laying the curb shall be of the self-propelled type equipped with a material hopper, distributing screw, and adjustable curb forming devices capable of laying and compacting the hot-mix asphalt concrete to the lines, grades and cross section as shown on the drawings, and in an even homogeneous manner free of honeycombs.

8-06.3(3B) EXTRUDED CONCRETE CURB (New Section)

The machine for placing the curb concrete shall be of the self-propelled type equipped with a material hopper, distributing screw, and adjustable curb forming devices capable of laying and compacting the cement concrete to the exact lines, grades and cross section as shown on the drawings and the Standard Plans.
8-06.3.4(a) MIXING AND PLACING (New Section)

8-06.3.4(a) THE BARS FOR CURB CONCRETE CURBS (New Section)
The bars shall be spaced 1 foot on each side of every joint. Where angle points occur in curb alignment, additional tie bars shall be placed 1 foot on either side of the angle point.
The tie bars shall meet dimensions as shown on Standard Plans.

8-06.3.4(b) EXTENDED ASPHALT CONCRETE CURBS (New Section)
The asphalt concrete mixture shall be homogeneously mixed to conform with Section 5-04.3 and shall be delivered to the hopper of the laying machine at a temperature of not less than 300 degrees F. not more than 100 degrees F. in the hopper. Each load of the asphalt concrete mix shall be run through the curb laying machine, properly adjusted to form and properly compact the asphalt concrete curb.

8-06.3.4(c) EXTENDED CURB CONCRETE CURBS (New Section)
The concrete concrete mixture shall be homogeneously mixed to conform with Section 5-01 when delivered to the hopper of the curb machine. Each hopper load of the concrete concrete mix shall be run through the curb laying machine, properly adjusted to form and properly compact the concrete concrete curb.

8-06.3.5 JUNIORS (New Section)

8-06.3.5(a) EXTENDED ASPHALT CONCRETE CURBS (New Section)
Unless conditions warrant, asphalt concrete curb construction at the specified temperature shall be a continuous operation in one direction, as to eliminate curb joints. However, where conditions are such that the width of the curb is too great to be laid as a continuous length, joints may be carefully made in such a manner as to appear as a continuous curb between the old and new sections of the curb. Joints shall be made in sections of 5 feet and each joint shall be cut vertically and to a depth of 2 inches as shown on Standard Plans. Joints shall not be placed in conflict with curb dwells.

8-06.3.5(b) EXTENDED AGGREGATE CURB CURBS (New Section)
Joints in the extended curb concrete curb shall be spaced at 15-foot intervals or shall match existing transverse joints or cracks in existing pavement. Joints shall be cut vertically and to a depth of 2 inches as shown on Standard Plans. Joints shall be aligned in accordance with the drawings and specifications.

8-06.3.5(c) EXTENDED ASPHALT CONCRETE CURBS (New Section)
The newly laid curb shall be protected from traffic by barricade or other suitable means until the beat of the asphalt concrete mixture has been dissipated and the mixture has attained its proper degree of hardness.

8-06.3.5(d) EXTENDED CURB CONCRETE CURBS (New Section)
Concrete liquid curing compound shall be used. Sufficient pigment shall be present so that the sprayed compound is easily discernible. Application shall be as outlined in Section 9-23.3.

The newly placed curb shall be protected from traffic by barricade or other suitable means until the concrete concrete mixture has attained its required strength.

8-06.3.6 FURTHER PROVISIONS (New Section)

8-06.3.6(a) EXTENDED ASPHALT CONCRETE CURBS (New Section)
Section 5-04 of the Specifications shall apply where specific details are required and where such provisions have not been included in this section of the Specifications.

194
8-07 PRECAST TRAFFIC CURB AND BLOCK TRAFFIC CURB

SECTION 8-07 PRECAST TRAFFIC CURB AND BLOCK TRAFFIC CURB

8-07.1 DESCRIPTION

Delete the section and replace with the following:

This work shall consist of furnishing and installing precast concrete traffic curb and precast concrete block traffic curb, of the design and type specified in the drawings, meeting the requirements of the Standard Plans and Specifications for Public Roads and Streets. The locations of the curbs shall be indicated on the drawings. The curb face shall be painted with approved traffic colors, either yellow or white, as specified on the drawings and designated by the Engineer. Precast Traffic Curb shall conform to Standard Plan No. 413. Precast Block Traffic Curb shall conform to Standard Plan No. 414.

8-07.1(X1) INSTALLING CURBS

Delete the last paragraph and replace with the following:

For both types of traffic curbs, meeting pieces, connecting dividers, and radial sections as detailed in the drawings, will be required at the ends of the curb lines, at transitions from Type 413 traffic curb to Type 414 traffic curb, and at Type 413 traffic curb installation with radii less than 15 feet.

8-07.1(X2) PAINTING OF CURBS

Delete this section and replace with the following:

Concrete traffic curbs shall be painted with 2 full coats of approved paint in accordance with Section 8-26.

8-07.4 MEASUREMENT

Delete this section and replace with the following:

Precast traffic curb and block traffic curb shall be measured in linear feet along the top of the curb and return. The meeting pieces and dividers will be measured as traffic curb.

8-07.5 PAYMENT

Delete this section and replace with the following:

Compensation for the cost necessary to complete the work described will be made at the unit contract price bid only for the pay items listed or referenced below:

1) "Curb, Traffic, Precast," per linear foot.

The unit contract price for "Curb, Traffic, Precast," shall include all costs for the work required to furnish and install the precast traffic curb and precast block traffic curb.

8-08 PLASTIC TRAFFIC BUTTONS AND LANE MARKERS (New Section)

SECTION 8-08 PLASTIC TRAFFIC BUTTONS AND LANE MARKERS (New Section)

Delete the title and content of Section 8-08 in its entirety and replace with the following:

8-08 PLASTIC TRAFFIC BUTTONS AND LANE MARKERS (New Section)

8-08.1 DESCRIPTION

This work shall consist of furnishing and installing plastic traffic buttons and lane markers with an epoxy adhesive. Material and installation shall meet the requirements of these specifications and Standard Plan 760.

Location and spacing shall be as indicated on the drawings or designated by the Engineer. The Contractor shall be responsible to do the preliminary spacing of the plastic buttons and lane markers from these control points prior to installation. Approval by the Engineer for the layout shall be obtained before traffic buttons or markers are installed. Color of traffic buttons and lane markers, Type 1, shall match the color of the pavement markings on which they are installed. The color of applicable pavement markings are set forth in Section 8-22.1(2).

8-08.2 MATERIALS (New Section)

Plastic traffic buttons and lane markers shall meet the requirements of the following sections of these specifications:

- Plastic Traffic Buttons
- Lane Markers Type 1
- Lane Markers Type 2
- Adhesives

8-08.3 CONSTRUCTION REQUIREMENTS (New Section)

8-08.3(X1) SURFACE PREPARATION (New Section)

Traffic buttons and lane markers shall be bonded to clean and dry pavement with an adhesive as specified herein.

All sand, dirt, and loose extraneous material shall be swept or blown away from the marker location and the cleaned surface prepared by one of the following procedures:

Surface dirt within areas to receive traffic buttons and lane markers shall be removed. Large areas of tar, grease or foreign materials may require sand blasting, steam cleaning or power cleaning to accomplish complete removal. Application of traffic buttons and lane markers shall not proceed until the cleaned surface has been approved by the Engineer.

8-08.3(X2) ADHESIVE PREPARATION (New Section)

At the time of use, the contents of Packages A and B shall be thoroughly resuspended by mixing. One ounce or weight of Package A shall be mixed with one ounce or weight of Package B until a uniform gray color is achieved without visible streaks of white or black. Formulation may be revised, if approved by the Engineer.

Catalyst shall be added to the base just before use. Excess mixed adhesive shall be discarded when catalyst action has caused stiffening and reduction of workability or a small ball of failed resin has formed in the center of the container. The adhesive shall be maintained at a temperature between 60° and 85°F before use and during application.

8-08.3(X3) APPLICATION PROCEDURE (New Section)

Applications of traffic buttons and lane markers to pavement shall not be done if the ambient air temperature is below 40°F.
The mixed adhesive shall be applied to the base of the traffic button and lane marker with a quantity sufficient to overfill all voids between the base of the traffic button, lane marker and the pavement, such that as the traffic button and marker is forced into final position, the excess adhesive is forced out to form a bead rim around the entire perimeter of the traffic button and lane marker.

Traffic buttons and lane markers shall be spaced and aligned as indicated on the drawings or designated by the Engineer. A displacement of not more than 1/8 inch left or right of the established guide line will be permitted. Improperly placed buttons shall be removed and replaced at the Contractor's expense.

Bonding shall be considered satisfactory when adhesive develops a minimum bond strength of tension of not less than 10 pounds per square inch for 8-inch and 10-inch plastic traffic buttons, and not less than 5 pounds per square inch for lane markers Type 1 and Type 2. Traffic will not be allowed to pass over the traffic buttons and lane markers until the minimum bonding strength has been achieved.

8-09.4 MEASUREMENT (New Section)

Measurement for plastic traffic buttons will be per each.

Measurement of lane markers, Type 1 and Type 2, will be by the unit for each type of marker furnished and set in place.

8-09.5 PRICING (New Section)

Compensation for the cost necessary to complete the work described in Section 8-09 will be made at the unit contract price bid only for the pay items listed or referenced below.

1. "Lane Marker Type 1", per each.
2. "Lane Marker, Type 2", per each.
3. "Plastic Traffic Button, Type [ ]", per each.

The unit contract price for the above bid items shall include all costs for all work required to furnish and install the traffic buttons and lane markers including surface preparation and adhesive.

No additional compensation will be allowed for removal of existing traffic buttons but the cost thereof shall be considered to be included in the prices bid for the various items comprising this improvement.

SECTION 8-09 - LANE MARKERS

Delete Section 8-09 in its entirety. Refer to Section 8-08 "PLASTIC TRAFFIC BUTTONS AND LANE MARKERS."
SECTION 8-11 - GUARD RAIL

8-11.2 MATERIALS
Supplement this section with the following under Beam Guard Rail.

Inspection ............................ 9-16.2(6)

8-11.4 MEASUREMENT
Delete the first paragraph and replace with the following:
Measurement of beam guard rail will be by the linear foot measured along the line of the of the completed guard rail from end to end, including transition sections, expansion sections, and terminal sections.

8-11.5 PAYMENT
Supplement this section with the following:

(6) "Relocate Beam Guard Rail", per linear foot.

The unit contract price per linear foot for "Relocate Beam Guard Rail" shall be full compensation for furnishing all labor, tools, equipment necessary to carefully remove and install beam guard rail at location shown on the drawings or as directed by the Engineer.

SECTION 8-12 - CHAIN LINK FENCE AND WIRE FENCE

8-12.4 MEASUREMENT
Delete this section and replace with the following:
Chain link fence will be measured by the linear foot of completed fence, along the ground line, exclusive of openings.
Gates will be measured by the unit for each type of gate furnished and installed complete in place.

8-12.5 PAYMENT
Delete this section and replace with the following:
Payment will be made for each of the following bid items as are included in the Bid Form:

(1) "Chain Link Fence (Type)", per linear foot.
(2) "Double 14 Ft. Chain Link Gate", per each.
(3) "Double 20 Ft. Chain Link Gate", per each.
(4) "Single 6 Ft. Chain Link Gate", per each.
(5) "Wire Fence Type .........", per linear foot.
(6) "Single Wire Gate 14 Ft. Wide", per each.
(7) "Double Wire Gate 20 Ft. Wide", per each.

When there is no cleaving and grubbing time in the project proposal, the work required to clear the area around the proposed fence shall be considered incidental to the unit price for fence or gate.

The unit contract price per linear foot or per each of the above items, shall be full compensation for furnishing all labor, materials, tools and equipment necessary to construct a complete fence or gate.
SECTION 8-13 - MONUMENT CASINGS

Delete Section 8-13 in its entirety and replace with the following:

8-13.1 DESCRIPTION (New Section)

This work consists of furnishing and setting survey monument frames and cover casings, and removing and replacing monuments casings which may be damaged or otherwise rendered useless due to construction activities.

8-13.2 MATERIALS (New Section)

Materials shall meet the requirements of the following sections of this Specification:

- Monument Frame and Cover Casings

8-13.3 CONSTRUCTION REQUIREMENTS (New Section)

8-13.3.1 REFERENCE POINTS (New Section)

The Engineer will reference all monuments in advance of construction and will report the points and grades at the proper time.

It shall be the responsibility of the Contractor to furnish materials and install required casings in accordance with the Drawings as and where directed by the Engineer. The Contractor shall carefully protect all reference points to the monuments and he shall give the Engineer reasonable notice of the schedule for monument work in order to avoid destruction of the points.

The monuments will be furnished and set by the Engineer.

8-13.3.2 FINISH AND PLACE MONUMENT CASTINGS (New Section)

Where indicated on the Drawings or where designated by the Engineer, the Contractor shall furnish and install Type 020 monument frames and covers in the inside and grades established by the Engineer.

8-13.3.3 ADJUST EXISTING MONUMENT CASTINGS TO GRADE (New Section)

Existing monument casings shall be adjusted to grades in accordance with Section 7-20, (1).

8-13.3.4 RESET OR RELOCATE MONUMENT CASTINGS (New Section)

When monument casings are required to be relocated or removed and reset, the Contractor shall give the Engineer a minimum notice of 2 working days to allow time for the Engineer to establish offset reference points.

The Contractor shall remove monument casings as required during construction and shall store the casings in a safe place.

Monument casings designed for removal and not reused on the project, shall be carefully removed and salvaged in accordance with Section 3-20.1(3).

The Contractor shall give the Engineer a minimum notice of 2 working days before resetting monument casings to allow time for the Engineer to set reference points for locating monument castings.

The monuments shall be reset by the Contractor in the location designated by the Engineer and at the grade of the street.

The Contractor shall replace lost or damaged casings with new castings at the Contractor’s expense.

8-13.4 MEASUREMENT (New Section)

Measurement for "Monument Frame and Cover" will be by each.

Measurement for "Reset Monument Frame and Cover" will be by each.

Measurement for "Relocate Monument Frame and Cover" will be by each.

8-13.5 PAYMENTS (New Section)

Compensation for the cost necessary to complete the work described in Section 8-13 will be made at the unit contract prices bid only for the pay items listed or referenced below:

1. "Monument Frame and Cover" per each.

2. "Reset Monument Frame and Cover" per each.

3. "Relocate Monument Frame and Cover" per each.

The unit contract price for "Monument Frame and Cover" shall include all costs for the work required to furnish and set the monument castings.

The unit contract price for "Reset Monument Frame and Cover" shall include all costs for the work required to remove, store, and reset the monument castings.

The unit contract price for "Relocate Monument Frame and Cover" shall include all costs for work required to remove, store and reset the monument casing to a new location.
9-14 - CONCRETE CURB AND SIDEWALKS

Delete Section 9-14 in its entirety and replace with the following:

9-14.1 DESCRIPTION (New Section)

This work shall consist of construction of sidewalks, thicknesses edges for sidewalks, monolithic curb and sidewalk, curb ramps, and has aileron pads; plus excavation for the depth of the sidewalks and subgrades for the following items:

9-14.2 MATERIALS (New Section)

Materials shall meet the requirements of the following sections of these Specifications:

<table>
<thead>
<tr>
<th>Concrete Concrete Class</th>
<th>5.06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland Cement</td>
<td>9.01</td>
</tr>
<tr>
<td>Aggregates</td>
<td>9.02</td>
</tr>
<tr>
<td>Portland Blast Furnace</td>
<td>9.03</td>
</tr>
<tr>
<td>Concrete Curing Materials</td>
<td>8.23</td>
</tr>
</tbody>
</table>

Slump of the concrete mix shall not exceed 3-1/2 inches.

9-14.3 CONSTRUCTION REQUIREMENTS (New Section)

9-14.3.1 GENERAL (New Section)

The curb and gutter section shall be placed prior to the placement of the sidewalk section unless otherwise directed by the Engineer.

9-14.3.2 EXCAVATION AND SUBBASE (New Section)

Excavation for sidewalks shall be as described in Section 2-03. Material designated by the Engineer, suitable for use in the sidewalk, shall be removed to a specific depth and then backfilled with selected native materials.

It is expected that there will be sufficient suitable native material excavated from various portions of the Further payment will be allowed for fill material. Unused material shall be classified as follows: the Contractor shall furnish, place, and compact native Aggregate, Type 10, pit run sand as required.

Excavations shall be compacted as specified in Section 2-03, 14.1A. In areas that are inaccessible to normal compaction equipment, approved tampers shall be used.

Before the forms are set, the subgrade shall be graded to within 1 inch of established grade and the section above the grade. If the forms fall on sidewalks drain or the Engineer directs sidewalks drain to be installed, they shall be installed according to Section 7-01 and the Standard Plan 264.

Quantities for necessary excavation shall be computed to the top surface of the sidewalk and for additional or deductions shall be made for the volume of the excavated. Volume of earthwork involved in excavation for "Concrete Concrete Sidewalks" shall be included in the unit price bid.

9-14.3.3 FORMS AND FINE GRADING (New Section)

Forms shall conform to requirements outlined in Section 5-06. Final forms shall be 11/2 x 11/2 (minimum) in length of not less than 30 feet. Steel forms may be used upon approval of the Engineer. Forms shall be placed at the top of the subgrade and for preparation of the subgrade shall be included in the unit price bids for "Concrete Concrete Sidewalks".

9-14.4 PLACING AND FINISHING CONCRETE (New Section)

The concrete shall be placed uniformly between the forms and thoroughly compacted with a steel chisel shovel. Through joints and damp joints shall be placed and constructed in accordance with the Standard Plans. In construction of through joints, the prescribed joint filler shall be adequately supported until the concrete is placed.

Forms shall be provided around all street name signs posts and traffic sign posts that are placed in concrete areas. Forms used for this purpose shall be 1 foot square or 1 foot minimum diameter concrete, as approved by the Engineer.

Forms for the curb section of the monolithic curb and sidewalk shall be as defined in Section 9-06.11A.

9-14.5 CURING AND PROTECTION (New Section)

The curing materials and procedures outlined in Section 5-06.11A shall prevail, except that white pigmented curing compounds shall not be used on sidewalks. The curing agent shall be applied immediately after finishing and be maintained for a period of 5 days. The Contractor shall use readily available sufficient protective covering, such as waterproof paper or plastic sheeting, to cover the top of an entire day in event of rain or other unsuitable weather.

The sidewalk shall be protected against damage or defacement of any kind until it has been accepted by the Owner. Sidewalk which is not acceptable to the Engineer because of damage or defacement, shall be removed and replaced at the expense of the Contractor.

Additional requirements for curing in hot weather shall be as outlined in Section 5-06.11A. Additional requirements for curing in cold weather shall be as outlined in Section 5-06.11A.

Curing for the curb section of the monolithic curb and sidewalk shall be as defined in Section 9-06.11A.
8-14.3(X) THROUGH AND CONSTRUCTION JUMPS (New Section)

Standard locations for through joints for sidewalks are:
(a) At streets margins produced at 30-foot or 28-foot intervals.
(b) To separate concrete driveways, walkways, curb ramps and their landings from sidewalks.
(c) At the vertical berm of fire hydrants, around utility poles and large diameter underground facilities cover casings also located in the sidewalk area.
(d) Longitudinal between concrete walls, curbs, paved planting strips and solid masonry or concrete walls where they abut.
(e) In or about 15 feet as nearly as possible, the through joints in the adjacent pavement and curb when sidewalk abuts curb.

Transverse construction joints (dove joints) shall be constructed with provided material 1/4 inch by 2 inches wide, and set at approximately 15-foot intervals, or as decided by the Engineer. At no time will joint spacing exceed 15 feet.

Transverse and longitudinal joints as shown on the Standard Plans shall be 1/2 inch thickness provided non-sagging joint material, cut to a width equal to the full depth of the concrete and located, plus 1/2 inch. When installed, they shall be placed with top edge 1/8 inch below the finished surface of the concrete, in a perpendicular plane to the surface and with the flange edge extended to the finished surface shall be in straight alignment, except where placed in curved locations as required by the Engineer.

Construction joints for sidewalks shall conform to the applicable requirements for through joints for pavement except for thickness of joint material being 1/8 inch and width of 2 inches. The top edge shall be 1/8 inch below the finished surface of the sidewalk. At no time will joint spacing exceed 15 feet.

8-14.3(X) CURB RAMP, TYPE 1 (New Section)

Curb Ramp, Type 1 shall be installed at locations where the contract drawings call for installation of curb ramps along with new sidewalks installed as a part of the same contract.

Curb Ramp locations shall be indicated on the Drawings or marked in the field by the Engineer. Curb ramp areas to be constructed, the Owner shall construct non-sagging joint material and sidewalks to be built shall be constructed separately from the sidewalk to material shall be installed between the curb ramp and the sidewalk with shaping as specified in Section 8-14.3(X).

The triangular shaped sidewalk areas shall be flush finished with brushing parallel to the curb face. The finished grade at the base of the ramp shall be 1 inch higher than the finished grade of the sidewalk to material shall be installed between the curb ramp and the sidewalk with shaping as specified in Section 8-14.3(X).

The triangular shaped sidewalk areas shall be brush finished with brushing parallel to the curb face. The finished grade at the base of the ramp shall be 1 inch higher than the finished grade of the sidewalk to material shall be installed between the curb ramp and the sidewalk with shaping as specified in Section 8-14.3(X).

Concrete for Curb Ramps shall not be ordered, overlaid or topped. Curb ramps shall be considered as part of the curb ramp. The sloping triangular shaped sidewalks are considered part of the curb ramp.

8-14.3(X) CURB RAMP, TYPE 2 (New Section)

Curb Ramps, Type 2 shall be installed at locations where the contract drawings mandate removal of existing driveways, walkways, sidewalk and grass areas on new sidewalks required by the contract documents immediately adjacent to the new curb ramp.
8-14.5 CEMENT CONCRETE SIDewALKS

Cement Concrete Sidewalk

8-14.5.1 CEMENT CONCRETE SIDEWALKS

Compensation for the cost necessary to complete the work described in Section 8-14 will be made to the unit contract prices bid only for the pay items listed or referenced below:

1. "Sidewalk, Cememt Concrete" per square yard.
2. "Sidewalk, Thickened Edge" per linear foot.
3. "Curb Ramp, Cement Concrete (Type)" per each.
4. "Bus Shelter Pad" per square yard.

The unit contract prices for "Sidewalk, Cement Concrete" shall include the costs for all work specified in Section 8-14 and Standard Plan 404 necessary to construct the sidewalk and not otherwise provided for herein.

The unit contract price for "Sidewalk, Thickened Edge" shall include the costs for all work necessary to construct the thickened edge where required.

The unit contract price for "Curb Ramp, Cement Concrete, Type 1," shall include all costs for the work required to construct the curb ramp as specified including the ramp, the sidewalks, joint materials, and excavation.

The unit contract price for "Curb Ramp, Cement Concrete, Type 2," shall include all costs for the work required to remove existing improvement within area of new curb ramp and to construct the curb ramp at "at or locations as specified in Section 8-14.3(5).

The unit contract price for "Bus Shelter Pad" shall include all costs for all work required to construct the bus shelter pads as specified.

The above unit contract prices include the costs for incidental items of work performed under Section 8-14 including, but not limited to, such work as excavation, grading, compacting, joint material, adjusting water meter and handle house to finish grade and all other work called for in the Drawings required by the Specifications or essential to the construction of the work described in Section 8-14.

Mineral aggregates of the type specified for sidewalk fill will be paid per ton in accordance with Section 4-01.3.

Concrete sidewalks will be measured and paid per Section 7-01.

Payment for miscellaneous curb and sidewalk or miscellaneous curb, gutter, and sidewalk shall be paid for by the individual bid items described in Section 8-14.4.

Replacements of signs will be measured and paid in accordance with Section 8-21.
SECTION 8-18 - CEMENT CONCRETE STAIRWAYS, LANDINGS AND STEPS (New Section)

8-18-1. DESCRIPTION (New Section)
This work shall consist of constructing, on a prepared connected subgrade, cement concrete stairways, landings, and steps, and such auxiliary work as may be necessary, including the construction of handrails, in accordance with the requirements of these Specifications and in conformity with the plans, grades, and cross sections indicated on the Drawings, Standard Plans, or established by the Engineer.

8-18-2. MATERIALS (New Section)

The concrete mix shall be Class 6 (3/4) for steps and stairways. Landings shall be Class 5 (3/4). Galvanized steel pipe railing shall be fabricated from standard weight steel pipe meeting the requirements of ASTM designation A 500. After fabrication the railings shall be hot-dipped galvanized per ASTM A 123.

Aluminum paint for handrails shall be Formu-la 3-1-57 aluminum paint meeting the requirements of Section 9-16-2.

Wood for railings shall be as indicated on the Drawings.

8-18-3. CONSTRUCTION REQUIREMENTS (New Section)

8-18-3.1 SITES PREPARATION AND GRADING (New Section)

Ramps shall be constructed at the area shall be cleared, staked, surveyed and graded in accordance with Sections 2-20 and 2-50 to the limits indicated on the Drawings or staked by the Engineer.

8-18-3.2 SUBGRADE PREPARATION AND FORMS (New Section)

The necessary subgrade preparation and compaction required in the construction of cement concrete stairways, landings, and steps shall meet the requirements for pavement subgrade preparation set forth in Section 2-06.

Forms shall meet the requirements of Section 5-06.3.7 except that wood side forms shall be not less than 2 inches nominal in thickness and shall be free from splits or bends.

8-18-3.3 REINFORCING STEEL (New Section)

Reinforcing steel for cement concrete stairways shall be placed as shown on the Standard Plans. The steel shall be assembled and securely tied with welded wire of not less than No. 6 gauge as shown on the Shop Drawings. After concreting, the reinforcing steel shall be galvanized according to ASTM A 570 after fabrication. If field welds are required, they shall be tested with a zinc alloy solder in a minimum thickness of 2.0 mils per ASTM A 586.

8-18-4.13 HARDWARE (New Section)

Handrails shall be of welded steel pipe construction fabricated and installed as indicated on the Standard Plans or the Drawings. Rails shall be made by certified welders and each weld shall be ground and buffed to a smooth finish. Rails shall be hot galvanized to conform to the Shop Drawings. If field welds are required, they shall be coated with a zinc alloy solder in a minimum thickness of 2.0 mils per ASTM A 586.

8-18-4.14 OTHER MATERIALS (New Section)

Concrete stairways, landings and steps shall be of the following materials:

- Reinforcing steel shall be ASTM grade 40 or higher.
- Concrete shall be ASTM C 305, grade B.
- Masonry units shall be ASTM C 270, grade A.
- Grout shall be ASTM C 1071, grade A.

8-18-4.15 FINISHING AND CURING (New Section)

Concrete for stairways and landings shall be Class 5 (3/4) unless otherwise provided in the Special Provisions or ordered by the Engineer. Placing, finishing and curing shall conform to the applicable requirements in Section 5-06.3.7, as they apply to cement concrete stairway construction.

Front and side edges of stair treads shall be to a radius of 1/2 inch.

Landings for stairways shall be marked as specified for concrete sidewalks in Section 8-14 except that curbing and horizontal markings shall be modified as necessary to allow in uniform size of squares in each landing. Stairs for those along the side of the stairways, the gutter portion of stairway landing shall be smooth finished without markings to conform with the stairway gutter.

8-18-4.16 CURTAIN (New Section)

Stairway, where Type 400 stairway is specified, or where a stairway is specified, a concrete curtain shall be constructed in accordance with the details on the Standard Plans. The curtain shall be constructed along the stairway, and adjacent to the concrete wall or landing that joins flights of stairs, connecting the stairway gutters.

8-18-4.17 SCAFFOLDS (New Section)

Scaffolds shall be of a type and shall have maximum 7-inch risers, minimum 11-inch treads, and shall be of the width of the existing sidewalk or as designated by the Engineer.

8-18-4.18 MEASUREMENT (New Section)

Concrete stairways, landings, and gutters will be measured by the cubic yard of common excavation in accordance with Section 5-06.3.7.

Measurements of "Stairway, Cement Concrete" and "Stairway, Cement Concrete, Special" will be by the square foot of tread surface installed. "Stairway, Cement Concrete, Type 400" will be measured by the linear foot for the horizontal distance from a point 2 feet 2 inches from the back of the top tread to a point 2 feet 2 inches from the face of the bottom riser.

Handrail of the type specified will be measured by the linear foot on the slope for the continuous length of the completed railing from the vertical centerline of the top post to the vertical centerline of the bottom post.

Concrete landings or walkways outside the stairway measurement limits will be measured as "Sidewalks, Cement Concrete" by the square yard in accordance with Section 8-14. Asphalt walks will be measured in accordance with Section 5-04.

Gutter will be measured by the linear foot on the slope for the gutter sections installed along stairways and along landings or concrete walls between stairways.

8-18-4.19 PAYMENT (New Section)

Compensation for the costs necessary to complete the work described in Section 8-18 will be made as the unit contract prices bid only for the pay items listed or referenced below:

- "Stairway, Cement Concrete, Type 400," per lineal foot.
- "Stairway, Cement Concrete, Special" per square foot.
- "Handrail, (Type)," per lineal foot.
(4) "Steps, Cement Concrete," per square foot.

(5) "Landings, Cement Concrete, Type 440," per linear foot.

The unit contract price for "Stairway, Cement Concrete, Type 440," shall include the costs for all work described in Section 8-18, and not otherwise provided for separately hereinafter, necessary to construct a 5-foot concrete stairway in accordance with Standard Plan No. 440, including garter.

The unit contract price for "Stairway, Cement Concrete, Special," shall include the costs for all work described in Section 8-18 and not otherwise provided for separately herein necessary to construct a stairway in accordance with Standard Plan No. 440, except with a pitch of other than 3 feet.

The unit contract price for "Handrail (Type)" of the type specified shall include the costs for all work required to fabricate and install the handrail along the stairway or sidewalk as specified by the contract documents.

The unit contract price for "Steps, Cement Concrete," shall include the costs for all work required to construct concrete steps as specified.

The unit contract price for "Landings, Cement Concrete," shall include the costs for all work described in Section 8-18 to construct a garter section along the edge of stairways in accordance with the cross section indicated on Standard Plan No. 440.

Concrete landings and wall sills shall be paid as common execution in accordance with Section 2-03.

Concrete walls and wall sills shall be paid as "Sidewalk, Cement Concrete," in accordance with Section 8-16.

Reinforcing steel shall be considered as incidental to the unit cost for stairway construction.

SECTION 8-19 - CEMENT CONCRETE DRIVEWAY AND ALLEY RETURN (New Section)

8-19.1 DESCRIPTION (New Section)

This work shall consist of cement concrete driveway and alley returns constructed at the locations shown on the drawings and where directed by the Engineer, and shall be in accordance with these Specifications and the Standard Plans.

The number of private driveways may be increased over that shown on the drawings, if required by the Engineer. Sufficient notice of the additional installations will be given by the Engineer to enable the Contractor to schedule the private driveways along with other construction in the same general area without moving equipment back for the purpose.

The particular type of driveway or alley return to be used shall be that which is specified in the Drawings and included in the Bid Forms.

Alley returns shall be constructed in all respects as specified and shown in the Standard Plan No. 440 and 341. The return thickness shall be 8 inches. The return return and the curb shall be poured simultaneously.

8-19.2 MATERIALS (New Section)

The Portland cement concrete, joint filler, reinforcing steel, and aging materials shall conform to requirements specified in Section 8-01, Non-Structural Portland Cement Concrete. The concrete mix shall be at least 2.5 cubic yards per cubic yard for class B (1-1-1), or class B (1-1) and the slump of the concrete shall not exceed 2-1/2 inches.

8-19.3 CONSTRUCTION REQUIREMENTS (New Section)

8-19.3(1) EXCAVATION AND BACKFILL (New Section)

Where directed by the Engineer, unsuitable materials in the subgrade shall be removed to a specific depth and backfilled with suitable materials which shall be compacted by Method B, as specified in Section 8-03.1(3). Payment for excavation below grade and additional materials will be paid for under the unit contract price for "Cement Excavation" and "Material Aggregate (Type)" specified for backfill.

Subgrade preparation for driveways and the required compaction shall conform to the applicable requirements in Section 2-06.1(2) to provide a firm, unyielding subgrade, acceptable to the Engineer.

8-19.3(2) FORMS AND FINISHING (New Section)

Forms for the straight sections of the driveway or alley return shall have a minimum thickness of 2 inches and be equal to the nominal depth of the concrete. Plywood or 1 inch lumber may be used as forms. All forms shall be securely stabilized and blocked to true line and grade.

A template shall be set upon the forms and the subgrade shall be tamped graded to conform to the required finished grade. The subgrade shall then be compacted to the approval of the Engineer. Prior to placement of the concrete, the subgrade shall be thoroughly dampened.

8-19.3(3) PLACING AND FINISHING CEMENT CONCRETE DRIVEWAY (New Section)

The concrete shall be spread uniformly between the forms and thoroughly compacted with an approved type of vibratory tool. Shoulder joints shall be located and constructed in accordance with applicable Standard Specifications. In the construction of through joints, the premolded joint filler shall be adequately supported until the concrete is placed on both sides of the joint.

Construction joints (damp joints) shall be formed with a tool or trowel first cutting a groove in the concrete to a depth equal to, but not greater than the joint filler material and then adding the premolded joint filler into the groove. Premolded joint filler for both through and damp joints shall be positioned in true alignment and at right angles to the center line of the driveway or alley return to the surface of the concrete.
The surface shall be brushed in a transverse direction in relation to the center line of the driveway or alley return with a fiber hair brush of approved type.

Driveways and alley returns shall not be constructed at the same time the pavement is placed unless authorized by the Engineer.

8-19.2(4) CURING AND PROTECTION (New Section)

The curing materials and procedures defined in sections 5-06 and 9-23 shall be used. The driveway and the alley return shall be protected against damage or defacement of any kind until acceptance by the Owner. Any driveway or alley return not acceptable, in the opinion of the Engineer because of damage or defacement, shall be removed and be replaced by the Contractor at his expense.

Before placing any concrete, the Contractor shall have on the job site enough protective paper to cover the pour of an entire day, in event of rain or other unsuitable weather conditions.

8-19.4 MEASUREMENT (New Section)

Measurement for cement concrete driveway and alley return will be by the square yard for the class and thickness of driveway actually placed, measured from the back of the curb to the back of the sidewalk.

8-19.5 PAYMENT (New Section)

Compensation for the cost necessary to complete the work described in Section 8-19 will be made at the unit contract prices bid only for the pay item listed or referenced below:

1. "Driveway, Cement Concrete (Thickness)," per square yard.

2. "Driveway, Cement Concrete, R8, (Thickness)," per square yard.

The unit contract price for "Driveway, Cement Concrete (Thickness)," and "Driveway, Cement Concrete, R8, (Thickness)," shall include all costs for the work required to construct the driveway as specified herein.

Alley return will be paid for as "Driveway, Cement Concrete (Thickness),"

Repayment for driveways and alley returns shall be considered incidental to the construction of the driveway, and no payment will be made to the Contractor therefor.

Payment will not be allowed for over excavation nor for the additional material required below the set grade resulting from negligence of the Contractor.
SECTION 8-21 — PERMANENT SIGNING

Delete Section 8-21 in its entirety and replace with the following:

8-21.1 DESCRIPTION (New Section)

This work shall consist of furnishing and installing new traffic signs and posts, street designation signs, installing City furnished street name signs, and house signs, relocating existing traffic signs designated by the Engineer.

8-21.2 MATERIALS (New Section)

Signs, materials and fabrication of signs shall meet the requirements of Section 9-28 of these Specifications.

8-21.3 CONSTRUCTION REQUIREMENTS (New Section)

8-21.3.1 SIGN INSTALLATION (New Section)

The multiple panel signs and sign structures shall be installed in accordance with the Drawings and signing details in the Appendix.

The signs shall be mounted level and face in the direction indicated on the Drawings or designated by the Engineer.

When mounting a sign on a wood post or wood pole, 5/16-inch x 3-1/4-inch galvanized or cadmium plated Lag Screw shall be used, with 1/8-inch thick x one-inch 0.062 nylon washer.

When mounting a sign on a steel pole 0.170 inch or thicker, the "drill & tap" method or cleats shall be used, with 5/16-inch stainless steel bolts and 1/8-inch thick x 1-inch 0.062 nylon washers. For a street pole less than 0.170 inch, 5/16-inch stainless steel cleats shall be used, with 5/16-inch stainless steel screws and 5/16-inch stainless steel washers used, unless approved by the Engineer.

Field repair of galvanized surfaces of drill holes shall be by galvanized repair paint meeting the requirements of Federal Specification MIL-P-43035 (Drugs) paint, high zinc dust content, galvanizing

8-21.3.2 STREET NAME, STREET DESIGNATION, AND RUN ZONE SIGNS (New Section)

Street names, street designation, and house zone signs shall be mounted as indicated on the traffic signing details in the Appendix of the Project Manual.

8-21.3.3 SIGN POST INSTALLATION (New Section)

Wood sign post holes shall be of sufficient dimensions to allow placement and connection of backfill material completely around the post. Selected backfill material shall be placed and compacted to meet the requirements of Section 2-03. The area disturbed during wood sign post installation shall be surfaced to match the surrounding surfaces. Where wood sign post is to be installed in existing paved concrete areas, a new hole 6-inch x 12-inch concrete shall be provided by saw cutting, or an 8-inch diameter hole shall be provided by core drilling.

Where new sidewalk or paved planting areas are to be constructed, the Contractor shall provide blockouts for installation of street name sign and traffic sign posts. Location of the signs posts shall be as specified on the Drawings or where designated by the Engineer. Blockout shall be 12-inch x 12-inch x 12-inch diameter, with a depth to match proposed paving.

After the post is installed, the cutout or blockout shall be capped with 3/4 inch to 1-1/2 inch material similar to the surrounding paved surface, with a crown of 3/4 inch to shed water away from the post. See Standard Plan No. 624 for details.

When required, parking meter posts shall be installed as indicated in the traffic signing details on the Drawings.

When required, street name sign and house zone sign posts shall be installed in an 8-inch diameter post hole with Class 3 concrete base, as indicated in Standard Plan No. 622.

8-21.3.4 SIGN COVERING (New Section)

As indicated on the Drawings or when designated by the Engineer, the Contractor shall cover certain signs and markers to facilitate and control the operation of the project. The covering shall be of sufficient size to entirely cover the sign unless otherwise designated by the Engineer, and shall extend over the edges of the sign and be fastened on the back. Adhesive tape shall not be used on the face of the signs. Other methods of covering may be used if approved by the Engineer.

8-21.3.5 SIGN RELLOCATION (New Section)

As indicated on the Drawings or designated by the Engineer, the existing sign and sign post shall be relocated to the new location. If necessary, relocating of existing signs and posts is necessary prior to01 cutting out and installing new signing. Removal of signs and posts required for sign relocation shall be in accordance with Section 2-02.

When existing street name post or house zone post are to be relocated, all old concrete cap and bases shall be removed from the base of these posts.

Relocation of existing signs and posts required for sign relocation shall be in accordance with the requirements for new installation. A new sign post shall be installed where indicated on the Drawings or designated by the Engineer.

8-21.4 MEASUREMENT (New Section)

Measurement for "Sign, Traffic" will be by the square foot of sign.

Measurement for "Sign, Street Designation" will be by each.

Measurement for "Sign, Street Name, (City Furnished), Street Name Post Mounted" will be by each. One unit of measurement will consist of all street name sign blades together with all block number plates for mounted on street name sign post.

Measurement for "Sign, Street Name, (City Furnished), Steel/Aluminum Pole Mounted" will be by each. One unit of measurement will consist of 2 street name sign blades together with 2 block number plates mounted on steel or aluminum pole.

Measurement for "Post, Traffic Sign", "Post, Parking Meter", and "Post, Street Name", and "Post, Run Zone" will be by each.

Measurement for "Relocate Sign, Traffic", "Relocate Sign, Street Name", and "Relocate Sign, Run Zone", will be by each.

Measurement for "Sign Covering" will be by the square foot of sign cover.
S-211.5 PERMANENT SIGNING

Compensation for the cost necessary to complete the work described in Section S-211 will be made at the unit contract prices bid only for the pay items listed or referenced below:

2. "Signs, Street Name," each.
3. "Signs, Street Name (City Bordered), Street Name Post Mounted," each.
4. "Signs, Street Name (City Bordered), Steel/Aluminum Pole Mounted," each.
5. "Signs, Bus Zone (City Bordered)," each.
8. "Post, Street Name," each.
11. "Relocate Signs, Street Name," each.
12. "Relocate Signs, Bus Zone," each.

The unit contract price for "Signs, Traffic" and "Signs, Street Name" shall include all costs for the work required to furnish the sign and mounting hardware and mount the signs as herein specified.

The unit contract price for "Sign, Street Name (City Bordered), Street Name Post Mounted" shall include all costs for the work required to mount the City furnished street name sign blades and block number plates. The City shall furnish the sign mounting hardware.

The unit contract price for "Signs, Street Name (City Bordered), Steel/Aluminum Pole Mounted" shall include all costs for the work required to mount one unit of City furnished street name sign blades and block number plates. The Contractor shall furnish the mounting hardware as shown on Standard Plan.

The unit contract price for "Signs, Bus Zone (City Bordered)," shall include all costs for the work required to mount the City furnished bus zone sign including the mounting hardware.

The unit contract price for "Post, Traffic Signs," "Post, Parking Meter," "Post, Street Name," and "Post, Bus Zone" shall include all costs for the work required to furnish and install the post as specified including foundation, backfill and surface restoration.

The unit contract price for "Relocate Signs, Traffic," "Relocate Signs, Street Name," and "Relocate Signs, Bus Zone" shall include all costs for the work required to remove and relocate the traffic signs, street name sign or bus zone sign including costs as specified. If a new post is installed on the new location, the post will be paid for separately.

When relocating street name signs to a newly installed street name sign post, the relocation cost shall be incidental to the cost of installing the post. The unit contract price for "Post, Street Name" shall include all costs for installing City furnished street name signs as specified hereinabove.

When relocating older signs to a newly installed street name sign post, the relocation will be paid for relocating the street name sign under this item "Relocate Signs, Street Name." All other older signs, mounting on the pole, furnishing and installing mounting brackets and hardware per Standard Plan.

The unit contract price for "Sign Coverings" shall be full compensation for all costs of furnishing and installing the covering material as specified. Removal of sign covering shall be considered incidental to the unit price bid for sign covering. Covering any signs for the convenience of Contractor's activities prior to new channelization shall be at the Contractor's expense.

All costs for the erection and maintenance of temporary warning and detour signs necessary to protect and safeguard the public from injury or damage shall be the responsibility of the Contractor, and shall be considered incidental to the contract and no separate payment will be made therefor.

218
Pavement Marking

II. Thermoplastic (Section 7.5 ABDJE)

1. Plain
2. Arrow strip
3. Crosswalk
4. Double line

III. Pressure Sensitive Tape (Section 7.5 ABDJE)

1. 4-inch white curb tape
2. Red curb tape
3. Yellow curb tape
4. 4-inch combination curb tape

B-22 MATERIALS (New Section)

Materials for pavement markings shall be paint or plastic material as noted in the Mil Form, and shall meet the requirements of Section 9-9-20 of these Specifications.

B-22.3 CONSTRUCTION REQUIREMENTS

B-22.3.1 Preliminary Painting

Delete this section and replace with the following:

The engineer will provide the preliminary layout for pavement marking alignment following the procedures outlined in the Manual. Preliminary layout will consist of providing the Contractor with a map that identifies the proposed location of the markings. The Contractor shall provide the necessary tools and materials to the Engineer prior to marking. Permanent marks shall be removed after preliminary painting. The Engineer shall provide the Contractor with the necessary tools and materials to the Engineer prior to marking.

Permanent pavement markings such as crosswalks, stop lines, center lines and lane stripes shall be installed in accordance with the preliminary layout. The Engineer shall provide the Contractor with the necessary tools and materials to the Engineer prior to marking.

B-22.3.2 Preparation of Surfaces (New Section)

Surface dirt and all contaminants within the areas to receive pavement markings shall be removed. Large areas of tar, gum, or foreign materials may require blasting, steam cleaning, power brushing, or chemical stripping to accomplish complete removal. Gravel blocking and paint shall be treated to the back edge of the curb and the edge of foreign material before painting.

Temporary pavement markings shall be completely removed. Cleaning and removal methods used shall not damage the pavement surface to a depth of or width greater than the required to provide adequate bond between the pavement and the pavement marking material. The pavement surface shall be approved by the Engineer after application of the markings.
8-22.3 PAINTED MARKINGS

8-22.3(a) GENERAL (New Section)

Equipment used in the application of the paint or markings shall be designed and operated to produce uniform quality markings meeting the requirements specified.

Traffic paint shall be applied at a rate of not more than 100 square feet per hour (approximately 15 min per thickness). This rate is effective at 16 degrees above 45 degrees wide lines, which will be the basis for the measurement of yield. A tolerance not to exceed minus 10 percent will be allowed for film thickness or yield in paint application.

New "dotted" crosshatch, pedestrian and bicycle symbols (including arrows), white sharp sand shall be spread over fresh paint at a rate of approximately 1 pound per 20 square feet.

8-22.3(b) TOLERANCES FOR STRIPING (New Section)

The allowable tolerances for line striping are as follows:

(a) Length of Strip: The longitudinal cumulative error within a 10-foot length of lane line shall not exceed plus or minus 4 inches.

(b) Width of Strip: The width of strip shall not vary more than plus or minus 1/8 inch.

(c) Lane Width: The lane width, which is defined as the lane width from the edge of pavement to the center of the lane line or between the centers of parallel and consecutive lane lines, shall not vary from the widths shown in the drawings by more than plus or minus 4 inches.

8-22.4 THERMOPLASTIC MARKINGS

8-22.4(a) INSTALLATION (New Section)

Thermoplastics are used to apply to an initially dry pavement surface after sufficient time has elapsed to ensure that the primer if required, has adequately dried and further curing of the primer will not adversely affect the thermoplastic material.

Thermoplastic material shall be applied in accordance with the manufacturer's recommended temperature range for ambient air temperature, pavement temperature, and temperature of the molten material.

Painted thermoplastic shall be applied to the pavement by a gravity or an extrusion method, or a combination of both. If the striping width is obtained by more than one application, the additional applications shall be fused together with no apparent overlap or gap.

Glass beads shall be applied separately to the thermoplastic material as it is being placed. The glass beads shall be uniformly distributed over the entire width of thermoplastic material so that objectionable irregularities in the material's reflectorization will not be present. This independent application of glass beads shall be applied uniformly at a rate of 1 pound for every 25 square feet of pavement marking. The dispenser shall be located behind and controlled simultaneously with the pavement marking operation so that the beads will be embedded in the pavement marking to a depth of at least 1/2 the bead diameter.

8-22.4(b) TYPE "P" INSTALLATION (New Section)

Type "P" prefabricated thermoplastic material shall be applied to the pavement in a manner which will provide a uniform surface over the various widths required. In application, the ambient air temperature shall be within the range recommended by the manufacturer.

Type "P" thermoplastic material shall be supplied with a precast, factory-applied adhesive or it may be furnished with separate adhesive as recommended by the manufacturer. Neither precast nor supplied separately, the adhesive shall be such as to allow the thermoplastic material to be repositioned on the pavement surface before permanently fixing it in its final position with a downward pressure.

When completed, the painted or thermoplastic markings shall not be less than 0.06 inches (1.5 millimetres) in thickness, exclusive of any precast or extruded plastic, and shall have a uniform cross-sectional configuration.
SECTION 8-30 - STREET LIGHTING SYSTEM (New Section)

8-30.1 DESCRIPTION (New Section)

The work consists of furnishing and installing a complete and functional electrical/street lighting system as indicated on the drawings and as specified herein.

8-30.1.1 GENERAL (New Section)

All final connections or erecting of electrical street lighting systems to overhead secondary or to secondary in vaults or buildings will be made by City light at no cost to the Contractor.

8-30.1.2 APPLICABLE CODES (New Section)

The work shall be performed in accordance with the applicable provisions of the following codes:

(a) Seattle Department of Lighting Material Standards, Construction Standards, and Requirements for Electrical Service Connection.

(b) State of Washington Electrical Construction Code, Chapter 296-44 WAC.

(c) State of Washington Electrical Vehicle Safety Rules, Chapter 296-45 WAC.

(d) National Electrical Code.

(e) Seattle Electrical Code Supplement.

(f) National Electric Institute (NEI).

(g) National Electric Safety Codes.

The Contractor shall be familiar with wires and voltages present within the construction area in the application of these requirements.

8-30.1.3 SHOP DRAWINGS (New Section)

The Contractor shall submit shop drawings for the following items in accordance with Section 1-05.3:

- Streetlight (include photometrics and socket position)
- Photovoltaic Cells
- Bracket Arms
- Multi-Cable and Accessories
- Wire Connectors
- Ground Clamps
- Splice Kits
- Switchboard Boxes and Disconnects
- "D.C. G. L. Outlets" (Hospital grade)
- Cabinets/Panels (Shop drawings for electrical cabinets, panels, and enclosures shall include but not be limited to the following):
  (a) Wiring schematic
  (b) Site layout, indicating approximate size and placement of equipment
  (c) Full description of materials, including brochures and schematics
  (d) UL/CSA Certification
  (e) All vents shall be screened

STREET LIGHTING SYSTEM (New Section) 8-30

8-30.1.4 GUARANTEES (New Section)

All materials supplied under this specification shall be guaranteed against defective workmanship and material for a period as indicated in Section 1-05.3. The Contractor shall be responsible for the replacement of any material or equipment found to be defective within the guarantee period, including labor, freight, shipping and delivery costs. All material returned to the supplier shall be replaced and returned to the City of Seattle within 30 days of receipt.

8-30.1.5 DEFINITIONS (New Section)

All technical words and phrases used within these specifications shall be interpreted as defined in the I.E.E.E. Standard Dictionary of Electrical and Electronic Terms.

8-30.1.6 FIELD TESTING (New Section)

Prior to completion of the work, the Contractor shall make the following tests on all electrical circuits:

(a) Test for grounds in each circuit, by physically examining the installation to ensure that all required ground jumper, devices and apparatuses are in use, that they are mechanically and electrically tight, and that they meet the requirements of Article 250 of the National Electrical Code.

(b) Insulation resistance test (with all readings recorded when requested by the Engineer). The insulation test shall be performed after all field connections have been made.

(c) A functional test in which it is demonstrated that each and every part of the system functions as specified or intended herein. The functional test shall be performed after all field connections are made.

8-30.1.7 FINAL INSPECTION (New Section)

As soon as practicable after the completion of the entire work, it will be examined by the Lighting Department and the Engineer. The Contractor will be notified when the examination is to be made.

If the inspection reveals defects in the work, such defects shall be repaired or unsatisfactory work shall be replaced at the乙方er's option before final acceptance. No extension of the contract time will be granted because of the time required to remedy such defects.

The Contractor will be charged with the actual cost to the City due to any repairs made necessary by such defects.

8-30.2 MATERIALS (New Section)

Materials shall meet the requirements of the following section of this specification:

Illustration and Electrical Materials........ 9-31

All materials furnished by the Contractor shall be new, unused and free from defects. Hardware not specifically called for but required to complete the work shall be considered incidental to the contract. All parts shall be furnished and installed by the Contractor at no additional cost to the City.

All steel shall be stainless or hot-dipped galvanized.

All electrical equipment, including lighting, lamps, photovoltaic cells, bracket arms, wire, etc. shall be permanently marked with manufacturer's name and appropriate ratings.

8-30.3 CONSTRUCTION DETAILS (New Section)
8-30 (1) GENERAL (New Section)

The work required for installation of electrical/street lighting systems shall be done as shown on the Standard Plans, the construction standards, and in accordance with the following provisions.

All wiring shall be per A.M. 123 and 153.

Only state certified electricians shall perform electrical work.

Wire clearances shall be in accordance with Seattle City Light requirements and the City and State laws.

To maintain safe traffic conditions, existing luminaires shall remain in service until in-turnover to new luminaires can be accomplished. Roadways shall not be opened to traffic until the required lighting system is operating properly.

All wiring of steel and aluminum structures shall be in accordance with AWWA Standard Specifications for Structural Components, including Luminaires and Traffic Signals, Section 1.4.3 for Steel and Section 1.5.3 for Aluminum. All steel structures shall be protected as per Section 1.4.3 of the above referenced book.

Field repair of galvanized surfaces shall be coated with a heated zinc alloy solder to a minimum thickness of 2 mils, in accordance with AWWA A153.

Where the wiring diagram indicates installation of a fuse or ground rod, in-line fuse holders and fuse or ground rod shall be installed as specified herein.

8-30 (2) LUMINAIRES (New Section)

The luminaires, reflector and lamp shall be thoroughly cleaned before installation on the tees. The luminaires shall be secured and adjusted according to the manufacturer's recommendations and shall be installed in the transverse roadway as set parallel to the roadway grade in the longitudinal roadway. After the poles have been placed with all other work, according to Construction Standard 605.

Alignment of luminaires shall be approved by the Engineer prior to final surfacing and each location.

Date of installation shall be marked on the bottom of the photoelectric cell with indelible marking pen. The lamp shall have the installation data etched in the metal base. The photoelectric cell receptacle shall be adjusted such that the photoelectric cell faces north.

8-30 (3) BRACKET ARMS (New Section)

Bracket arms shall be installed at the locations indicated on the Standard Plans. Mounting point of the bracket on wood poles shall be located as necessary to provide the required mounting height of the luminaire above the pavement surface as indicated on the Standard Plans. The mounting bracket shall be adjusted to provide required wire clearances.

Wood pole bracket arms shall be attached by one through bolt and two lag bolts. Through bolts on wood poles shall be set off no more than 10 threads nor less than 5 threads away from the mounting point. The lag bolts shall be treated with galvanizing paint and approved by the Engineer. The through bolt shall not be used to attach any other hardware.

At locations where the existing bracket arm is to be used, any existing tape present on the arm shall be removed. (This tape was used to indicate luminaires internationally disconnected in late 1977 to conserve energy.)

Bracket arms on steel poles shall be attached with galvanized steel bolts.

Bracket arms on aluminum shall be attached with stainless steel bolts.

8-30 (4) RELAYING EQUIPMENT (New Section)

Where equipment is to be relocated, the Contractor shall furnish and install the necessary materials, hardware and equipment required to complete the new installation. The new hardware required to complete the installation shall be of the same quality and type as hardware required in these specifications for new work.

226
In addition, unless noted otherwise in the Drawings, installation of MI cable shall be subject to the following requirements:

1. The radius of the inner edge of the bend shall not be less than 10 cable diameters, unless instructed otherwise by the Engineer. At no time shall the bend be less than 5 diameters.

2. Attachment: The cable shall be attached using copper clips and 1/8" clasp bolts. Bolts sized for 1/2" penetration and all associated parts shall be stainless steel. The cable shall be spaced 1/4\(\frac{1}{4}\) inch apart from walls by means of stainless steel or nylon spacers. More than one cable (of the same outside diameter) may be placed in a clip if they are dressed parallel and neatly.

3. Cable shall not be run on any removable surface or pump station ceilings unless so noted on the Drawings.

4. Polyethylene Jacket: Nicks and cuts in the polyethylene jacket shall be repaired as directed by the Engineer.

5. Protection: Cable ends shall be protected from moisture at all times.

6. Testing: All cable shall be tested with a meter after installation and prior to hook-up. The insulation resistance shall be greater than 10,000 Meg Ohms. The tests shall be conducted in the presence of the Engineer.

7. The test results shall be recorded on the Data Sheet. A sample of Data Sheet is provided herein, and the test results shall be included in the 0 & P Manual.

8. Tools: All tools used to make up the cable glands shall be as specified by the cable manufacturer.

9. Expansion: Where cables may expand due to temperature changes, the cable run shall contain small hose or pipe of direction as recommended by the cable manufacturer.

10. The cable shall not be connected to any vibrating or moving device.

11. As noted in Section 9-11.4, the conductors exposed to the street shall be insulated. The insulating sleeves shall be of Type-5A rubber-coated or Type-7A rubber-coated on the Drawings. Steel and copper conductors shall be identified by one of several colors, which are in one sheet, they shall be identified by coded bands (not tape) or different colored sleeves.

12. Splice: MI cable may be spliced using glands and junction boxes when permitted by the Engineer.

13. Conduct: Conduct entering a pump station may be stubbed inside the wall and converted to MI cable. The cable shall be spliced to the external wiring in a conduit or J-box.

14. Central Reconnect: MI cable entering central cabinets such as motor starter and pump control equipment shall terminate on devices within 50 inches of the MI entrance or terminate on a terminal strip.

15. Circuit Breaker Panels: MI cable conductors shall be terminated at the central bus and at the circuit breakers. Ends in terminal bus sleeves shall be required, as directed by the Engineer.

16. Notes - MI cable shall terminate in a J-box or conduit with a minimum of 8 inches of flex and stranded wire continuing on to the motor.

17. Protection: Where MI cable may be damaged by sliding objects such as at the floor grate, it shall be protected by a 4\(\frac{1}{2}\) x 4\(\frac{1}{2}\) x 1\(\frac{1}{2}\) angle or other means as noted on the Drawings or directed by the Engineer.

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N.I. CABLE TEST RECORD

DATE: ______________________

PROJECT: ______________________

STATION: ______________________

CABLE DESCRIPTION: ______________________

READING: ______________________

TESTER: ______________________

DATE: ______________________

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5-30.37) GROUNDING AND BONDING (New Section)

All metallic apparatuses containing electrical conductors, including cabinets, metallic conduit, metal poles, pole plates, and junction boxes, shall be made mechanically and electrically secure to form a continuous system which shall be effectively grounded. Where metallic conduit systems are used, an insulated ground wire shall be installed in the conduit.

Where plastic conduit systems are used, all metallic apparatuses shall be electrically bonded by a separate insulated ground conductor.

Where parallel electrical circuits exist in an electrical conduit, the equipment grounding conductor shall be sized as determined by the rating of the largest overcurrent device serving any circuit contained in the conduit. Only one equipment grounding conductor is required in any conduit.

The equipment grounding conductor shall be sized as indicated on the Drawings. Minimum size shall be 8\(\frac{1}{2}\) copper.

All conduit runs with phase conductors (with the exception of the run from the meter to the first handle) shall have a ground wire installed in the conduit.

A ground wire shall interconnect all ground runs in each circuit. Grounding of the equipment grounding conductors throughout the system shall be by approved ground clamps.

Metal conduit, ground wires, and the service neutral shall be bonded and grounded at the service entrance point as required under the NEC and the City of Seattle Electrical Code.

Where wires pass through a metal conduit expansion joint, a separate wire shall be pulled through to each adjacent handle or pole foundation.

Only one wire shall be installed under any ground clamp.

Ground rods shall be installed in firm undisturbed earth. In fill or in areas with poor soil conditions, expansion shall be added until the rod cannot be removed by hand. Minimum spacing between ground rods shall be 10 feet.
8-30 STREET LIGHTING SYSTEM (New Section)

8-30.3(X) REMOVAL AND SAVAGE OF EXISTING EQUIPMENT (New Section)

Refer to Section 2-02.2(X).

8-30.4 MEASUREMENT (New Section)

Measurement for "Luminaire, High Pressure Sodium, (Qty=)", will be by each.

Measurement for "Bracket A (Length)", will be by each.

Measurement for "Relocate Luminaire", "Relocate Bracket A", and "Relocate Luminaire and Bracket A", will be by each.

Measurement and payment for removed electrical items will be included in sections 2-02.4 and 2-02.5.

Measurement for "Wiring, Street Lighting", will be by lump sum.

8-30.5 PAYMENT (New Section)

Compensation for the cost necessary to complete the work described in Section 8-30 will be made at the unit contract prices and only for the pay items listed or referenced below:

1. "Luminaire, High Pressure Sodium, (Qty=)", each.
2. "Bracket A (Length)", each.
3. "Relocate Luminaire", each.
4. "Relocate Bracket A", each.
5. "Relocate Luminaire and Bracket A", each.

The unit contract price for "Luminaire, High Pressure Sodium, (Qty=)", will include all costs for the work required to furnish and install the luminaire, including the base, hardware, photometic cell and wiring to the fuseholder at the secondary source or at the base of the pole.

The unit contract price for "Bracket A (Length)", will include all costs for the work required to furnish and install the bracket A, including hardware.

The unit contract price for "Relocate Luminaire" will include all costs for the work required to remove the luminaire and reinstall it at the new location, including hardware, and cleaning and relamping relocated luminaires.

The contract lump sum price for "Wiring, Street Lighting", will include all costs for the work required to furnish and install wiring for the street light system as specified from the service point to the luminaire, including taps, splices, tape, fuseholder, excess wire for connections, and any other material for a complete lighting system.

TRAFFIC SIGNAL SYSTEM (New Section)

8-31 TRAFFIC SIGNAL SYSTEM (New Section)

8-31.1 DESCRIPTION (New Section)

The work consists of furnishing and installing a complete traffic control system of controllers, signals, and appurtenances as indicated on the drawings.

8-31.1(1) GENERAL (New Section)

The Contractor shall familiarize himself with the wires and voltages present within the construction area in the application of the requirements herein.

If, for any reason, one or more vehicular or pedestrian signals should go dark or fail to function properly at the moment of the Contractor's work, the Contractor shall immediately call for and be responsible for any required police control of the intersection. The Contractor shall also immediately notify the Engineer and the City Signal Maintenance Office (334-4813) of the nature of the problem. Unless otherwise designated by the Engineer, the Contractor shall immediately undertake the necessary repairs with qualified electrical workers. The Engineer may require the work to be done by City forces. The Contractor shall be responsible for all costs incurred.

8-31.1(2) DEFINITIONS (New Section)

All technical words and phrases used within these Specifications shall be interpreted as defined in the National Electrical Manufacturers Association Publication TH-1963.

8-31.1(3) APPLICABLE CODES (New Section)

All electrical work shall be done by state certified electricians. The work shall be performed in accordance with the applicable provisions of the latest edition of the following codes:

National Electrical Code
State of Washington Electrical Code
State of Washington Electrical Construction Code
City of Seattle Department of Lighting Requirements for Electrical Service Connection

8-31.1(4) SHOP DRAWINGS AND REFERENCE MATERIALS (New Section)

8-31.1(4)(A) SHOP DRAWINGS (New Section)

The Contractor shall submit shop drawings in accordance with Section 3-05.3 for the following:

(a) Controller Assembly (components & cabinets)
(b) Controller Wiring Diagram (Typical for each type)
(c) Control Cabinet Wiring Diagram (Typical for each type)
(d) Control Cabinet Size and Layout (Each type)
(e) Functional description of the controller including program diagram with instructions for program sizing.
(f) Signal Heads and Mounting Assemblies
(g) Cable and Wire
(h) Pole Line Hardware
(i) Interior Illuminated Signs
8-31 TRAFFIC SIGNAL SYSTEM (New Section)

(a) The Contractor shall submit two "as built" wiring diagrams to the Engineer for each signalized intersection prior to requesting the Engineer's approval for turnover or cut-over.

8-31.1(3) REFERENCE MATERIAL (New Section)

At or before delivery of the controller for testing, the Contractor shall deliver 3 complete sets of operation manuals, maintenance manuals, controller assembly wiring and program diagrams, and parts lists installed in a plastic envelope within each cabinet.

The method of programming the controller shall be completely detailed and shall include a description of each step in the program. The conditions under which the programming may be accomplished (i.e., flashing or full operation) shall also be detailed.

A complete description of all software shall be furnished for each module of controller proposed. The description shall include all steps of the various programs as well as all inputs and outputs.

8-31.1(5) CONTROLLER ASSEMBLY TESTING REQUIREMENTS (New Section)

8-31.1(5)(A) GENERAL (New Section)

Controller assemblies all undergo testing by both the manufacturer and the City of Seattle Engineering Department. Certified testing by the manufacturer will not result in immediate acceptance of the equipment by the City or will it indicate the City Specifications have been met and approved.

8-31.1(5)(B) MANUFACTURER'S TEST PROCEDURE (New Section)

The manufacturer shall perform the following testing on system equipment in the prescribed manner and certify that each complete controller assembly has successfully met or exceeded all the requirements set forth herein.

(a) Functional and operational testing of all controller units, system equipment, auxiliary equipment and the complete controller assembly. This shall include but not be limited to the tests covered in the City of Seattle "Functional Test Procedure for Controller Assemblies" (included in the Appendix).

(b) A minimum of 72 hours of burn-in of all controller units, controller assemblies and signal system control equipment including auxiliary equipment.

(c) Each controller assembly type shall be environmentally tested in accordance with NEPA Standards Number T.11 for Traffic Control Systems, Part 2 "Environmental Standards and Test Procedures". The Environmental test shall be made by an independent laboratory.

The Contractor shall submit the manufacturer's certified test results prior to delivery of the controller assembly to the City for functional testing.

If a failure occurs in any step of the testing, the manufacturer shall record the failure and take corrective measures. If a failure occurs in the base controller unit or any other major segment (i.e., controller assembly more than once, that part of the assembly shall be completely replaced by a new unit). Repair shall be made as soon as practicable and testing shall resume to ensure the continuity of the test.

A failure shall be defined as any occurrence which results in other than normal operation of the equipment. A failure is considered to be, but not limited to the following:

8-31 TRAFFIC SIGNAL SYSTEM (New Section)

(a) If the controller unit sequences improperly or exhibits improper interval or phase without proper call through remote switch, time clock or start-up routine.

(b) If indicator lights give false representation.

(c) If any timing is disrupted or deviates more than ± 100 milliseconds from its setting.

(d) If any load switch produces an incorrect signal indication.

(e) If the conflict monitor, after receiving a simulated green-glow and walk-walk conflict for each phase or other sensor module, fails to perform in the prescribed manner.

(f) If any auxiliary equipment does not operate properly.

8-31.1(5)(C) CITY OF SEATTLE FUNCTIONAL TEST PROCEDURE (New Section)

The functional test by the City of Seattle will require at least 3 working days of satisfactory operation.

The Contractor shall deliver the controller assembly to the City of Seattle Engineering Department Traffic Control Shop at 1500 8th Avenue South in Seattle. The City will then initiate a functional test according to the "Functional Test Procedure for Controller Assemblies". The Contractor shall witness the final acceptance test of the controller assembly by the City prior to accepting the cabinet for installation.

A failure shall be defined as any occurrence which results in other than normal operation of the equipment, and shall include but not be limited to the failure items listed under Section 8-31.1(5)(B).

If any part of the controller assembly fails to meet the specifications or operates in other than normal operation, the test shall be discontinued. The Contractor shall then make immediate arrangements to correct or modify the equipment within five days upon written notice from the City. If repairs or replacement cannot be made within 5 days the Contractor shall remove the controller assembly from service and perform the repair work during the period of time the controller assembly will be unavailable for testing. The functional test will again be initiated and all costs incurred for repairing will be borne by the Contractor. In addition, no extension of the contract time will be granted because of the time required to make repairs or replacements.

The Contractor shall pay all shipping and packaging or crating cost incurred by the City in returning equipment which does not meet specifications or is found to be defective.

8-31.1(6) FIELD TESTING (New Section)

The Contractor shall make the following tests on all new electrical circuits. If requested by the Engineer, test equipment shall be certified before and after the tests:

(a) Test for continuity of each circuit.

(b) Test for grounds in each circuit which consists of the physical examination of the installation to ensure that all required grounds, jumpers, devices and apparatus do exist and are mechanically firm, meeting the requirements of Article 250 of the National Electrical Code.

(c) Resistance test to each circuit between the conductor and ground with all switches, panel boards, fuse holders, switches, receptacles and over-current devices in place and all connections included. The across test shall be performed with all lines handled for continuity to controller, conflict monitor, load switches, or other jump connected accessories. The Contractor shall furnish the Engineer with 3 copies of the test results identifying observed malfunctions with their respective circuits prior to any checkout of the installation to be turned on or cut out.

The insulation resistance on all electrical circuits whose nominal voltage is between 115 volts and 600 volts other than direct burial cable shall not be less than 6 megohms between the conductor and ground on these circuits of total single conductor length of more than 2,000 feet, nor less than 0.002 megohms for circuits with single conductor length 2,000 feet or less. For those circuits below 115 volts nominal and all direct burial circuits, the insulation resistance shall not be less than 2 megohms to ground, except not less than 0.002 megohms for line wires.
TRAFFIC SIGNAL SYSTEM (New Section)

8-31.1(4) CHECK-OUT PROCEDURE (New Section)

The Contractor shall call for an intersection check-out after completing the controller cabinet installation along with all other signal equipment complete with wiring connections. The Contractor will notify the Engineer in writing, agreeing to perform this check-out by signing the Field Inspection Form. Any necessary work to complete the installation must be completed prior to the scheduled check-out. The Contractor must notify the Engineer in writing that the intersection is ready to be checked-out. The Engineer will notify the Contractor of the day and time of the check-out. The Contractor will perform the check-out in accordance with the specifications. Any deficiencies detected during the check-out shall be corrected by the Contractor prior to the scheduled check-out. The Engineer will certify the intersection as ready for turn-on.

8-31.1(5) TURN-ON/OFF-OUT PROCEDURE (New Section)

Upon satisfactory check-out of an intersection, the Contractor, after conferring with the Engineer, shall schedule a turn-on for the new signals or a turn-out for the existing signals. A request to "turn-on" new signalized intersections or "cut-out" existing signalized intersections shall be submitted in writing to the Engineer at least 3 working days prior to the proposed date of the new signal turn-on or the existing signal turn-cut. The Contractor shall submit an as-built wiring diagram to the Engineer 7 days prior to the proposed turn-on or turn-out date. The turn-on or turn-out of existing signals shall be performed on a Saturday, Sunday, or holiday, unless the Engineer determines otherwise.

8-31.3(1) INTERSECTION CHECK-OUT AND TURN-ON PROCEDURES (New Section)

The Contractor shall provide uniformed Police control at any time an intersection is dark or inactive, such as during controller changeover, cable installation, signal turn-on or cut-out, or similar circumstances. The Contractor shall have all traffic control devices (i.e., pavement markings, channelization, and signs) in place prior to requesting the Engineer's approval for turn-on or cut-out.

To maintain safe traffic conditions, existing signals shall remain in operation until a simultaneous cut-over to the new signals can be accomplished.

At the time of turn-on of new signals, temporary "SIGNAL AHEAD" signs shall be placed upstream on all approaches. These signs shall remain in place for not less than 7 nor more than 11 calendar days. All signs shall be highly visible and placed in a safe and secure location.

At the time of cut-over of existing signals having phasing which is different from the new signal operation (i.e., added phases, split phases, etc.), temporary "TRAFFIC AHEAD" signs shall be placed in all directions. These signs shall remain in place for not less than 7 nor more than 11 calendar days. At a cut-over of existing signals having phasing which is the same as the new signal operation, no temporary signing is necessary. All signs shall be highly visible and placed in a safe and secure location.

254
After signing the City's functional test report, the Contractor shall pick up the controller cabinet at 1060 6th Avenue South for installation.

8-31.2(C) SIGNAL HEADS, VEHICLE AND PEDESTRIAN (New Section)

8-31.2(C)(1) GENERAL (New Section)

Signal heads shall not be installed at any intersection earlier than 14 calendar days prior to turnover of cut over.

Mounting shall be bracket, mast arm, post top, open wire, or chain, all as indicated on the Drawings. Signals mounted on post top shall utilize standard 6-inch signal heads. Bracket-mounted signal heads shall be installed in line with the pole center line. Mounting surfaces shall be provided with an attachable connection that permits incremental lifting of an individual signal head above or below the horizontal plane of the mounting surface. Signals shall be installed with the mounting axis above the pedestrian crossing.

Attachments such as masts, backplates or adaptors shall be designed to accept the mounting system without affecting the weatherproof and light integrity of the signal.

Electrical service shall be neatly joined to the supporting structure with only sufficient slack for wind effect when open wire mounted.

All new vehicular and pedestrian signal heads shall be covered (boxed) completely with a 6 all black polyethylene sheathing until the new signals are ready to be energized.

Alignment of vehicular and pedestrian signal heads shall be approved by the Engineer prior to final turnover on each signalized location.

8-31.2(C)(2) VEHICLE SIGNAL HEADS (New Section)

The bottom of the vehicular signals mounted on mast arm or post top shall be 16'-1½ feet above street grade. Vehicular signals mounted on brackets or post top shall be 10' 15' 1½ feet above street grade.

The signal shall be standard 1½ inch flanges installed as a single unit, as a multiple section head, or in combination with other signals. The signal receptacle shall be provided with an attachable vertical post fabricated as indicated on the Drawings. Signals shall be installed with the mounting axis above the pedestrian crossing.

Signal heads located over the roadway shall not be in conflict physically or visually with trolley wires, open wire or any other hazards existing or proposed for the location. Signals shall be installed with the mounting axis above the pedestrian crossing.

When beam adjusters are required, the vehicular heads shall be situated in the field such that the brightest flange of the red section. Heads shall be placed as viewed from the direction in which they face.

Optically programmed type traffic signal heads shall be programmed before the traffic signal system present. The Contractor shall make arrangements with the representative to ensure timely completion of the programming.

Vehicle signal heads shall be attached to the mast arm with a signal coupling unit as detailed. Mounting heads shall be in the vertical plane. The top (red) section of all heads on one mast arm shall be positioned to some distance from the center of the mast arm.

Vehicle signal heads shall be attached to the open wire or mast arm by means of a cable clamp. Balance adjuster units shall be mounted and operated as shown on the Drawings. Signals mounted on post top shall utilize standard 6-inch signal heads. Bracket-mounted signal heads shall be installed in line with the pole center line. Mounting surfaces shall be provided with an attachable connection that permits incremental lifting of an individual signal head above or below the horizontal plane of the mounting surface. Signals shall be installed with the mounting axis above the pedestrian crossing.

The top (red) section of all heads shall be level on the same span.
8-31 TRAFFIC SIGNAL SYSTEM (New Section)

As these locations where cuts are made on a slope and for paving, the Contractor shall, when the cut to hold the tan in place while the cut becomes right.

When placing the loop across asphalt or concrete pavement before or course, a 12-inch minimum length of to connect the loop cross section shall be allowed open, and shall be so placed as to have a minimum clear of 4 inches by 2 inches minimum on each side. This mast clear shall be taped with 2 layers of electrical tape to prevent asphalt or concrete from entering the conduit.

Where loop installation conflicts with existing operational loops, the new loops shall be installed to the nearest 12 inches in the exchanger loop so that phase change can be placed in a small radius. Loop wire, from the loop to lead-in splices, shall be covered a minimum of 3 feet per foot. When the loops are conform to the standard, all connections shall be made in the main cover cabinet. Connections for the wiring diagram.

The cable shield and drain wire shall be grounded to the system ground on the controller cabinet only. Each shield between cabinet and splice shall be continuous throughout the complete junction box. A minimum of 4 inches of the shield cable shall be removed from the ends of the lead-in cable.

Each lead-in wire shall have a permanent cloth or plastic tag with the label number shown on the loop detector wiring chart. Tag shall be placed at all accessible points on the system. The shielded loop lead-in cable splice to the loop wire shall be made in the nearest traffic handle lead-in cable in the traffic handle. The splice between the lead-in wire and the lead-in shall be made with a suitable splice, with a maximum number of 8 inches in 3 degrees increments. Each lead-in wire shall be taped with a suitable tape to prevent asphalt or concrete from entering the conduit. Each strand of the shield shall be taped with 2 layers of electrical tape to prevent asphalt or concrete from entering the conduit.

The loop magnetic polarities may be used to determine the loop wire polarity if the loop switching polarity is not marked during installation. The Contractor shall be responsible for damage to the loop wire due to overheating during the loop magnetic polarity test.

8-31.5A INDUCTION TESTING AT THE HANDHELD (New Section)

Before splicing the loop wire to the loop lead-in cable, an Induction test shall be performed by the Contractor to ensure the induction is within the acceptable range. If the Induction does not fail in the acceptable range, then the Contractor shall make corrective measures as necessary until the desired readings are obtained. Induction readings shall be recorded on the As-Built Plans showing the readings for each loop.

8-31.5B LOOP CONTINUITY TESTING (New Section)

The completed loop and lead-in configuration after splicing shall be checked for continuity, using a suitable tester that will not exceed the voltage rating of the lead-in and loop wire rating.

The Contractor shall also perform a continuity test on the loop and lead-in configuration to determine that the resistance is within 10% of specified. If resistance is greater than specified, it shall be checked for the correct continuity by using the loop continuity testing equipment. If the resistance is greater than specified, the Contractor shall make corrective measures as necessary. After the test is completed, the Contractor shall perform the resistance and continuity tests again. If the continuity and resistance tests do not meet the previous requirements, the Contractor shall make corrective measures as necessary until the desired readings are obtained.

8-31.5C INHIBITION TESTING AT THE CONTROL CABINET (New Section)

After all splice connections and the continuity test is complete, the Engineer shall test the inhibition of the loop and loop lead-in cable at the controller cabinet to isolate the inductive in the inhibited loop. Inhibited loops shall be inhibited if the current in the loop is not in the acceptable range of plus or minus 10% of the calculated Induction. If the Induction does not fall in the acceptable range, then the Contractor shall make corrective measures as necessary until the desired readings are obtained. Inhibition readings shall be recorded on the As-Built Plans showing the reading for the total loop plus lead-in.

8-31.5D INTERSECTION ILLUMINATED SIGN (New Section)

Interior illuminated signs shall be covered (aoched) completely with a 6 mil opaque polyethylene sheeting until the sign is ready to be energized and the Engineer authorizes the Contractor to remove the sheeting.

The signs shall be mounted as indicated on the standard plans. The sign shall be mounted with temporary tools and capable of being attached without tools. The bottom of the sign at the lowest point on the span shall be a minimum of 10'-1/2 feet and a maximum of 16'-1/2 feet above the roadway. If the distance does not fall in the acceptable range, then the Contractor shall make corrective measures as necessary until the desired readings are obtained. Inhibition readings shall be recorded on the As-Built Plans showing the reading for the total loop plus lead-in.

8-31.5E INTERSECTION ILLUMINATED CROSSBAR SIGN (New Section)

The Contractor shall call for an intersection check-out after completing the control unit cabinet installation along with all other equipment and wiring connections. The Contractor shall be present and make a check-out, by energizing each field circuit and noting as necessary to verify the completion of the installation. If the crossbar sign unit is found to be incomplete or defective, the Contractor will be notified of the deficiency. The Contractor shall have all traffic controls (i.e., pavement markings, channelization and signing) in place prior to the Engineer approving the crossbar sign for turnover.

The crossbar sign unit shall be provided with an adjustable connection that permits incremental tilting of 20 degrees above or below the horizontal plane maintaining a constant vertical plane when complete and mounted. Terminal connection shall permit external adjustment about the mounting axis in 5 degrees increments.

The crossbar sign unit shall be attached to the span wire by means of 2 cable clamps, balance adjusters and securing the fittings as indicated on standard plans. The sign is the span wire before loading shall not exceed 5% or be less than 3'-1/2 percent of the total span. Span wires shall be designed to provide such that The Crossbar Sign shall be mounted at the lowest point on the span shall be a minimum of 16'-1/2 feet and a maximum of 18'-1/2 feet above the roadway. If the distance does not fall in the acceptable range, then the Contractor shall make corrective measures as necessary until the desired readings are obtained. Induction readings shall be recorded on the As-Built Plans showing the reading for each loop.
8-31(X)(2) INTERCONNECT CABLE (New Section)

Aerial interconnect cable runs shall be installed 24'-12" feet above street grade on the street side of the pole.

The contractor shall select the size and type of cable to ensure adequate size to prevent air or moisture on the line side of the street to prevent air or moisture on the line side of the

All cable pulled through service entrances or underground ducts shall be lubricated with an approved cable pulling compound.

The contractor shall use grip or "befor-pull" to grip the jacketed messenger when pulling and installing. Pulling and installing shall be done in such a manner as to not damage the jacket. When the jacketed messenger is finished by the local ensemble assembly for dead-ends or splices the web shall be split in the middle.

At points and near the messenger strands shall be head-ended by either automatic stringing or standard head-ended by stringing or feed-throughs. The length of each strand shall be determined by the length of the run and the center of the messenger so that the end of the messenger coming through the check of the messenger strands can be worked between the messenger strands and lifted together to form a continuous run. A handle grip clamp shall be used to hold the strands together.

Interconnect cable shall not be spliced. Interconnect cable shall be run continuously through the terminal strips of controllers and aerial terminal compartments.
TRAFFIC SIGNAL SYSTEM (New Section)

Each individual splice or termination of extra leads shall be insulated, taped and made waterproof. High strength bronze alloy split bolt fittings shall be used for splicing.

Loop wire shall not be spliced, except for splicing with the loop lead-to-wire within the adjacent horizontal or vertical terminal compartment.

Service cable or motor cable shall not be spliced except as indicated on the drawings.

3-31.030 TERMINATIONS (New Section)

Except at a splice, conductors shall be terminated on a terminal strip at the signal equipment which it is servicing. Only terminal strips with screw-type pressure bindings ports shall be used. Stripped screw-type pressure fittings at the terminal strip. Solid conductors shall attach directly to the screw post.

All terminals shall be marked with field wiring numbers printed on back or front mounted marking strips.

Connection of service wires to city light wires will be by City Light.

All conductors at every termination and all terminal strips shall be permanently tagged with an identifying circuit number conforming to the signal wiring diagram. Wire markers shall be self-adhesive vinyl discs or paper strips printed with the circuit numbers. Wire markers shall be applied within 6 inches of the terminations.

3-31.040 TERMINATION OF PEER MOTION CABLE (New Section)

The cable shield shall be grounded to the system ground at the controller and only. The cable shield between cabinets and splice shall be continuous throughout intermediate junction boxes and be insulated to prevent grounding in any junction box or line circuit.

3-31.050 ELECTRICAL SERVICE CONNECTIONS (New Section)

The Contractor shall furnish and install equipment and wiring for 2 parallel 120 volt, 60 Hz AC electrical services. The electrical service cable shall be installed as indicated on the drawings.

All electrical conductors within service enclosures shall be copper, except that conductors inside service enclosures shall be aluminum in serving exclusively in a distribution system which is totally aluminum. Electrical conductors as used herein are inclusive of bare wire, single conductor cables, conductors terminal lugs, grounding boxes, etc. Those services which supply both aluminum and copper distribution conductors and other circuits shall employ copper boxes, lugs, terminal, ground bars, etc.

The service neutral shall be connected to the ground in the controller cabinet. The service ground and neutral shall be kept isolated from the logic ground circuit in the controller cabinet.

The EEPBAR shall be mounted when the Contractor is ready for the electrical service connection. The electrical service connection to the overhead secondary or underground vault service wires will be made by City Light.

3-31.060 GROUNDING AND BONDING (New Section)

All metallic appurtenances containing electrical conductors, including cabinets, metallic conduit, metal poles, pedestals, and junction boxes, shall be made electrically and electrically secure to form a continuous system which shall be effectively grounded. Where metallic conduit systems are employed, the conduit may serve as the equipment grounding conductor.

Where metallic conduit systems are employed, all metallic appurtenances shall be electrically bonded as required by Article 250-95 of the NEC.

The metallic grounding conductor shall be in all cases sized consistent with Table 250-95 of the NEC. All proportional adjustments in grounding conductor capacities shall be considered as accomplished by the installation of a ground rod near each pole or pedestal further to the service ground nut. An "overriding" of equipment grounding conductors will be required. However, a ground rod at the junction box nearest the pole or pedestal shall not be required if metallic conduit systems are employed.
TRAFFIC SIGNAL SYSTEM (See Section)

Measurement for "Pedestrian Button Assembly" will be by each.
Measurement for "Detector Loop (Slam)" will be by each complete installation.
Measurement for "Sign, Interior Illuminated (Slam)" will be by each.
Measurement for "Sign Grosswinkel, Illuminated" will be by each.
Measurement for "Interconnect Cable, (Type)" will be by linear foot.
Measurement for "Aerial Terminal Compartment" will be by each.
Measurement for "Signal Wiring, (Location)" will be by lump sum for each intersection.
Measurement for "Open Wire" will be by linear foot.
Measurement for "Open Wire, Exterior" will be by linear foot of span.
Measurement for "Reelocate (Item)" will be by each, linear foot or lump sum as directed for the particular item on the Bid Form.

8-31.5 PAYMENT (New Section)

Compensation for the cost necessary to complete the work described in Section 8-31 will be at the unit contract prices bid only for the pay items listed or referenced below:
(1) "Traffic Signal Controller, (Description)," each.
(2) "Signal Head, (Type) (Description)," each.
(3) "Pedestrian Button Assembly, (Type)," each.
(4) "Detector Loop, (Slam)," each.
(5) "Sign, Interior Illuminated (Slam)," each.
(6) "Sign, Grosswinkel, Illuminated," each.
(7) "Interconnect Cable, (Type)," per linear foot.
(8) "Aerial Terminal Compartment," each.
(9) "Signal Wiring, (Location)," lump sum.
(10) "Open Wire," per linear foot.
(11) "Open Wire, Exterior," per linear foot.
(12) "Reelocate (Item)," each.
(13) "Reelocate (Item)," linear foot.
(14) "Reelocate (Item)," lump sum.

The unit contract price for "Traffic Signal Controller (Description)" shall include all costs for the work required to furnish and install the Controller, including but not limited to cabinets, all circuiting, equipment and internal wiring, manufacturer's testing and the pedestal for Type I cabinets.
The unit contract price for "Signal Head, (Type) (Description)" shall include all costs for the work required to furnish and install the Signal Head, including all mounting hardware for the mounting specified, installation, alignment, testing; and when specified, handrail, fiber optic arms, lens, installation of city-furnished interior illuminated traffic sign, bollards, and programming as may be required.
The unit contract price for "Pedestrian Button Assembly" shall include all costs for the work required to furnish and install the Pedestrian Push Button Assembly, including the button and housing, 1 or 2 directional signs as specified, and required mounting hardware. Pedestrian push button pads and foundations will be paid per Section 8-32.5.
TRAFFIC SIGNAL SYSTEM (New Section)

Measurement for "Pedestrian Push Button Assembly" will be by each.
Measurement for "Detector Loop" (Size)" will be by each complete installation.
Measurement for "Signs, Interior Illuminated (Size)" will be by each.
Measurement for "Signs, Grooved, Illuminated" will be by each.
Measurement for "Interconnect Cable, (Type)" will be by linear foot.
Measurement for "Aerial Terminal Equipment" will be by each.
Measurement for "Signal Wiring, (Location)" will be by lump sum for each intersection.
Measurement for "Span Wire" will be by the linear foot.
Measurement for "Span Wire, Category," will be by linear foot or lump sum as directed for the particular line on the Bid Form.

9-31.5 REMOTE (New Section)

Compensation for the cost necessary to complete the work described in Section 9-31 will be at the unit contract prices bid only for the pay items listed or referenced below:

(1) "Traffic Signal Controller, (Description)," each.
(2) "Signal Head, (Type) Description)," each.
(3) "Pedestrian Push Button Assembly," each.
(4) "Detector Loop, (Size)," each.
(5) "Signs, Interior Illuminated (Size)," each.
(6) "Signs, Grooved, Illuminated," each.
(7) "Interconnect Cable, (Type)," per linear foot.
(8) "Aerial Terminal Equipment," each.
(9) "Signal Wiring, (Location)," lump sum.
(10) "Span Wire, per linear foot.
(11) "Span Wire, Category," per linear foot.
(12) "Relocate (Item)," each.
(13) "Relocate (Item)," linear foot.
(14) "Relocate (Item)," lump sum.

The unit contract price for "Traffic Signal Controller (Description)" shall include all costs for the work required to furnish and install the controller, including but not limited to cabinets, all circuiting, equipment, and internal wiring, manufacturer's testing, and the pedestal for Type I cabinets.

The unit contract price for "Signal Head, (Type) Description)" shall include all costs for the work required to furnish and install the signal head, including all mounting hardware for the mounting specified, installation, alignment, testing, and when specified, biodegradable fiber optic arrow lanes, installation of City-furnished interior illuminated traffic signs, lenses, and programming as may be required.

The unit contract price for "Pedestrian Push Button Assembly" shall include all costs for the work required to furnish and install the pedestrian push button assembly, including the button and housing, 1 or 2 directional signs as specified, and required mounting hardware. Pedestrian push button posts and foundations will be paid per Section 9-35.3.
S-32

POLES, PEDESTALS, AND FOUNDATIONS (New Section)

SECTION S-32 - POLES, PEDESTALS AND FOUNDATIONS (New Section)

S-32.1 DESCRIPTION (New Section)

The work consists of furnishing and installing poles, pedestal extensions, pedestals, posts, master key, concrete foundations and back guy assemblies as indicated on the Drawings and specified herein.

S-32.1.1 APPLICABLE CODES (New Section)

See Section S-30.1.2(2) for applicable codes.

S-32.1.2 SHOP DRAWINGS (New Section)

The Contractor shall submit shop drawings in accordance with Section 1-05.3 for the following material:

(a) All metal poles
(b) Ornamental net covers
(c) Nest dome
(d) Luminaire extensions
(e) Anchor bolts, nuts, washers
(f) Bolt extenders
(g) Pedestals

All strain poles or street light only poles which deviate from the Drawings shall include certification by a licensed Professional Engineer that the metal poles meet all structural requirements of Section 9-31.

S-32.1.3 GUARANTEE (New Section)

All labor, materials, and equipment supplied under this specification shall be guaranteed against defective workmanship and material for a period as indicated in Section 1-05.10. The Contractor shall be responsible for the return and replacement cost of any material or equipment found to be defective within the guarantee period, including labor, freight, and handling costs. All material returned to the supplier under the guarantee shall be repaired or replaced and returned to the City of Seattle within 10 days of receipt.

S-32.2 MATERIALS (New Section)

Materials shall meet the requirements of the following Sections of these specifications:

Concrete for foundation

- 5-06

Poles, Pedestals, and Foundations

- 9-33

Back Guy Assemblies

- 9-33

All poles will be subject to inspection at the point of manufacture and at the point of delivery. Inspection and acceptance at the point of manufacture shall not relieve the Contractor from obligation to furnish material in accordance with the Specifications.

S-32.3 CONSTRUCTION REQUIREMENTS (New Section)

S-32.3.1 POLES (New Section)

The Contractor shall lay out pole locations and grades as indicated on the Drawings. Poles shall be located to provide a minimum of 3 feet clearance from the face of the curbs.

Poles shall be handled in loading, unloading and erecting in such a manner that they will not be damaged.

Field results of galvanized surfaces shall be accomplished by coating with a heated zinc alloy solder to a minimum thickness of 2 mils per ASTM A 789.

The Contractor shall select or replace all precast poles at his own expense. Any parts of metal poles that are damaged due to Contractor's operations shall be repaired or replaced at his own expense.

Poles shall not be erected before concrete foundations have set 7 days. Poles shall not be loaded before concrete foundations have set 20 days.

Signal related poles shall not be erected until the turnouts or crossovers are completed.

Leveled nuts shall be used on all metal poles. Leveling nuts and washers shall be placed on anchor bolts to allow approximately 1 inch of dry pack mortar under the leveling nut. Poles shall be placed on the balls and the leveling nuts and washers. The leveling and locking nuts and washers shall then be adjusted to plumb the pole.

The pole shall be raised before loading such that it will be plumb after all loads have been applied. Floating shall be defined as the condition existing when an imaginary vertical line from the center line of the pole top passes through the center line of the pole base at ground level. A tolerance of plus or minus 0.17 inches per foot of pole height above the ground will be permitted with the exception that in no case shall the pole lean toward the street. Leveling nuts shall be torqued to the manufacturer's recommendations.

After pole anchor bolts and nuts have been inspected and approved by the Engineer with a load applied, each shall be filled around the perimeter of the anchor bolts and leveling nuts, then dry pack mortar shall be placed under the pole to completely fill the void under the base outside the anchor bolts by packing the bolts and finishing towards the outside. Dry pack mortar shall be placed approximately 60 degrees away from the base plate. Nutter shall consist of a 1/4 inch square of coarse and fine mesh with just enough mortar so that the mixture will stick together and be sealed into a ball by the hand and will not settle free moisture when set. There shall be a 1/4 inch drain tube in the center on the lower side of the base to provide drainage from within the pole or pedestal.

Installation of pedestals shall meet the same requirements for installing pole, except raising will not be required.

All metal lighting poles shall be numbered for identification in accordance with numbering set forth on the Drawings by utilizing 3-inch Series "C" numbers. The light pole number shall be 3 feet above the concrete base, oriented 45 degrees from the plane of the back guy arms in the direction of approaching traffic. All numbers shall be clearly visible to approaching ectomorphs. Paint for the numbering shall be black, high gloss enamel meeting Federal Specification TT-C-499. Numbers shall be applied over a compatible primer. An alternative application of a nonreflective lettering film with a pressure sensitive, self-adhesive backing may be used when approved by the Engineer.

S-32.3.1.1 WOOD POLES (New Section)

Wood poles shall be set at the depth indicated in the following table:
8-32 RECOMMENDED POLE SETTING DEPTH

<table>
<thead>
<tr>
<th>Length of Pole (Feet)</th>
<th>Minimum Set Depth in Earth (Feet)</th>
<th>Set Depth in Back (Feet)</th>
</tr>
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<tbody>
<tr>
<td>20</td>
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<tr>
<td>25</td>
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<td>3.7</td>
</tr>
<tr>
<td>30</td>
<td>4.0</td>
<td>3.9</td>
</tr>
<tr>
<td>35</td>
<td>5.0</td>
<td>4.0</td>
</tr>
<tr>
<td>40</td>
<td>6.0</td>
<td>4.1</td>
</tr>
</tbody>
</table>

After each steel pole is set in the ground to the specified depth, the space around the pole shall be backfilled with selected earth or washed gravel and other deleterious material, placed in layers approximately 6 inches thick. The earth or gravel shall be compactly compacted. The poles shall be raised as necessary to be plumbed as defined in Section 8-32.4.10 after backfilling.

8-32.3(2) FOUNDATIONS (New Section)

F-323.2(2)A GENERAL (New Section)

Foundations shall be cast 5 (1 1/2") concrete and be of the size and configuration indicated on the Blueprint. Foundations shall be constructed in channels, cast in place concrete in square-based holes or rectangular holes. Concrete shall be placed against the pole and shall be compacted with a tamper or grout, metal forms may be used for the top 8 inches of foundation. Each foundation shall be poured in one continuous pouring operation. For purposes of this requirement, delays of more than 30 minutes are unacceptable as one continuous pour.

Anchor bolts shall be set securely in place and held to a vertical position with the specified bolt protrusion and at the specified bolt circle to match the exact hole pattern of the base to be installed. The top of the bolts shall be at the same elevation. A steel template shall be used at the base, and a wood or steel template shall be used at the upper end of the anchor bolt to maintain the hole pattern. The template shall be held or pushed to the anchor bolt and left in the foundation. Anchor bolts shall not be used or cut after fabrication. Nailing of anchor bolts shall be for rejection and removal of entire foundation.

Prior to placing concrete, all projecting anchor bolts shall be taped with a corrosion protection tape from a point 6 inches below the top of the foundation to the top of the bolt. Tape shall be per Material Standard 500.1(5) and shall be personal to place. Base and finish shall be installed over the tape. Immediately after concrete is placed, the location of the anchor bolts shall be checked with a template conforming to the bolt pattern of the bases of the poles. Concrete shall be checked for levelness and alignment. The concrete is placed. Concrete shall be float finished, edged and brushed where necessary. Nailing of anchor bolts after concrete has set will not be allowed.

8-32.3(2)B CONCRETE FOUNDATIONS (New Section)

Anchor bolts shall be the size specified by the controller manufacturer. A head of waterproof cement shall be installed under the lip of the controller cabinet prior to installing the cabinet to prevent moisture penetration.

Top of the controller foundation shall be level with 6-inch minimum below the adjacent surface.

A 3/4-inch diameter tubular drain hole shall be installed in all concrete foundations for signal controllers Type II and III.

8-32.3(2)C POL, PERIODICAL AND PERMANENT PUSH-BUTTON POST FOUNDATIONS (New Section)

Reinforcing steel shall be kept 2 inches clear on all sides of the foundation, and shall be set securely in place.

Where the foundation is to a proud area such as a sidewalk, the foundation shall be held 3-1/2 inches below and parallel to finish the grade. Top of the foundation shall be given a finish finish. The placement of material shall then be placed over the top of the foundation to match the contour and finish of the adjacent surface.

8-32.3(2)D GEOGRASS ASSEMBLIES (New Section)

Back guys assemblies for wood poles shall be constructed in accordance with details on the Standard Plans.

All thru bolts shall be properly trimmed and treated.

8-32.3(4) RETRACTING EQUIPMENT (New Section)

When equipment is to be retracted, the Contractor shall furnish and install all necessary materials and equipment (including all hardware) required to complete the complete installation. Any new hardware required to install the installation shall be of the same quality and type as hardware required in these specifications for other work.

8-32.4 MEASUREMENT (New Section)

Measurement for poles, insulator crossarms, mast arms, pedestals, posts, foundations, back guy assemblies, or a combination of any of these items will be by each of the type and size specified in the Bid Plans, or as applicable. Guide poles and the attached guide arms will be measured per each as a combined unit.

8-32.5 PAYMENT (New Section)

Compensation for the cost necessary to complete the work described in Section 8-32 will be made at the unit contract prices bids only for the pay item listed or referenced below:

1. "Pole, Steel Strut (Type)", each.
2. "Pole, Steel Strand (Type) w/Length (Ams)", each.
3. "Pole, Steel Lighting (Length)", each.
4. "Pole, (No.12) Lighting (Length) w/Length (Ams)" each.
5. "Pole, Aluminized, (Length)" each.
7. "Insulator Retainer, each.
8. "Wood Arm (Sims), each.
9. "Pedestal, Steel, (Length)", each.
11. "Foundation, (Each)", each.
12. "Back Guy Assembly", each.

249
(13) "Relocate (item)," each.

The unit contract price for "Pole, Steel (Type)", and "Pole, Aluminum (Length)" shall include all costs for the work required to furnish and install the pole, including headache, bracket arm flanges and bolts, base plate, all necessary hardware, raising, plumbing, and grounding.

The unit contract price for "Pole, Steel, Strain Davit (Type) with (Length) Arm" and "Pole, (Material) Lighting Davit (Length) with (Length) Arm" shall include all costs for the work required to furnish and install the pole, the extension arm, including headache, steel pole extension tense, steel pole laminate cap, welding, base plate, all necessary hardware, raising, plumbing, and grounding.

The unit contract price for "Pole, Steel (Length)" shall include all costs for the work required to furnish and install the wood pole, including excavation, backfill material, and inspection.

The unit contract price for "Base Arm, (Length)" shall include all costs for the work required to furnish and install the most arm with all necessary hardware, fittings and end cap.

The unit contract price for "Pedestal, Steel (Length)" shall include all costs for the work required to furnish and install the Pedestal, and shall include installation, plumbing, raising and all hardware as detailed on the drawings.

The unit contract price for "Pedestrian Push-Button Box," shall include all costs for the work required to furnish and install the box, including all drilling and tapping, plumbing, steel pipe, pipe cap, "Water collar", gasket, pipe flanges, and all required hardware.

The unit contract price for "Foundation, Traffic Signal Controller (Type)," and "Foundation, (Item)," shall include all costs for the work required to construct the foundation in place as specified and detailed on the Plans, including excavation, backfill, forming, concrete, reinforcing steel, anchor bolts, ground rods, anchors, nuts, rebar, rebar covers, gaskets and drainage hardware as specified.

The unit contract price for "Back Guy Assembly," shall include all costs for the work required to furnish and install the Back Guy Assembly, and shall include installation of all guy cable, hardware, insulators, pipe, fittings, and anchor as detailed on the Standard Plans.

The unit contract price for "Relocate (item)" shall include all costs for the work required to remove and reinstall the item, including hardware and rehabilitation as required.

When installation of a new pole, pedestal, or post disturbs existing surface improvements that will remain, the cost of surface restoration will be included in the unit contract price of the pole, pedestal, or post as applicable. No separate payment will be made.

Payment for the work to be performed shall be full compensation for all labor, materials, equipment and incidentals necessary to complete the work as specified or shown on the drawings.
CONDUIT AND TRENCHING (New Section)

8-33

conformity by waterproof sealing or other means approved by the Engineer. When otherwise suitable native backfill is not available due to the presence of any material that would not be acceptable to the Engineer, concrete shall be furnished. In general, backfill material from excavation shall be free from large or frozen lumps, wood or other extraneous material and of a quality acceptable to the Engineer.

If the trench is not backfilled the same day conduit is placed, one end of the conduit shall be left open until backfilling is started, or a rigid or non-metallic expansion joint shall be installed in the conduit run.

At the end of each day's work and all other times when construction operations are suspended, all equipment and other obstructions shall be removed from that portion of the roadway which may be required to be open for use by public traffic.

Special care shall be taken in backfilling trenched sections used for conduit installations under existing highways, so that all voids are completely filled. Where concrete or cast iron pipe is used, the concrete shall be properly mixed with a minimum of 26 inches of cover at street crossings, 26 inches cover under asphalt roads, 40 inches of cover under the bottom of railroad tracks (conduit under railroad tracks shall be rigid steel), and 18 inches of cover at all other locations, unless otherwise noted on the drawings.

Trench backfilling shall be completed in 95 percent of natural density in accordance with Sections 7-10.3.11 (COMPRESSION OF BACKFILL), 7-10.3.12 (COMPRESSION OF BACKFILL), and 7-10.3.13 (COMPRESSION OF BACKFILL).

8-33.3.2A GENERAL (New Section)

Conduit shall be installed in the ranker, type, size and location indicated on the drawings. Deviations from the locations indicated or specifications may be required by field conditions shall be approved in writing by the Engineer prior to installation.

For conduit runs that deviate from the planned location and are to be buried to concrete structures such as floor slabs, topping walls, columns, etc., the Contractor shall be required to submit an "as-built" plan showing the new location of all the conduits. Conduit shall be repositioned prior to the pouring the concrete. The as-built plan shall show the conduit run as reinstalled and be submitted to the Engineer.

Conduit runs parallel to curbs shall be placed adjacent to back of curb, or according to the details on the drawings. The location of the boxes shall be in accordance to the Project Manual, except where in conflict with existing facilities.

Changes of conduit direction shall be made with manufactured or fabricated elbows of radius not less than 1/2 of the conduit diameter.

Installation of the PVC-coated system shall be made in conformance with the following:

(a) Coupling and Jointing: All connections shall be made with a coupling and jointing; the conduit shall be thoroughly cleaned and a proper size coupling pulled through it prior to installing clave, or couplings shall be cleaned in the presence of the Engineer. Existing conduit to be incorporated into a new system shall be cleaned with a vacuum and a cylindrical wire brush and blown out with compressed air.

(b) Grounding: Grounding shall be made with a ground wire or ground rod. Grounding shall be done in accordance with the requirements of the Engineer.

(c) Testing and Jointing: All connections shall be made with a coupling and jointing. The conduit shall be thoroughly cleaned and a proper size coupling pulled through it prior to installing clave, or couplings shall be cleaned in the presence of the Engineer. Existing conduit to be incorporated into a new system shall be cleaned with a vacuum and a cylindrical wire brush and blown out with compressed air.

(d) Stripping of Insulating Material: When using a head threader, a tool with an adjustable guide shall be used. The conduit shall be thoroughly cleaned and a proper size coupling pulled through it prior to installing clave, or couplings shall be cleaned in the presence of the Engineer. Existing conduit to be incorporated into a new system shall be cleaned with a vacuum and a cylindrical wire brush and blown out with compressed air.

(e) Threading: When using a head threader, a tool with an adjustable guide shall be used. The conduit shall be thoroughly cleaned and a proper size coupling pulled through it prior to installing clave, or couplings shall be cleaned in the presence of the Engineer. Existing conduit to be incorporated into a new system shall be cleaned with a vacuum and a cylindrical wire brush and blown out with compressed air.

(f) Threading: When using a head threader, a tool with an adjustable guide shall be used. The conduit shall be thoroughly cleaned and a proper size coupling pulled through it prior to installing clave, or couplings shall be cleaned in the presence of the Engineer. Existing conduit to be incorporated into a new system shall be cleaned with a vacuum and a cylindrical wire brush and blown out with compressed air.
8-33 CONDUIT AND TRENCHING (New Section)

8-33.233b JACKETING OR BOXING (New Section)
Rigid steel conduit may be boxed or boxed when approved by the Engineer. Rigid non-metallic type
conduit may be installed under existing pavement if a hole larger than the conduit is presawn and
the conduit installed by hand.

8-33.4 MEASUREMENT (New Section)
Measurement for "Conduit, (Type), (Slm)" will be by linear foot. Measurement for "Trenching, Conduit, (Type), (Slm)" will be by linear foot.

8-33.5 PAYMENT (New Section)
Payment for the cost necessary to complete the work described in Section 8-33 will be made at the
unit contract prices bid only for the per linear foot listed or referenced below:

<table>
<thead>
<tr>
<th>Type</th>
<th>Payment (Per Linear Foot)</th>
</tr>
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<tbody>
<tr>
<td>Conduit</td>
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</tr>
<tr>
<td>Trenching</td>
<td>1.00</td>
</tr>
<tr>
<td>Conduit Riser</td>
<td>1.00</td>
</tr>
<tr>
<td>Handhole</td>
<td>1.00</td>
</tr>
</tbody>
</table>

8-33.6 HANDHOLES (New Section)
Handholes shall be precast concrete, and reinforced as indicated on Standard Plans 500. Handholes
shall have covers with a side-lock device. Covers shall be 3/4 inch thick steel having a 3-way
raised pattern, and shall be hot-dip galvanized in accordance with AWS A53. Covers shall be
identified on 1 inch high letters "NH" clearly visible on the top nearest traffic control cabinets
on the handhole or "HC" when the handhole is used by street lighting only. The marking shall be
accompanied by welding or shall be cast onto the cover.

<table>
<thead>
<tr>
<th>Type</th>
<th>Length</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>HC</td>
<td>24</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

8-33.(X14) HANDHOLES (New Section)
Handholes shall be precast concrete, and reinforced as indicated on Standard Plans 500. Handholes
shall have covers with a side-lock device. Covers shall be 3/4 inch thick steel having a 3-way
raised pattern, and shall be hot-dip galvanized in accordance with AWS A53. Covers shall be
identified on 1 inch high letters "NH" clearly visible on the top nearest traffic control cabinets
on the handhole or "HC" when the handhole is used by street lighting only. The marking shall be
accompanied by welding or shall be cast onto the cover.

<table>
<thead>
<tr>
<th>Type</th>
<th>Length</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>HC</td>
<td>24</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Type 4 handholes shall use a Type 230 frame and cover in accordance with Section 9-05.15 except that
the word "NH" shall be cast on the cover in lieu of "NHHC" when required by the Engineer. If Handholes
are located on the right-of-way, unless otherwise required, shall always be located outside the pavement
and any other work unless otherwise directed by the Engineer.

254
SECTION 9-00 DEFINITIONS AND TESTS

9-00.7 GALVANIZED HOOKS, ASTM DESIGNATION A153

The first sentence of the first paragraph of this section is revised to read:

An acceptable alternate to hot dip galvanizing in accordance with ASTM A153 will be zinc coatings mechanically deposited in accordance with ASTM B690, provided (1) the minimum thickness of zinc coating is not less than that specified in ASTM A153, and (2) the process will not produce hydrogen embrittlement in the base metal.

SECTION 9-01 PORTLAND CEMENT

9-01.2 SPECIFICATIONS

Change all references to "NAP" and "K2O" in Section 9-01.2 and its subsections to read "Na2O" and "K2O", respectively.

9-01.2(3) LOW-MILK

Delete this section and replace with the following:

The percentage of alkalies in low-milk cement shall not exceed 0.60 percent by weight calculated as Na2O plus 0.56 K2O. This limitation shall apply to all types of portland cement. Percentage of alkalies shall be determined in accordance with ASTM Designation C151.

SECTION 9-02 RHEUMINOUS MATERIALS

9-02.1(3) RAPID CURE (RC) LIQUID ASPHALT

Section 9-02.1(3) is revised as follows:

Under the column labeled "No. 800", the volume percent of total distillate to 437°F is revised to 25.

Under the column labeled "No. 600", the volume percent of total distillate to 437°F is revised to 15.

9-02.1(5) RECYCLING (RECYCLED) AGENTS (New Section)

The rejuvenating agent shall be a liquid obtained from selected used petroleum distillates approved for use by the Seattle Materials Testing Laboratory. Rejuvenating agents shall meet the following specifications for the grade designated:

**HOT MIX RECYCLING AGENT**

<table>
<thead>
<tr>
<th>Test</th>
<th>T65</th>
<th>RA 5</th>
<th>RA 25</th>
<th>RA 75</th>
<th>RA 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity at 140°F (cSt)</td>
<td>220</td>
<td>10</td>
<td>30</td>
<td>150</td>
<td>300</td>
</tr>
<tr>
<td>Flashpoint</td>
<td>200</td>
<td>400</td>
<td>600</td>
<td>800</td>
<td>1000</td>
</tr>
<tr>
<td>Separates, %</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Residue from</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EPC Oven test at</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>325°F</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Viscosity Ratio</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EPC Oven Test</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Weight Change ± 1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DIN or Report</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

1 The final acceptance of rejuvenating agents meeting this specification is subject to the compliance of the mix evaluated asphalt blends with the requirements in Section 27 for the class of asphalt mix required.

2 The use of ASTM D674 has not been studied in the context of this specification; however, it may be applicable. In cases of dispute, the reference method shall be ASTM D674.

3 Viscosity Ratio = EPC Viscosity at 140°F, cSt. ORIG VISCOITY AT 140°F, cSt.

9-02.4 ANTI-STRIPPING ADDITIVES

Delete this section and replace with the following:

When directed by the Engineer, asphalt material shall be treated with an approved heat-stable anti-stripping additive. The anti-stripping additive shall be added to the asphalt at the point of shipment and shall be at the percentage designated by the Engineer, not to exceed 1 percent by weight of the asphalt. The anti-stripping additive shall be approved by the Materials Laboratory prior to use. Once designated for use on a specific project, the brand, grade or percentage of anti-stripping additive shall not be changed without the prior approval of the Engineer.
9-02.3 ASPHALT EMULSION (New Section)
The asphalt emulsion shall be either quick setting type (CQP-h) or latex modified asphalt quick setting type (CQP-l-late).

The emulsion shall be in accordance with the following requirements:

Test on Emulsions:
- CQP-h
- CQP-l-late

<table>
<thead>
<tr>
<th>Property</th>
<th>CQP-h</th>
<th>CQP-l-late</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paste Viscosity at 77°F (Sec)</td>
<td>20-90</td>
<td>20-100</td>
</tr>
<tr>
<td>Residues by distillation</td>
<td>72%  min.</td>
<td>90% min.</td>
</tr>
<tr>
<td>Residue, reported on No. 20</td>
<td>0.2% max.</td>
<td>0.1% max.</td>
</tr>
<tr>
<td>Penetration at 5 days</td>
<td>55</td>
<td>67</td>
</tr>
<tr>
<td>Particle Charge</td>
<td>Positive</td>
<td>Positive</td>
</tr>
</tbody>
</table>

Test on residue:
- Penetration at 77°F, 3 sec. | 40-110 | 40-90     |
- Solubility in 3% NaOH solution | 975 min. | 990 min.  |
- Brittleness at 77°F | 40 min. | 44 min.   |

Emulsion shall pass all AASHTO specifications for CQP-h or CQP-l-late and the USGA, H 103 and 116 specifications for "Shrinkage" and "Void in Coalesced Asphalt Shrink Seal Systems." USGA 92 116 "New Shrinkage Test for Finely Divided Asphalt Mixes" shall also be applied to determine coating and compatibility with a given aggregate.

9-02.3A LATEX MODIFIED EMULSION (New Section)

In addition to the properties for CQP-h-late above, the latex modified emulsion shall have added to it a bifunctional binder. The binder shall be vinyl-acrylic emulsifier latex meeting the following requirements:

- Volatility, %: 54-65
- Viscosity, cps Brookfield, 60 RPM: 300-1300
- Particle size, micron: 0.4 average
- Free vinyl acetate, %: Less than 0.6
- Color: 1.6
- Odor: Very Slight
- Taste: 9.0

Proportion to Asphalt Emulsion: 0-10% by weight - depending on aggregate and job demands.

AEROSOL 9-03

SECTION 9-03 - AEROSOLS

9-03.1 PRINCIPAL REQUIREMENTS

Mineral aggregates most commonly used for backfill purposes have been given an aggregate type number to identify each particular aggregate. Requirements for ashen aggregates identified by a type number are contained in the sections beginning with 9-03.3 through the Mineral Aggregate Chart listed in section 9-03.4.

Mineral aggregates shall be uniform in quality, essentially free from various types of wood waste or other objectionable or extraneous material, and obtained only from sources approved by the Engineer.

Written requests for source approval shall be submitted to the Engineer not later than 10 days prior to the intended use of the mineral aggregate. Should the proposed source be one the Engineer is unfamiliar with, the Engineer reserves the right to take preliminary samples and make preliminary tests at the proposed source prior to approval. Continued approval of a source is contingent upon the mineral aggregates from that source continuing to meet contract requirements.

Unless otherwise specified, mineral aggregates shall meet the requirements for grading and quality when delivered to the project site. The exact point of acceptance will be determined at the site by the Engineer.

9-03.12 AEROSOLS SUBSTANCES

Delete this section and replace with the following:

The material of contaminated substances in the washed aggregate shall conform to the following limits:

1. Particles of specific gravity less than 1.05 but greater than 1.00 percent by weight.

2. Organic matter, by colorimetric test, shall not be darker than the reference standard color AASHTO designation G60 unless other tests prove a darker color to be harmless.

9-03.13 GRADING

Delete this section and replace with the following:

Fine aggregate shall be regularly graded from course to fine in two sizes and when separated by means of the U.S. Standard sieve shall meet the following grading requirements expressed as percentages by weight. Class 1 shall be used unless otherwise specified.

Acceptance of the grading and quality of the aggregate will be based on samples taken from the final size. The exact point of acceptance will be determined at the site by the Engineer.

Class 1

<table>
<thead>
<tr>
<th>Class</th>
<th>Max.</th>
<th>Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Passing No. 30</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>2 Passing No. 60</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>3 Passing No. 80</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>4 Passing No. 100</td>
<td>53</td>
<td>45</td>
</tr>
<tr>
<td>5 Passing No. 200</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>6 Passing No. 300</td>
<td>25</td>
<td>0</td>
</tr>
</tbody>
</table>

(Net Sieving)

In individual tests, variations under the minimum or over the maximum will be permitted as follows provided the average of 3 consecutive tests is within the above limits:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>In Individual Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 30 and coarser</td>
<td>2.0 percent</td>
</tr>
<tr>
<td>No. 50 and finer</td>
<td>0.5 percent</td>
</tr>
</tbody>
</table>

258
9-03.1(1)(c) USE OF BROADBRIM GRADE F

Delete the table in paragraph 2 and replace with the following:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>95</td>
<td>100</td>
<td>100</td>
<td>95</td>
<td>95</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>90</td>
<td>90</td>
<td>95</td>
<td>95</td>
<td>90</td>
<td>90</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>85</td>
<td>85</td>
<td>90</td>
<td>90</td>
<td>85</td>
<td>85</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>80</td>
<td>80</td>
<td>85</td>
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<td>85</td>
</tr>
<tr>
<td>75</td>
<td>75</td>
<td>80</td>
<td>80</td>
<td>75</td>
<td>75</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>70</td>
<td>70</td>
<td>75</td>
<td>75</td>
<td>70</td>
<td>70</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>65</td>
<td>65</td>
<td>70</td>
<td>70</td>
<td>65</td>
<td>65</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>65</td>
<td>65</td>
<td>60</td>
<td>60</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>55</td>
<td>55</td>
<td>60</td>
<td>60</td>
<td>55</td>
<td>55</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
<td>55</td>
<td>55</td>
<td>50</td>
<td>50</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>45</td>
<td>45</td>
<td>50</td>
<td>50</td>
<td>45</td>
<td>45</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
<td>45</td>
<td>45</td>
<td>40</td>
<td>40</td>
<td>45</td>
<td>45</td>
</tr>
</tbody>
</table>

All percentages by weight.

9-03.1(2)(c) GRADING (New Section)

Supplement this section with the following:

Acceptance of grading and quality of the aggregate will be based on samples taken from stockpiles at the concrete plant. The exact point of acceptance will be determined in the field by the Engineer.

9-03.1(3)(c) GRADING AND QUALITY

Delete paragraph 2 and the table under paragraph 2 and replace with the following:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Graded</th>
<th>Crushed</th>
<th>Screened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passing Slabs</td>
<td>Passing Slabs</td>
<td>(1/2-0.75)</td>
<td>(1/2-0.75)</td>
</tr>
<tr>
<td>55%</td>
<td>55%</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>50%</td>
<td>50%</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>45%</td>
<td>45%</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>40%</td>
<td>40%</td>
<td>85</td>
<td>85</td>
</tr>
<tr>
<td>35%</td>
<td>35%</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>30%</td>
<td>30%</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>25%</td>
<td>25%</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>20%</td>
<td>20%</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>15%</td>
<td>15%</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>10%</td>
<td>10%</td>
<td>55</td>
<td>55</td>
</tr>
</tbody>
</table>

9-03.1(4)(c) GRADING (New Section)

Supplement this section with the following:

Acceptance of the grading and quality of the aggregates will be based on samples taken from the final mix.

9-03.1(5)(c) TEST REQUIREMENTS

Delete this section and replace with the following:

Aggregate for asphalt concrete shall meet the following test requirements:

<table>
<thead>
<tr>
<th>CLASS OF ASPHALT CONCRETE</th>
<th>B</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>粒度分布</td>
<td>Min.</td>
<td>90</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>含有等效材料</td>
<td>Min.</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
</tr>
</tbody>
</table>

When material is being produced and stockpiled for use in a specific contract or for a future contract, the fracture and sand equivalent requirements shall apply at the time of stockpiling. When material is used from a stockpile that has not been tested as provided above, the fracture and sand equivalent requirements shall apply at the time of initial introduction to the cold feed of the mixing plant.

9-03.2(1)(c) BALLAST

Delete this section and replace with the following:

Rheology ballast shall be manufactured from ledge rock or talus obtained from sources approved by the Engineer. Rheology ballast shall meet the requirements of Section 9-03.16 for Mineral Aggregate Type 14. That portion of riverine ballast retained on a 1/4 inch square sieve shall not contain more than 0.5 percent of mud waste.

When approved by the Engineer, mineral aggregate Type 1 or 2 may be utilized for rheology ballast in lieu of mineral aggregate Type 14.

Ballast shall be a totally crushed material with no naturally occurring surfaces and shall apply to material retained on each sieve size 1/4 inch and above if that sieve retains more than 5 percent of the total sample.

9-03.3(2)(c) SKEW BIVERT

Delete this section and replace with the following:

Skew bivert shall meet the requirements of Section 9-03.3(1) for bivert except the gradation shall meet the requirements of Section 9-03.16 for Mineral Aggregate Type 1, Type 2, and Type 3.

Skew bivert shall be a totally crushed material with no naturally occurring surfaces and shall apply to material retained on each sieve size No. 10 and above if that sieve retains more than 5 percent of the total sample.

The portion of crushed surfacing retained on a 1/4 inch square sieve shall not contain more than 0.15 percent mud waste.
Crushed surfacing may be manufactured from gravel if its use will meet the requirements set forth in Section 9-03.11 for Mineral Aggregate Type 10 and 20.

**9-03.9(5) SAND FILLER (New Section)**

Sand filler shall consist of naturally occurring sand grains, preferably angular, screened from natural deposits and meeting the requirements of Section 9-03.16 for Mineral Aggregate, Type 11.

**9-03.10 AGGREGATES FOR GRAVEL BASE**

Delete this section and replace with the following:

Gravel base shall meet the requirements of Section 9-03.12(2) for Mineral Aggregate Type 17.

**9-03.11 CRUSHED GRAVEL (New Section)**

Crushed gravel shall be manufactured by mechanically crushing clean, washed gravel, and shall meet the grading requirements of Section 9-03.16 for Mineral Aggregate Type 10, 20, and 21 through 26. The number of fractured surfaces and the minimum percent of crushed particles required to have the fractured surfaces specified are as follows:

<table>
<thead>
<tr>
<th>Aggregate Type</th>
<th>Minimum Fractured Surfaces</th>
<th>Minimum Percent Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2 or more</td>
<td>90%</td>
</tr>
<tr>
<td>20</td>
<td>2 or more</td>
<td>90%</td>
</tr>
<tr>
<td>21</td>
<td>1 or more</td>
<td>75%</td>
</tr>
<tr>
<td>22</td>
<td>1 or more</td>
<td>75%</td>
</tr>
<tr>
<td>23</td>
<td>1 or more</td>
<td>75%</td>
</tr>
<tr>
<td>24</td>
<td>2 or more</td>
<td>90%</td>
</tr>
</tbody>
</table>

Mineral Aggregate, Type 10 and Type 20 may be used as Top and Base Course in lieu of a Crushed Rock Aggregate Type 1 and 2.

(a) the Crushed Surfacing Mineral Aggregate Type 10 and 20 will be covered and confined completely with asphalt or cement concrete pavement or
(b) confined within a trench; and
(c) except as in accordance with Sections 9-04.

Crushed gravel shall be substantially free from adherent coatings. The presence of a thin, firmly adhering film of weathered rock shall not be considered as coating unless it exists on more than 50 percent of the surface area of any slice between consecutive laboratory slices.

The portion of mineral aggregate retained on a 1/4-inch sieve shall not contain more than 0.1 percent wood waste by weight. The portion of mineral aggregate passing a U.S. No. 10 sieve shall not have wood waste that will result in more than 250 parts per million of organic matter by colorimetric tests when tested. The color shall be measured after the sample has been in the test solution for one hour.

**9-03.12 GRAVEL BACKFILL (New Section)**

Delete this section and replace with the following:

Gravel backfill shall consist of crushed, partially crushed, or naturally occurring granular material depending on the type of mineral aggregate specified by the Engineer or the Contract Documents.

**9-03.12(1A) CLASS A (New Section)**

Delete this section and replace with the following:

Gravel backfill for foundations, Class A, shall meet the requirements of Section 9-03.9 and 9-03.16 for Mineral Aggregate Type 10, 20, and 26, whichever is specified.
Crushed surfacing may be manufactured from gravel if its use will meet the requirements set forth in Section 13-04.11 for Mineral Aggregate Type 10 and 10-A.

9-03.10 AGGREGATES FOR CRUSHED BASE

Delete this section and replace with the following:

Crushed base shall meet the requirements of Section 9-03.12(1) for Mineral Aggregate Type 17.

9-03.11 CRUSHED GRAVEL (New Section)

Crushed gravel shall be manufactured by mechanically crushing clean, washed gravel, and shall meet the grading requirements of Section 9-03.16 for Mineral Aggregate Type 10, 17, and 22 through 26. The surface of fractured surfaces and the minimum percent of crushed particles required to have the fractured surfaces specified are as follows:

<table>
<thead>
<tr>
<th>Aggregate Type</th>
<th>Fractured Surfaces</th>
<th>Minimum Percent Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2 or more</td>
<td>90%</td>
</tr>
<tr>
<td>22</td>
<td>2 or more</td>
<td>70%</td>
</tr>
<tr>
<td>26</td>
<td>1 or more</td>
<td>70%</td>
</tr>
<tr>
<td>22</td>
<td>2 or more</td>
<td>60%</td>
</tr>
</tbody>
</table>

Mineral Aggregates, Type 22 and Type 26 may be used as Top and Base Course in lieu of a Crushed Rock Type 1 and 2 as specified.

(a) The Crushed Surface Mineral Aggregate Type 22 and 26 will be covered and confined completely with asphalt or cement concrete pavement; or

(b) confined within a trench; and

(c) costs shall be adjusted in accordance with Section 4-04.

Crushed gravel shall be substantially free from adherent coatings. The presence of a thin, firmly adhering film of weathered rock shall not be considered as coating unless it exists on more than 50 percent of the surface area of any slice between successive laboratory slices.

The portion of mineral aggregate retained on a 1/4 inch sieve shall not contain more than 0.1 percent of loose gravel that will resist in more than 250 parts per million of organic matter by colorimetric tests when tested.

Color shall be measured after the sample has been in the test solution one hour.

9-03.12 GRAVEL BACKFILL

Delete this section and replace with the following:

Gravel backfill shall consist of crushed, partially crushed, or naturally occurring gravel material depending on the type of mineral aggregate specified by the Engineer or the Contract Documents.

9-03.12(4) CLASS A (New Section)

Delete this section and replace with the following:

Gravel backfill for foundations, Class A, shall meet the requirements of Section 9-03.9 and 9-03.16 for Mineral Aggregate Type 2 or Mineral Aggregate Type 14, whichever is specified.

9-03.12(18) (New Section)

Delete this section and replace with the following:

Gravel backfill for foundations, Class B shall conform to the requirements of Section 9-03.12(4) for Mineral Aggregate, Type 17.

9-03.12(21) GRAVEL BACKFILL FOR WAILS

Delete this section and replace with the following:

Gravel backfill for wails shall consist of free draining sand and gravel from naturally occurring or screened sources; have such characterization of size and shape that it will compact readily, and meet the requirements of Section 9-03.16 for Mineral Aggregate Type 17.

That portion of the material retained on a 1/4 inch square opening shall contain not more than 0.1 percent by weight of wood waste.

9-03.12(23) GRAVEL BACKFILL FOR PIPE BEDDING

Delete this section and replace with the following:

Type bedding material shall meet the requirements of Section 9-03.16 for Mineral Aggregate Type 9 and Mineral Aggregate Type 22 as specified on the Drawings and the Standard Plans.

Pipe bedding material, Type 9 shall consist of screened sand, gravel, or other inert materials or combinations thereof from sources approved by the Engineer. The aggregate shall be hung, string, durable particles free from adherent coatings. The material shall be washed thoroughly to remove clay, loam, sand, organic matter, or other deleterious substances. The amount of deleterious substances in the washed pea gravel shall not exceed values specified in Section 9-03.12(3a)

Gravel bedding material, Type 22 shall be manufactured from screened crushed gravel. The finished product shall be clean, uniform in quality, and free from wood, bark, roots, and other deleterious materials. The crushed screenings shall be substantially free from adherent coatings. The presence of a thin, firmly adhering film of weathered rock shall not be considered as coating unless it exists on more than 50 percent of the surface area of any slice between successive laboratory slices.

The portion of Mineral Aggregate, Type 22 retained on a 1/4 inch sieve shall not contain more than 0.1 percent deleterious materials by weight.

9-03.12(24) GRAVEL BACKFILL FOR DRAINS

Delete this section and replace with the following:

Gravel backfill for drains shall meet the requirements of Section 9-03.1(3a), 9-03.1(2a), and 9-03.16 for Mineral Aggregate, Type 16 except the percent by weight passing the U.S. No. 200 sieve specified in Section 9-03.1(3a) shall not be greater than 7.50 percent.

9-03.12(25) PIT RUN SAND AND GRAVELS (New Section)

Pit run sand and gravel shall meet the requirements of Section 9-03.16 for Mineral Aggregate Type 10.

9-03.12(26) WASHED SAND AND GRAVELS (New Section)

Washed sand and gravels shall consist of screened sand, gravel or other inert materials, or combinations thereof, from sources approved by the Engineer, having hung, string, durable particles free from

262
adherent coatings. The materials shall be washed thoroughly to remove clay, lime, alkali, organic matter, or other deleterious substances. The amount of deleterious substances in the washed soil or gravel shall not exceed the values specified in Section 9-04.16(2)A for Mineral Aggregate, Types 4 and 5, and 9-04.16(3)A for Mineral Aggregate, Types 4 and 5.

9-03.14 GRAVEL BERM

Delete this section and replace with the following:

Unless otherwise specified in the Drawings or in the Project Manual, gravel berm shall meet the requirements of Section 9-03.14(2) and the grading requirements in Section 9-03.16 for Mineral Aggregate, Types 4 and 5.

If requested by the Contractor, the screen size may be increased if it is determined by the Engineer that larger size aggregate will be satisfactory for the specified backfilling or embankment construction.

9-03.15 TEST METHODS FOR AGGREGATE

Supplement this section with the following:

<table>
<thead>
<tr>
<th>TITLE</th>
<th>TEST METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortar Strength</td>
<td>ASTM C109</td>
</tr>
</tbody>
</table>
9-03.17 ROCK (New Section)

Rock for constructing new rock facings shall be large, broken pieces of igneous rock. Rock material shall be rectangular, selected pieces of rock sound and resistant to weathering. Rock shall be free of soft, weathered material and some of soft rock susceptible to deterioration. When broken into pieces weighing 50 to 100 pounds and tested for soundness with sodium sulfate in accordance with ASTM T594, the loss through a 1 in sieve after 6 cycles shall not exceed 35 percent by weight.

The density of rock material shall be a minimum of 150 pounds per cubic foot. The size categories for rock shall be as follows:

<table>
<thead>
<tr>
<th>Size</th>
<th>Approx. Weight</th>
<th>Minimum Dimensions</th>
<th>Approx. Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-in rock</td>
<td>100 to 400 lb</td>
<td>12 inches</td>
<td>1.75 cf</td>
</tr>
<tr>
<td>Two-in rock</td>
<td>500 to 800 lb</td>
<td>13 inches</td>
<td>6.6 cf</td>
</tr>
<tr>
<td>Three-in rock</td>
<td>900 to 1,000 lb</td>
<td>16 inches</td>
<td>6.6 cf</td>
</tr>
<tr>
<td>Four-in rock</td>
<td>1,000 to 1,200 lb</td>
<td>18 inches</td>
<td>9.0 cf</td>
</tr>
</tbody>
</table>

Rock less than 1 cubic foot in volume or weighing less than 100 pounds shall not be used.

9-04.1 ASPHALT FILLER FOR CONTRACTION AND LONGITUDINAL JOINTS IN CONCRETE PAVEMENTS

Delete paragraph 1 and replace with the following:

Premixed Joint filler for use in contraction and longitudinal joints shall be 3/8 inch in thickness and shall consist of a suitable asphaltic material encased in asphalt-impregnated paper or asphalt-impregnated felt. It shall be sufficiently rigid for easy installation in winter months and not too brittle for handling in cold weather. It shall meet the following test requirements:

Premixed joint filler shall meet the requirements of ASTM Standard D994 or ASHRMD Designation M33.

9-04.2 PREMIXED JOINT FILLER FOR EXPANSION JOINTS

Delete this section and replace with the following:

Premixed joint filler for through joints shall be 3/4 inch thick and as wide as the depth of the pavement.

Premixed joint filler shall meet the requirements of ASTM Standard D1751 or ASHRMD Designation M113.

9-04.2(2) Poured Rubber Joint Sealer

Delete this section and replace with the following:

9-04.2(3) Poured joint sealer for pavement areas

Delete items (1) of paragraph 1 and replace with the following:

(1) Bond test methods shall be in accordance with AASHTO Test Method No. 4214.

9-04.2(3) Poured joint sealer for walkways (New Section)

Poured joint sealer used to seal sawed joints in sidewalks, stairs, pavers, and other walkways shall be a polyethylene sealer conforming to the requirements of Federal Specification T-M-00226 Type I (self-leveling) Class A or Type II (non-sag) Class A.

9-04.10 CRACK SEALING - RUBBERIZED ASPHALT

This section is supplemented with the following:

Rubberized asphalt for crack sealing shall conform to ASTM D-199 and have a Georgia flash point (AASHTO T-48) of 400 degrees. During flash point testing, the rubberized asphalt shall be agitated carefully to prevent local over heating.
9-05.11(1) CONCRETE DRAIN PIPE
Delete this section and replace with the following:
Concrete drain pipe shall meet requirements of ASTM Designation C144 Class 2 for pipe less than 24 inches in diameter; ASTM C68 Class 1b for 24 and 36 inch diameter pipe; and ASTM C676 Class II for pipe 18 inches in diameter and larger, unless noted otherwise on the drawings.

9-05.11(2) ALUMINIZED (ALUMINIZED) OR ALUMINUM COATED (ALUMINIZED)
CORRUGATED IRON OR STEEL DRAIN PIPE
The last sentence is revised to read:
Welded seam aluminum coated (alumaloid) corrugated iron or steel drain pipe with metallized coating applied inside and out following welding is acceptable.

9-05.11(4) COUPLING RINGS
Delete paragraph 2 of this section and replace with the following:
Acceptable coupling rings for corrugated metal pipe shall be made using a 3 piece, 4 inch wide corrugated coupling band. Hold together with angle and bolts, a gasket made between the pipe and the band, and be of the same material and corrugations as the pipe, and meet the requirements of Section 9-05.11(5).

9-05.11(5) COUPLING RINGS
Delete paragraph 2 of this section and replace with the following:
Acceptable coupling rings for aluminum corrugated pipe shall be made using a 3 piece, 4 inch wide corrugated coupling band, held together with angle and bolts, a gasket made between the pipe and the band, and be of the same material and corrugations as the pipe, and meet the requirements of Section 9-05.11(4).

9-05.1(1) ASSUMED CONCRETE DRAIN PIPE
This section is deleted.

9-05.1(5) POLYVINYL CHLORIDE (PVC) DRAIN PIPE
Delete this section and replace with the following:
Polyvinyl Chloride (PVC) drain pipe and fittings shall meet the requirements of ASTM D1785 with continuous gasket joints.

9-05.2(1) PERFORATED ASSUMED CONCRETE UNDERDRAIN PIPE
This section is deleted.

9-05.2(4) ALUMINIZED (ALUMINIZED) OR ALUMINUM COATED (ALUMINIZED)
CORRUGATED IRON OR STEEL UNDERDRAIN PIPE
The last sentence of the first paragraph is revised to read:
Welded seam aluminum coated (alumaloid) corrugated iron or steel underdrain pipe with metallized coating applied inside and out following welding is acceptable.

9-05.3(1) PLAIN CONCRETE CURVATURE PIPE
Delete this section and replace with the following:
Plain concrete pipe shall meet the requirements of ASTM C14 Class 2.

9-05.3(2) REINFORCED CONCRETE CURVATURE PIPE
Delete this section and replace with the following:
Reinforcing concrete curvatures shall conform to the requirements of ASTM C666 Class III.

9-05.4 STEEL CURVATURE PIPE AND PIPE ARCH
The last sentence is revised to read:
Welded seam aluminum coated (alumaloid) corrugated steel pipe and pipe arch with metallized coating applied inside and out following welding is acceptable.

9-05.4(3) PROTECTIVE TREATMENT
The first paragraph is revised by deleting the following:
Treatment 1 - Coated inside and out with asbestos fibers embedded in the exterior coating and then covered on both sides with asphalt.

9-05.4(5) FIRE RESISTANCE
This section is deleted.

9-05.5(5) COUPLING BANDS
Delete paragraph 3 of this section and replace with the following:
Aluminum angle shall be of the same material as the coupling bands.

9-05.7 CONCRETE STORM SEWER PIPE
Delete the title and replace with the following:
9-05.7 CONCRETE STORM DRAIN, SANITARY SEWER, AND COMBINED SEWER PIPE
Delete this title and section, and replace with the following:
9-05.7(1A) PLAIN CONCRETE STORM DRAIN PIPE
Delete this title and section, and replace with the following:
9-05.7(1A) PLAIN CONCRETE STORM DRAIN, SANITARY SEWER, AND COMBINED SEWER PIPE
Plain concrete storm drain, sanitary sewer, and combined sewer pipe shall meet the requirements of ASTM C144 Class 2, unless otherwise stated on the drawings. Submersion test shall be conducted as follows:
The pipe selected for test shall be placed either end down on a soft rubber pad, as at the option of the engineer, and filled with water. The pipe shall be kept full of water for a period of two minutes. At the end of that period the outer surface of the pipe shall be examined for leaks. A leak is herein defined as a water spot on which, when wiped dry with a cloth, moisture will quickly reappear.

268
9-05 SANITARY SEWER AND STORM DRAIN STRUCTURES, CLINCHERS AND CONCRETE

The Engineer may select a seepage of 2 percent but in no case shall less than 5 pipes of each size be treated.

9-05.707A REINFORCED CONCRETE STORM SEWER PIPE

Delete this title and section and replace with the following:

9-05.707A REINFORCED CONCRETE STORM DRAIN, SANITARY SEWER AND COMBINED SEWER PIPE

Reinforced concrete pipe shall conform to AGA Designation C16, and shall be of the class noted on the Drawings or in the Special Provisions.

Pipe ends of reinforced concrete pipe may be bell and spigot, bell and spigot, or tongue and groove unless otherwise specified in the Special Provisions.

Acceptance shall be based on load bearing tests, material tests and inspection of the product at all stages of construction. Acceptance by cylinders or cores instead of load bearing tests is permissible when agreed upon by the manufacturer and the Engineer prior to manufacture.

Both bells and spigots shall be reinforced in pipe 30 inches or more in diameter.

The identification of the size and of the elliptical reinforcement shall be in accordance with Section 9-05.707B.

9-05.707C CONCRETE STORM SEWER PIPE JOINTS

Delete this title and section and replace with the following:

9-05.707C SANITARY PIPE JOINTS, COMBINED SEWER PIPE JOINTS

All concrete pipe shall be jointed with rubber gaskets. The joints and gasket material shall meet the requirements of AGA D451. Gasket material shall be handled and stored in accordance with Section 9-06.44(2).

9-05.707D TESTING CONCRETE STORM SEWER PIPE JOINTS

Delete this title and section and replace with the following:

9-05.707D TESTING SANITARY PIPE JOINTS, COMBINED SEWER PIPE JOINTS

Ampire this section to require testing for storm drain, sanitary sewer, and combined sewer pipe.

9-05.8 AGGREGATE CONCRETE SEWER PIPE

This section is revised to read:

9-05.9 STEEL SPIRAL RIB STORM SEWER PIPE

Steel spiral rib storm sewer pipe shall be manufactured of metallic coated (aluminized or galvanized) corrugated steel and inspected in accordance with Section 9-05.4. The size, coating, and steel shall be as shown in the plans or in the specifications.

The manufacturer of spiral rib storm sewer pipe shall furnish to the Engineer a certificate of compliance stating that the materials furnished comply in all respects with these specifications. The Engineer may require additional information or tests to be performed by the Contractor, at no expense to the State.

Unless otherwise specified, spiral rib storm sewer pipe shall be furnished with pipe ends cut perpendicular to the longitudinal axis of the pipe. Pipe ends shall be cut evenly. Spiral rib pipe shall be fabricated either by using a continuous helical lock seam with a seam gasket or a continuous helical welded seam parallel to the rib.

Helical ribs shall project outwardly (from the smooth pipe wall) and shall be fabricated from a single thickness of material. The ribs shall be essentially Concentric and shall be 3 4 inch plus 3 times the wall thickness (in) 4 in and shall be manufactured so that the inside of the pipe wall immediately adjacent to the inside or outside of the pipe wall immediately adjacent to the lockseam or aluminized to tip surface of rib. The maximum spacing of ribs shall be 10.75 inches center to center (measured normal to the direction of the ribs). The radius of head of the rib at the corners of the rib shall be a minimum of 3.00 inches and a minimum of 0.175. If the sheet between adjacent ribs does not contain a lockseam, a stiffer shall be included midway between ribs, having a nominal radius of 0.25 inch and a minimum height of 0.30 inch toward the outside of the pipe. Pipe shall be fabricated with ends that can be effectively joined with coupling hubs.

When required spiral rib pipe shall be brite finished or galvanized. The brite treatment for spiral rib pipe shall conform to the requirements of Sections 9-05.13(d) and 9-09.4(6).

9-05.9(1) CONTINUOUS LOCK SEAM PIPE

Pipes fabricated with continuous helical seam parallel to the rib may be used for full circle pipe. The lock seam shall be formed in the flat between ribs and shall meet the following quality requirements:

(a) The edges of the sheets within the cross-section of lock seam shall lay at least 3/4 inch for pipe greater than 10 inches in diameter with an occasional tolerance of 30 percent of lap width allowed.

(b) The lap joint surfaces shall be in tight contact.

(c) There shall be no excessive angularity on the interior of the 180 degree fold of the seam at the lock seam which will cause visible cracks in the sheet. Roller indentations shall not cause cracks in the sheet or a loss of metal-to-metal contact within the seam.

(d) Testable specimens cut from production pipe nominal to and across the lock seam shall develop the strength as tabulated below:

<table>
<thead>
<tr>
<th>Pipe Size Thickness</th>
<th>Minimum Lock Seam Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.075</td>
<td>9000</td>
</tr>
<tr>
<td>0.095</td>
<td>9800</td>
</tr>
</tbody>
</table>

9-05.9(1A) BASIS FOR ACCEPTANCE

The basis for acceptance will be a qualification test, conducted by the Headquarters Materials Laboratory, for each manufacturer of galvanized helically corrugated lock seam steel pipe. Only those specific pipe sizes and gasket materials approved under the qualification test will be accepted.

Continuous Lock seam, pipe shall be sampled and tested in accordance with AASHTO T-268.

9-05.9(2) CONTINUOUS WELDED PIPE

Pipes fabricated with a continuous welded walled seam parallel to the rib may be used for full circle pipe. The welding process for galvanized steel pipe shall be so controlled that the combined width of the inside and outside seams shall exceed 3 times the thickness of the metal. All welding shall be performed through the pipe wall. Testing of welded seam quality control shall conform to AASHTO T-268. Welded pipe fabricated from aluminized steel pipe shall have the coating of the welded area repaired by flame or gas welding and the new area shall be tested in accordance with AASHTO T-268.

Repair of Damaged Galvanizing: When the galvanized (zinc coated) surface has been burned by gas or arc welding, all surfaces of the welded connections shall be thoroughly cleaned by wire brushing and all traces of the welding flux and loose or cracked galvanizing removed, after which the areas shall be repaired by flame spray retaping both inside and out. 271
9-05.4 hose COUPLING RINGS

Coupling rings shall be of the same materials as the pipe. Coupling rings and gaskets shall conform to Section 9-05.4.1.

9-05.10 STEEL STORM SEWER PIPE

This section is revised to read:

Steel storm sewer pipe shall conform to the requirements of Section 9-05.4 for steel culvert pipe and shall be either helically corrugated lock seam or helically corrugated composite welded steel pipe. Helically corrugated lock seam steel pipe shall require protective treatment. If welded steel aluminium coated (galvanised) steel pipe shall require metallized aluminium coating inside and out following welding.

9-05.11 ALUMINUM STORM SEWER PIPE

This section is supplemented with the following:

When gasketed helically corrugated lock seam aluminium pipe is called for, Treatment 3 is not required.

9-05.11(2) BARS FOR Acceptance

This section is revised to read:

The bars for acceptance of aluminium storm sewer pipe will be the same as specified in Section 9-05.11(2), except when gasketed helically corrugated lock seam aluminium pipe is called for. A qualification test, conducted by the Headquarters Materials Laboratory, will be required for each manufacturer of gasketed helically corrugated lock seam aluminium pipe. Only those specific pipe sizes and gasket materials approved under the qualification test will be accepted.

9-05.14 PIPE Composite BORE PIPE

Delete this section.

9-05.15(1) MANHOLE RING AND COVER

Delete this section and replace with the following:

Ring and cover dimensions shall conform to the Standard Plans. Rings shall be manufactured from cast iron, ASTM A 48 Class 35, or ductile iron, ASTM A 500, Grade B, 55-60ksi. Gaskets shall be manufactured from neoprene, liquid coated metal, or neoprene gasketed metal. Rings and covers shall be free of porosity, shrink cavities, cold shuts, and cracks. Rings and covers shall be free of surface defects which would impair durability. Rings of defective material shall be returned by the contractor. The manufacturer shall also provide a test bar per ASTM A 48. In accordance with Section 9-05.1, the test bar is taken by the manufacturer, the Contractor shall also provide the same location of the manufacturer.

A bituminous coating equivalent to American Tan Company Z2110 Linoleum-Asphalt Paint shall be applied to all surfaces. The finished coating shall be continuous and smooth.

Castings shall be machine finished on the horizontal mating surface and the vertical facing surface common to the ring and cover, so as to ensure full bearing (nonwelding) for the entire length and circumference of the bearing surface, and permit interchangeability with other castings of the same design, so as to allow the castings to be easily removed. The vertical face common to the ring and cover shall be beveled as shown on the Standard Plans. Upon request of the Engineer, the manufacturer shall furnish at the finishing standard ring and covers for use by inspectors in testing fit and seating.

All covers shall be labeled with the following information:

(a) Name or symbol of the manufacturer;
(b) Order's name (City of Seattle);
(c) Material label "NEXT" for Ductile Iron;
(d) Identification of the use in 3-inch high letters (Water, Waste, Drain, Etc.);
(e) Country or manufacturer/origin.

The use of lock-type castings are called for, the locking device shall permit the cover to be properly released from the ring. All movable parts shall not bind and shall be made of corrosion resistant and non-salt water soluble stuffing. Upon request of the Engineer, the manufacturer shall make available at the factory a testing device suitable for providing the capacity of the assembly to resist uplift pressure on the lid equal to 20 lb. per square inch of water.

The manufacturer's identification and material type shall be attached to each and other shall be a minimum of 1/2 inch letters centered flush with the adjacent surfaces.

9-05.15(2) METAL FRAME AND GRATE AND SOLID METAL COVER FOR OUTFLOW BAYS OR INLETS

Delete this title and section and replace with the following:

9-05.15(2) METAL FRAME AND GRATE FOR OUTFLOW BAYS OR INLETS

If the frame and grate shall conform to the Standard Plans.

The frame may be made of cast iron, ASTM A 48 Class 35, or ductile iron, ASTM A 500, Grade B, at the manufacturer's option. The grate shall be made of ductile iron only. Other applicable provisions of Section 9-05.15(1) shall apply.

Catch basins, Type 240A and 242B and Inlets, Type 2506 and 252B shall be furnished with a waxed type grate as indicated on the Drawings.

9-05.17 FILTER FABRIC (New Section)

The new material shall be woven or non-woven construction and consist of long chain polymeric fibers composed of polypropylene, polyethylene, polyethylene terephthalate, or polyamide. The fibers shall be orientated into a multi-directional, multi-numbered, flat webbed fabric whereby they retain their position relative to each other and allow the passage of water as specified. The fabric shall be free of any chemical treatment or coating which reduces the permeability and shall be tested to determine commonly found in soil. The new material shall conform to the physical property requirements listed below.

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Acceptable Typical Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength, psi</td>
<td>ASTM D-1681</td>
<td>60 (minimum)</td>
</tr>
<tr>
<td>Elongation, %</td>
<td>ASTM D-1681</td>
<td>20 (minimum)</td>
</tr>
<tr>
<td>Coefficient of Moisture Resistance</td>
<td>Building Code</td>
<td>20 cm to 10 cm (minimum)</td>
</tr>
<tr>
<td>Permeability, cm²/sec</td>
<td>ASTM 785</td>
<td>45 (minimum)</td>
</tr>
<tr>
<td>Permeability, cm²/sec</td>
<td>Corps of Engineers</td>
<td>70 to 100</td>
</tr>
</tbody>
</table>

#Equivalent to the admittance in the main direction for the typical fabric width.

1Inflation testing machine with ring clamp: steel ball replaced with a 5/16 inch diameter steel ball cylinder with spherical tip centered within the ring clamp.

The specimen shall be furnished in a protective wrapping which shall protect the fabric from ultraviolet radiation and from abrasion due to shipping and handling.

9-05.18 ALUMINUM SPIRAL RIB STORM SEWER PIPE (New Section)

Aluminum spiral rib storm sewer pipe shall be manufactured of corrugated aluminum and inspected in accordance with Section 9-05.5. The size, coating, and metal shall be as shown in the plans or in the specifications.

The manufacturer of spiral rib storm sewer pipe shall furnish to the Engineer a certificate of compliance stating that the materials furnished comply with all requirements with those specifications.
The Engineer may require additional information or tests, to be performed by the Contractor, at no expense to the State.

Unless otherwise specified, spiral rib storm sewer pipe shall be furnished with pipe ends cut perpendicular to the longitudinal axis of the pipe. Rib ends shall be cut smoothly. Spiral rib pipe shall be fabricated by using a continuous helical lock seam with a resin gasket.

Helical ribs shall project outwardly from the smooth pipe wall and shall be fabricated from a single thickness of material. The ribs shall be 3/4 inch wide by 3/4 inch deep with a central spacing of 7-1/2 inches center to center. Pipe shall be fabricated with ends that can be effectively joined with coupling bands.

9-05.18(1) CONTINUOUS LOCK SEAM PIPE (New Section)

Pipe fabricated with continuous helical seam parallel to the rib may be used for full circle pipe. The lock seam shall be formed in the flange between ribs and shall meet the following quality requirements:

(a) The edges of the sheets within the cross-section of lock seam shall lap at least 5/16 inch for pipe greater than 10 inches in diameter, with an occasional tolerance of minus 10 percent of lap width allowable.

(b) The lapped surfaces shall be in tight contact.

(c) There shall be no excessive sagidity on the interior of the 180 degree fold of the metal at the lock seam which will cause visual cracks in the sheet. Rolling indentations shall not cause cracks in the sheet or a loss of metal-to-metal contact within the seam.

(d) Testable specimen cut from production pipe normal to and across the lock seam shall develop the strength as tabulated:

<table>
<thead>
<tr>
<th>Pipe Wall Thickness</th>
<th>Minimum Lock Seam Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.075</td>
<td>360</td>
</tr>
<tr>
<td>0.095</td>
<td>425</td>
</tr>
</tbody>
</table>

9-05.18(1A) BASIS FOR ACCEPTANCE (New Section)

The basis for acceptance will be a qualification test, conducted by the Headquarters Materials Laboratory, for each manufacturer of gasketed helically corrugated lock seam steel pipe. Only those specific pipe sizes and gasket materials approved under the qualification test will be accepted.

Continuous lock seam pipe shall be sampled and tested in accordance with AASHTO T-349.

9-05.18(3) COUPLING BANS (New Section)

Coupling bands shall be of the same material as the pipe. Coupling bands and gaskets shall conform to Section 9-05.18(1).

SECTION 9-06 - STRUCTURAL STEEL AND RELATED MATERIALS

9-06.20 DOWNSPOUTS (New Section)

Downspouts shall be standard weight steel pipe, 4 inch or 6 inch diameter as shown in the Drawings.

The downsputs shall be full length pipe sections in all straight runs. If the Contractor elects, he may use other types of couplings and fittings in lieu of the ground couplings and fittings shown in the Drawings, provided they are equal and are approved by the Engineer.

All downsputs shall be hot-dipped galvanized in accordance with A.S.M.E. Designation A 120 after cutting to length, grooving, threading, bending or any other fabrication. Any work where the galvanizing has been disrupted shall be repaired with galvanizing repair paint formula A-9-12.

All fastenings of the downsputs to the structure, couplings, and pipe supports shall be galvanized in accordance with A.S.M.E. Designation A 153.

The portion of downsputs located under decks shall be constructed of concrete and shall be fully covered in a grout under concrete 1-1/2 inch thick and meeting the requirements of A.S.M.E. Designation D 1782, Type No. 1, except the color requirement is waived.

9-06.21 ELASTOMERIC BEARING PADS (New Section)

The first sentence of the first paragraph of this section is revised to read: Elastomeric bearing pads shall conform to the physical property requirements of the current AASHTO Standard Specifications for Highway Bridges, Division 11, Section 24.
9-07.1 DEFORMED STEEL BARS
Delete this section and replace with the following:

Unless otherwise specified in the Special Provisions or on the Drawings, reinforcing bars for the particular use specified shall be deformed steel bars of the size specified in the Contract Documents meeting the requirements of A615, Grade 60.

Deformed steel bars are referred to in the Drawings and Specifications by numbers: for example, #3, #4, #5, etc.

Reinforcing bars shall be free from loose mill scale, dirt, grease, or other defects affecting the strength of bond with concrete. Steel coated with rust may be used if the objections are not deep or loose coated. Size numbers shall be taken to represent the diameter of the bar in 1/8 inch units, except where standard wire gauge sizes are indicated on the Drawings.

9-07.2 PLAIN STEEL BARS
Delete this section and replace with the following:

Where plain steel bars are specified, they shall conform to the chemical and physical properties of A615, Grade 60, unless specifically noted otherwise. Plain steel bars are indicated in the Drawings and Specifications by fractions of an inch: for example, 1/8", 1/4", 5/32", etc.

9-07.3 SPIRAL TIES
Delete this section.

9-07.4 WIRE MESH
Delete this section and replace with the following:

Wire mesh for concrete reinforcement shall conform to the requirements of the Standard Specifications for Tied Mesh Wire Fabric for Concrete Reinforcement, A646, or the Standard Specifications for Welded Wire Fabric for Concrete Reinforcement, A497. All wire mesh shall be of an approved kind and quality of manufacturer.

9-07.5 COLD DRAWN WIRE
Supplement this section with the following:

Cold drawn wire is noted in the Drawings and Specifications by the letter W followed by a number indicating the cross-sectional area of the wire in hundredths of a square inch: for example, 1/8, 1/4, 1/2, etc.

9-07.6 DEFORMED WIRE (New Section)
Deformed wire shall conform to the requirements of A616, Deformed Steel Wire for Concrete Reinforcement.

Deformed wire is noted in the Drawings and Specifications by the letter D, followed by a number indicating the cross-sectional area of the wire in hundredths of a square inch: for example, 1/8, 1/4, 1/2, etc.
SECTION 9-08 - PAINTS

9-08.5 TEST METHODS

Delete this section and replace with the following:

As set forth in Section 9-08.2, all paints shall meet the special requirements set forth for each formula. The test methods used to check those special requirements shall be as specified by Federal Specification TT-P-441. When test methods are not covered by the above, applicable ASTM methods shall be followed.

SECTION 9-09 - TIMBER AND LUMBER

9-09.2 GRADE REQUIREMENTS

The Tabulated Working Stress Chart referred to in this section is supplemented with the following:

<table>
<thead>
<tr>
<th>Post Type</th>
<th>Minimum Tangential</th>
<th>Minimum Radial</th>
<th>Minimum Shear</th>
<th>Minimum Tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lodgepole Pine</td>
<td>65</td>
<td>250</td>
<td>75</td>
<td>1,100,000</td>
</tr>
<tr>
<td></td>
<td>8&quot; x 8&quot; or 8&quot; x 8&quot;</td>
<td></td>
<td></td>
<td>Grade No. 1</td>
</tr>
<tr>
<td>Lodgepole Pine</td>
<td>875</td>
<td>250</td>
<td>75</td>
<td>1,100,000</td>
</tr>
<tr>
<td></td>
<td>8&quot; x 8&quot; only</td>
<td></td>
<td></td>
<td>Grade No. 1</td>
</tr>
</tbody>
</table>
SECTION 9-08 - PAINTS

9-08.5 TEST METHODS

Delete this section and replace with the following:

As set forth in Section 9-06.2, all paints shall meet the special requirements set forth for each formula. The test methods used to check those special requirements shall be as specified by Federal Specification TT-P-141. When test methods are not covered by the above, applicable ASTM methods shall be followed.

SECTION 9-09 - TIMBER AND LUMBER

9-09.2 GRADE REQUIREMENTS

The Tabulated Working Stress Chart referred to in this section is supplemented with the following:

<table>
<thead>
<tr>
<th>Grade Bolt Repair</th>
<th>1100</th>
<th>65</th>
<th>250</th>
<th>850</th>
<th>1,100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; x 6&quot; or 8&quot; x 8&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Select Structural</td>
</tr>
<tr>
<td>8&quot; x 8&quot; only</td>
<td>875</td>
<td>65</td>
<td>250</td>
<td>725</td>
<td>1,100,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grade No. 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40% or W138</td>
</tr>
</tbody>
</table>

278
SECTION 9-10 - FILING

9-10.2(1) CONCRETE

The second paragraph of this section is revised to read:

The concrete for prestressed piles shall conform to the requirements of Section 9-10.2. The concrete for prestressed piles shall have a minimum compressive strength of 6,000 psi at the age of 28 days. The minimum compressive strength of concrete at the transfer of prestress shall be 3,000 psi.

9-12 - MACHINE UNITS

Delete the title and content of Section 9-12 in its entirety and replace with the following:

SECTION 9-12 - MACHINES, CRUSH RASINS & INLETS (New Section)

9-12.1 REINFORCED CONCRETE (New Section)

Reinforced concrete shall consist of portland cement, mineral aggregates and water, in which steel has been embedded in such manner that the steel and concrete act together.

9-12.1.1 CONCRETE (New Section)

Portland cement shall conform to the requirements of the Specifications for Portland Cement ASTM C 150, any type, unless otherwise listed in the Special Provisions; or it may be air-entraining portland cement conforming to ASTM C 115.

9-12.1.2 STEEL REINFORCEMENT (New Section)

Reinforcement shall consist of wire conforming to ASTM A 62 or ASTM A 490, or wire fabric conforming to ASTM A 350, or ASTM A 615 or bars of Grade 60 steel conforming to ASTM A 302 or bars of Grade 80 steel conforming to ASTM A 302.

9-12.1.3 AGGREGATES (New Section)

Aggregates shall conform to ASTM C 33, except that the requirement for gradation shall not apply to prestressed slabs.

9-12.1.4 MIXTURE (New Section)

The aggregates shall be so sized and graded, and proportioned and thoroughly mixed in proportions of cement and water as will produce a homogeneous concrete mixture of such quality that the mortar components will conform to the strength and performance requirements of these specifications. Additives or blends may be used with the written permission of the Engineer.

9-12.1.5 CURING (New Section)

Upon completion of casting, the prestressed components shall be placed in a location free from outside drafts, covered and cured in a moist atmosphere maintained by an injection of steam for such a time and under such a temperature as may be needed to enable the mortar components to meet the strength requirements.

Or, prestressed components may be water-cured by covering the mortar components with a water saturated material, or by a layer of perforated pipes, mechanical sprinklers, porous hose, or by any other approved method. In all cases the components continuously moist during the curing period. Cure-in-place components shall be water cured for a period not less than 7 days, except that when high-early- strength cement is used, the curing shall be not less than 3 days. Pigmented concrete curing compound or other approved method may be applied in lieu of moist curing.

All cast in place concrete placed under these specifications shall have a minimum compressive strength of 3,000 psi at 28 days. Strength determination shall be in accordance with ASTM C 39, unless otherwise approved by the Engineer. Prestressed components shall conform to the strength requirements of ASTM C 472.

9-12.2 STEPS (New Section)

Unless otherwise specified in the Special Provisions, unit steps may be either of the following, at option of the contractor or option of the manufacturer of the unit:

280
9-12.2(1) ALIGNMENT STEPS (New Section)
Aluminum steps shall be forged of 6005-T6 alloy having a minimum tensile strength of 30,000 psi. The cross section shall be not less than 3/4 inch wide by 1/8 inch thick with two non-reinforced grooves not to exceed 1/8 inch deep and 1/8 inch wide. Pattern and dimensions shall conform to the Standard Plans.

9-12.2(2) GALVANIZED REINFORCED BAR STEPS (New Section)
Galvanized deformed bar steps shall be 1 inch diameter deformed bar conforming to ASTM A 615, Grade 40 or Grade 60, hot bent and galvanized after bending. For heating, the temperature shall be at least 1000°F. Galvanizing shall conform to ASTM A 123-46. Step dimensions and pattern shall conform to the Standard Plans.

9-12.3 LADDERS (New Section)
Except as otherwise provided in the Special Provisions, base sections of present railings more than 3 feet in height shall be provided with a ladder as detailed in the Standard Plans, made of steel conforming to the requirements for steps given in Sections 9-12.2(1) and 9-12.2(2). Base sections 3 feet or less in height require no steps or ladder.

9-12.4 MEANS (New Section)

9-12.4(1) METHOD FOR JOINING (New Section)
Method for bolting present or memory railings, catch basins, or inlet units shall be one part portland cement to not less than one part nor more than two parts plaster sand, mixed with the least amount of water consistent with workability.

9-12.4(2) METHOD FOR PLASTER-COATING (New Section)
Method for plaster-coating memory unit railings shall be proportioned according to either of the two alternatives tabulated below:

<table>
<thead>
<tr>
<th>Parts by volume</th>
<th>Parts by volume</th>
<th>Plaster sand, properly proportioned in deep loose condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>or 0.1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1/4</td>
</tr>
</tbody>
</table>

Alt. 1: 1:1 (Type II)

Alt. 2: 1:0

9-12.5 CONCRETE MASONRY UNITS (New Section)
Concrete block shall conform to the Specifications for Concrete Masonry Units for Construction of Catch Basins and Manholes ASTM Designation C 139, except that normal horizontal thickness shall be 6 inches measured radially, and blocks shall have semicircular mortar grooves approximately 1 inch radius at the ends.

9-12.6 CONCRETE BRICK (New Section)
Concrete brick shall conform to the Specifications for Concrete Building Brick ASTM C 55 Grade A.

9-12.7 CLAY BRICK (New Section)
Clay brick shall conform to ASTM C 11, Grade 9A unless otherwise provided in the Special Provisions.

9-12.8 TRAMS AND COLUMNS (New Section)
Refer to Section 9-05.15.

9-12.9 PRECAST MASONRY COMPONENTS (New Section)
Precast masonry components shall conform to ASTM C 478 except as modified herein.

9-12.9.1 BASE SECTIONS (New Section)
Base sections shall conform to the requirements for present masonry sections in Section 9-12.9.2, except that the reinforced base slab shall be made an integral part of the unit, and openings for pipes shall be cast into the slab instead of being cut in after the unit is cast. Base slab thickness shall be not less than 1-1/2 inches nor more than 4 inches from the top, and shall extend full from the wall of the masonry section and be tied to the longitudinal steel when called for in the Standard Plans. The width of the base section shall be reinforced with a 1-1/2 inch diameter deformed bar. Openings to receive pipe shall be cast as required to permit the inside of the section, shall be held to the masonry units and have openings as detailed in the Special Provisions. Reinforcement connections conforming to ASTM C 365 may be used at the contractor's option.

9-12.9.2 PRECAST MASONRY COMPONENTS (New Section)
Reinforcement for standard sections shall consist of a single cage of steel placed at the approximate center of the wall of the section. The cage shall be made up of three longitudinal wires, 0.1 inch diameter each, with a 0.1 inch diameter wire placed at the corners of the sections. Admixtures shall develop a tensile strength of 50,000 psi at 28 days.

Admixtures shall be two parts of cement and one part of 1-1/4 inch maximum size aggregate.

9-12.9.3 PRECAST CONCRETE (New Section)
Standard precast concrete shall provide reduction from 48 inches to 24 inches and 54 to 24 inches and shall be not less than 24 inches in height. Admixtures to the glass sections shall be similar to joining between other sections, but the top surfaces shall be flat and at least 5 inches wide. Spacing shall be 6 inches minimum and reinforcing shall conform to the requirements specified for standard sections of the larger diameter. Steps shall be provided for standard sections, and an additional step shall be provided to the 48 high to 24 inch and the 54 to 24 inch concrete cones opposite the lower steps and above about 6 inches in diameter, as shown on the Standard Plans. No more than two Lifts shall be cast into each cone, and they shall be located so they will sustain reinforcing as shown in the drawings. At the contractor's option, steel hoops may be provided for handling, in lieu of Lifts.
2-12

MANHOLE, CASSET BAYS & INLETS (New Section)

9-12.9(6) FLAT SLAB COVERS (New Section)
Standard flat slab covers shall be in minimum of 8 inches thick and shall conform to the outer dimension of the standard sections upon which they are to be placed. Details of opening location and reinforcing shall be as shown on the Standard Plans.

9-12.9(5) FLAT SLAB REDUCTION SECTIONS (New Section)
Reductions to 24 inches and 48 inches openings can be made by means of a flat slab reducing sections as shown on the Standard Plans. Standard flat slab covers shall be a minimum of 8 inches thick and shall conform to the outer dimension sections upon which they are to be placed. Details of opening location and reinforcing shall be as shown on the Standard Plans.

9-12.9(6) T-TOP PIPE MANHOLE (New Section)
T-Top pipe manholes shall conform to the Standard Plans and shall be provided with foundation and bedding, and otherwise installed in the same manner as the connecting pipe.

9-12.9(7) JOINTS (New Section)
Joints between prestressed concrete elements shall be rubber gasketed in a manner similar to pipe joints conforming to AWWA C 40A. Shop drawings of the joint design shall be submitted to the Engineer for approval, prior to manufacture. Completed joint shall show no visible leakage and shall conform to the dimensional requirements of AWWA C 40A.

9-12.10 SHOP FABRICATED REINFORCED CONCRETE MANHOLE (New Section)
Where corrugated metal manhole are specified, they shall be as shown on the drawings and shall conform to the details as shown in the drawings. The base material and grout, if required, shall be as shown on the drawings. All pipe connections to the manhole shall be made with a standard bend type as shown in the drawings.

9-12.11 MONOLITHIC CONCRETE MANHOLE (New Section)
Monolithic Concrete Manholes shall conform to the Standard Plans.

9-12.12 TRAPS (New Section)
Where traps are required they shall be of the type specified and constructed in accordance with the Standard Plans.

SECTION 9-14 - ROADMILE SEATING AND ROADMILE PLANTING
Delete this title and replace with the following:

SECTION 9-14 - ROADMILE SEATING AND ROADMILE PLANTING

9-44.1 SOIL
Planting soil Type D shall be used unless otherwise specified on the drawings or in the Project Manual.

9-44.1(1) TOPSOIL TYPE A
The topsoil shall be friable surface soil from the A horizon as determined by the United States Agriculture Soil Conservation Service Soil Survey. Topsoil shall be free from materials toxic to plant growth; noxious weed seeds, diseases, roots; subsoil stones and other debris. One hundred percent of the topsoil shall pass through a 1 inch screen. Maximum electrical conductivity shall be 2.0 millimhos and the maximum exchangeable sodium percentage shall be 20 percent.

Topsoil Type A shall consist of a sandy clay loam, sandy loam, loam, clay loam, silty clay loam, or silt loam soil. These soil texture classes shall be determined by the United States Department of Agriculture Classification System. These texture classes shall be restricted by the following maximum percentage compositions based on the material passing the Number 10 screen:

<table>
<thead>
<tr>
<th>Separates</th>
<th>Allowable Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>80%</td>
</tr>
<tr>
<td>Clay</td>
<td>20%</td>
</tr>
</tbody>
</table>

The maximum allowable percentage of gravel retained on a 1/4 inch screen shall not exceed 20 percent by weight. Of the material passing the 1/4 inch screen, the maximum allowable percentage of gravel retained on a Number 10 screen shall not exceed 10 percent by weight. Total organic matter shall be 1 percent to 10 percent by volume. Organic matter shall be determined by the Walkley-Black sulfurous acid dichromate digestion process. The pH shall be 5.5 to 7.0.

9-44.1(2) TOPSOIL TYPE B
Topsoil Type B shall be native topsoil, as described in Section 8-01.327B, taken from within the project limits either from the area where roadway construction is to be performed or from stripings from borrow pit, or quarry sites, or from other approved State sources.

9-44.1(3) TOPSOIL TYPE C
Topsoil Type C shall be native topsoil meeting the requirements of Topsoil Type B but obtained from a source provided by the Contractor outside of the State owned right of way.

9-44.1(4) PLANTING SOIL TYPE D (New Section)
Planting soil shall consist of two-thirds soil and one-third organic material thoroughly mixed together.

The ingredients to be used in mixing planting soil shall meet the following requirements:

(a) Soil shall be sandy loam or loamy sand consisting largely of sand, but with enough silt and clay present to give it a small amount of stability. Individual sand grains can be seen and felt freely. When wet, the hand, when dry, it shall fall apart when the pressure is released on squeezing when wet, it shall form a ball that will not hold its shape when the pressure is released, but shall withstand careful handling without breaking.

Soil shall meet the following:
9-14 PRODUCTION CONTROL AND FORAGE PLANTING

<table>
<thead>
<tr>
<th>Size</th>
<th>Shave</th>
<th>Percent Finishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-7A</td>
<td>APF P-1</td>
<td>75-100</td>
</tr>
<tr>
<td>4-10</td>
<td>APF P-1</td>
<td>80-90</td>
</tr>
<tr>
<td>5-20</td>
<td>APF P-1</td>
<td>85-90</td>
</tr>
<tr>
<td>0.000</td>
<td>Clays</td>
<td>90-100</td>
</tr>
</tbody>
</table>

(b) Organic Matter: Organic matter shall be derived from sphagnum peat or approved substitutes such as fibrous sawdust, wood or wood type past, or well-rotted cow manure with a minimum of litter (straw, manure or shavings). Substitutes shall contain less than 20 percent of ash by dry weight, shall have a moisture content of less than 50 percent of the wet weight and shall have been thoroughly aerated during the drying process. Milled planting soil shall have a pH range of 5.0 to 6.5 with dolomitic lime added as necessary to attain this range.

The mixture shall be fertilized with a slow release fertilizer with a 14-14-14 formulation, or with urea or urea-hydrolzate, calcium nitrate, ammonium nitrate, and sulphate of potash manganate at rates indicated from a soil test or as directed by the Engineer.

All materials shall be pre-mixed prior to bringing to the job site.

9-14.1(5) PLANTING SOIL FOR TREE PITS (New Section)

Planting soil for tree pits shall consist of native soil excavated from the planting pit and thoroughly mixed with a commercial grade 14-14-14 formulation slow release fertilizer at an amount of 1 pound per inch of tree diameter.

9-14.2 SEED

Grasses, legumes, or cover crop seed of the type herewith specified shall conform to the standards for “Certified” grass seed or better as outlined by the State of Washington Department of Agriculture Rules for Seed Certification, latest edition. Seed shall be furnished in standard containers on which shall be shown the following information:

(a) Common name or seed
(b) Lot number
(c) Net weight
(d) Percentage of purity
(e) Percentage of germination (in case of legumes percentage of germination to include hard seed)

(f) Percentages of weak seed content and inset material clearly marked for each kind of seed in accordance with applicable State and Federal laws.

Upon request, the Contractor shall furnish to the Engineer duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed testing laboratory within six months before the date of delivery on the project. Seed which has become wet, mild, or otherwise damaged in transit or storage will not be accepted.

Seed mix shall be as specified in the Project Manual.

9-14.2(1) SEED MIX #1 (Highway Mix) (New Section)
The seed mixture and rate of application shall be as follows:

<table>
<thead>
<tr>
<th>Kind and Variety of Seed in Mixture</th>
<th>Percent by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colonial Ryegrass (Hillocks or Arthur)</td>
<td>40%</td>
</tr>
<tr>
<td>Red Clover (Tullibee, Rainbow or Premier)</td>
<td>60%</td>
</tr>
</tbody>
</table>

The rate of application shall be 2 pounds per 1000 square feet. The seed mixture shall be no less than 90% pure, and shall have a minimum germination rate of 90%.

9-14.2(2) SEED MIX #2 (Garden Mix) (New Section)
The seed mixture and rate of application shall be as follows:

<table>
<thead>
<tr>
<th>Kind and Variety of Seed in Mixture</th>
<th>Percent by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial Rye</td>
<td>40%</td>
</tr>
<tr>
<td>White Dutch Clover</td>
<td>10%</td>
</tr>
</tbody>
</table>

The rate of application shall be 2 pounds per 1000 square feet. The seed mixture shall be no less than 90% pure, and shall have a minimum germination rate of 90%.

9-14.2(3) SEED MIX #3 (Playground Mix) (New Section)
The seed mixture and rate of application shall be as follows:

<table>
<thead>
<tr>
<th>Kind and Variety of Seed in Mixture</th>
<th>Percent by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial Rye</td>
<td>35%</td>
</tr>
<tr>
<td>Tall Fescue</td>
<td>25%</td>
</tr>
<tr>
<td>Manhattan Perennial Rye</td>
<td>20%</td>
</tr>
<tr>
<td>Annual Rye</td>
<td>20%</td>
</tr>
</tbody>
</table>

The rate of application shall be 2 pounds per 1000 square feet. The seed mixture shall be no less than 90% pure, and shall have a minimum germination rate of 90%.

9-14.2(4) SEED MIX #4 (Field and Shade Mix) (New Section)
The seed mixture and rate of application shall be as follows:

<table>
<thead>
<tr>
<th>Kind and Variety of Seed in Mixture</th>
<th>Percent by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial Rye</td>
<td>35%</td>
</tr>
<tr>
<td>Manhattan Perennial Rye</td>
<td>25%</td>
</tr>
<tr>
<td>Red Creeping Fescue</td>
<td>20%</td>
</tr>
</tbody>
</table>

The rate of application shall be 2 pounds per 1000 square feet. The seed mixture shall be no less than 90% pure, and shall have a minimum germination rate of 90%.

297
9-14.3 FERTILIZER
Delete this section and replace with the following:

Fertilizer shall be a standard commercial grade of organic or inorganic fertilizer of the kind and quality specified herein. It may be applied in or mixed with the water used for irrigation, and/or in a mixture containing the percentage of total nitrogen, available phosporic acid, and water-soluble potash as the amounts specified. All fertilizers shall be labeled in standard commercial containers, with weight, name of plant nutrient and other information required by law. Each container shall have a guaranteed statement of analysis clearly marked, all in accordance with State and Federal laws.

Acceptable commercial fertilizer may be applied in one of the following forms:

(a) A dry free-flowing granular fertilizer suitable for application by agricultural fertilizer sprayer.

(b) A liquid fertilizer ready to be mixed with water, suitable for application by irrigation equipment.

(c) A granular or pelleted fertilizer, suitable for application by blower equipment.

(d) A non-volatile liquid fertilizer.

Fertilizer shall be standard commercial grade of formulation, 50 percent of the nitrogen shall be derived from 30 percent urea-ammonium phosphate at the rate of 12 pounds per 1,000 square feet. The Contractor shall provide a sample (2 pounds) of fertilizer to the Seattle Engineering Department Materials Laboratory.

9-14.4 MULCH
Amend this title to read:

9-14.4.1 MULCH AND AMENDMENTS

9-14.4.1(2) WOOD CELLOPHANE FIBER
Supplement this section with the following:

Wood cellulose fiber shall be applied at the rate of 60 pounds per 1,000 square feet.

9-14.4.5 ASPHALT EMULSION
Delete this section and replace with the following:

9-14.4.5(5) FILL

The fill shall be derived from approved sources and conform to ASTM D 2697 unless otherwise specified. The fill shall be spread and granulated to a 1:2-inch mesh screen and conditioned in storage piles for at least six months after acceptance. The fill shall not contain substances harmful to plant life.

9-14.4.6 VERMICULITE/PERLITE/PUMICE

Vermiculite, perlite, or pumice shall be horticultural grade and free of any toxic materials.

9-14.4.7 TACKIFIER

Tackifier used as a tie-down for mulch shall conform to, and is specified as one of the following:

Type A: Organic tackifier shall be derived from natural organic plant sources containing no growth or propagation inhibiting materials. It shall be applied in quantities sufficient to equal the penetration properties of a 0.9-mpa asphalt emulsion applied at the rate of 400 gallons per acre. Tackifier shall be hydrated in water and mixed with other slurry materials. Wood cellulose fiber shall be added to the tackifier as a toop at the rate of 150 pounds per acre. The tackifier shall be sprayed on the mulch after it is in place on the slopes.
All bare root plant materials shall have a heavy fibrous root system. All plants must be dormant at the time of planting.

Average height to spread proportions and branching shall be in accordance with the applicable sections, illustrations, and accompanying notes of the American Standard for Nursery Stock.

Plants, which have been determined by the grower to have suffered damage as the result of splitting of the roots, stem, or a major branch, have deformities of the stems or major branches; have a lack of symmetry; have dead or defoliated tops or branches; or have any defect, injury, or condition which renders the plant unsuitable for its intended use, will be rejected.

9-14.7(3) HANDLING AND SHIPPING

Delete this section and replace with the following:

All plant material shall be dug with care by experienced workmen. The root system of all plant material shall not be permitted to dry out at any time.

Evergreen and deciduous plant materials shall be furnished balled and burlapped (BB) unless otherwise specified. Balled and burlapped plants shall be handled by the bulk of earth and not the trunk. Unless otherwise specified, plants may be supplied in suitable containers or boxes. The container must be well-developed to hold the earth intact after removal from the container without root breakage. Handling and shipping shall be done in a manner that is not detrimental to the plants.

The nursery shall furnish a notice of shipment in triplicate at the time of shipment of each container(s) or other lot of plant material. The original copy shall be mailed to the buyer, the duplicate to the consignee and the triplicate shall be delivered to the nursery to the buyer. The buyer shall retain the following information:

(a) Name of shipper.
(b) Date of shipment.
(c) Name of consignee (including all names as specified in the contract).
(d) Consignee and delivery point.
(e) State contract number.
(f) Point from which shipped.
(g) Quantity contained.
(h) Certificate of grade (statement that material conforms to the specifications).
(i) Size (height, trunk diameter, caliper, etc. as required).
(j) Statement of root pruning (date and size of pruning).
(k) Signature of shipper by authorized representative.

All container grown plants shall be the container. All balled and burlapped plants shall be balled by the shipper.

Plants material shall be packed for shipment in accordance with prevailing practice for the type of plant being shipped, and shall be protected at all times against drying, sun, wind, heat, freezing, and other detrimental conditions. In the event that the plants were not protected properly, the plant material shall be temporarily held for 30 days transportation in closed vehicles, plants shall be handled and pruned properly to prevent damage. When transported in open vehicles, plants shall be protected by tarps or other suitable cover material.

9-14.7(5) LABELING

Delete this section and replace with the following:

Plants delivered shall have legible labels attached to each individual plant delivered as a separate unit or to each box, bundle, bale or container containing one or more plants. Labels shall give the necessary detailed information as to horticultural name, size, age, caliper or other data required to identify as conforming to specifications. A label shall be attached to each bunch or container, plant, information on the label shall show the quantity together with the plant classification or grades as specified in the order. In the event of delivery, the state of Washington Department of Agriculture shall be notified in writing of the labeling of plant material. Plant material with illegible or missing tags will be rejected by the buyer. All plants that are damaged or dehydrated shall have an individual tag on each plant.

9-14.7(4) DEFECTS

Delete this section and replace with the following:

The contractor shall, as soon as practical, inform the buyer as to the source of plant materials for the project. Approval of plant material for a project shall not be considered as final approval. The contractor shall notify the buyer as soon as possible of the advance of delivery of plants from the nursery to insure adequate time for inspection before planting.

All trees will be inspected by the Engineering Department Arboriculturist or his representative at the project site prior to planting. The contractor shall plant only those plants material approved by the Arboriculturist or his representative.

Root condition of plants furnished in containers shall be determined by removal of the plant from the container. Plants not meeting the requirements herein specified shall be immediately removed from the project and replaced by the contractor at no additional cost to the City.

Plants material delivered, inspected and approved for planting shall be planted immediately. Plants not immediately planted by the contractor may be temporarily stored upon written authorization from the Arboriculturist.

9-14.7(6) TEMPORARY STORAGE

Supplement this section with the following:

Plant material delivered and accepted shall be planted immediately. Plants that cannot be planted within a 1 day after arrival shall be "dusted-in" in accordance with accepted horticultural practices.

(a) Bare root plants shall be placed in trenches with roots covered with moist earth or other suitable material. All bare root material supplied in bales shall have the bale broken and placed in the trenches separately.

(b) Balled and burlapped plants shall have the root ball protected by moist earth, sand, or other acceptable material.

9-14.7(7) SOD

Delete this section and replace with the following:

All sod shall comply with the State and Federal laws, including parity, with respect to inspection, plant diseases, and insect infestation. Sod shall be planted in accordance with the specifications and as agreed upon at the time of contract. Sod shall be well established and ready for harvest when plantings are expected to be made.

Sod shall be sand, sandy-clay or similar soil that has been thoroughly incorporated with composted manure or other suitable organic matter. Sod shall be free of weeds and reasonably free of objectionable grasses.
9-14.7(8) FILL MATERIAL (New Section)

Fill material shall be a "Mineral Aggregate, Type 10" meeting the requirements of Section 4-03, or may be a native sandy loam, of medium texture without clay or rocks, obtained from selected roadway or trench excavated material.

The fill material shall be free of toxic amounts of acid or alkaline elements, brush, roots, sticks and other objectionable material. A 1 cubic foot sample of the fill material shall be submitted to the Engineer for testing and approval.

9-14.7(9) STAKES, GUTS, AND WRAPPI NGES

Stakes shall be wood and shall be installed as shown in the plans.

The minimum size of wire used for gaging shall be 14 gauge, soft drawn. Commercial plant ties may be used in lieu of hose and wire gaging upon approval of the Engineer.

Hose for gaging shall be nylon, rubber, or reinforced plastic and shall have an inside diameter of at least 1/4 inch.

Grass wrap shall be a crinkled waterproof paper weighing not less than 4.0 pounds per 100 square feet and shall be made up of two sheets cemented together with asphalt.
9-15.6 CHECK VALVES

Delete this section and replace with the following:

Gate valves shall be heavy duty bronze conforming to the requirements of ANSI Designation 8-61. Valves shall be of the same size as the pipe on which they are placed and shall have either flange or coupling connections. Service rating (for underground cold water) shall be 300 psi. Valves shall be of the double disk, taper seat type, with rising stem, union bonnet and bushing. Manufacturer’s name, type of valve and size shall be cast on the valve.

9-15.12 AUTOMATIC CONTROL VALVES

Delete this section and replace with the following:

Valves shall be of a "normally closed" design and shall be electric solenoid operated, having manual rating of 6.3 watts utilizing 24 volts AC power. Solenoids shall be directly attached to the valve bonnet or body with all control parts and parts completely internal. Valves shall be of 150 psi, bronze or bronze or type body bronze-varnished combination. The opening and closing speed of the valve shall be a minimum of 5 seconds for closing with a constant rate of closing, and a minimum of 3 seconds for opening with a constant rate of opening and closing. A manual control bleed cock shall be included on the valve to operate the valve without the requirement of electric current. A manual shutoff valve with cross handle for service operation is required for manual operation from fully closed to wide open. When the manual adjustment is set, the valve shall operate automatically to the adjusted position. A valve shall be completely stopped when the control valve is closed either manually or automatically. Automatic control valves and automatic controllers need not be of the same manufacturer.

9-15.9 DRAIN VALVES

Delete this section and replace with the following:

The Contractor shall install 3/4 inch male automatic ball check drain valve at the low point in the system. The drain valve shall be dropped to a pocket containing a minimum of 1/2 cubic yard of coarse gravel or crushed rock (3/4 inch to 3 inches size).

9-15.11 CROSS-CONNECTION CONTROL DEVICES

Delete this title, section, and subsections with the following:

9-15.11 BACKFLOW PREVENTION DEVICES (New Section)

When called for in the Drawings and Special Provisions or as required by the Seattle Water Department, backflow prevention devices shall be installed. All backflow prevention device installations are subject to inspection by authorized county or municipal authorities.

9-15.11(1) ATMOSPHERIC VACUUM BREAKERS (New Section)

Atmospheric vacuum breakers shall be of a type included in the Washington State Department of Social and Health Services listing of "Acceptable Atmospheric Vacuum Breakers" or other types with input approved. They shall be installed downstream of the last shutoff valve and a minimum of 6 inches above the highest outlet or overflow level of the irrigation system.

A vacuum breaker shall be attached to each hose bib.

9-15.11(2) PRESSURE VACUUM BREAKERS (New Section)

Pressure vacuum breakers shall be of a type included in the Washington State Department of Social and Health Services listing of "Acceptable Pressure Vacuum Breakers" or other types with input approved. They shall be installed a minimum of 26 inches above the highest outlet or overflow level of the irrigation system and located so that adequate room is available for maintenance and testing.

9-15.1(3) DOUBLE CHECK VALVE ASSEMBLIES (DCVA) (New Section)

Double check valve assemblies shall be of a type included in the Washington State Department of Social and Health Services listing of "Approved Double Check Valve Assemblies." Inspection of the entire system shall be performed by the Seattle Water Department. DCVA's shall be inspected and tested periodically during the life of the contract by backflow device testing certified by the Washington State Department of Social and Health Services. Units found to be defective shall be repaired or replaced.


9-15.1(4) REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION DEVICES (RPDB) (New Section)

Reduced pressure principle backflow prevention devices will be installed if waterlines or other chemicals are to be injected into the irrigation system. These units shall be of a type included in the Washington State Department of Social and Health Services listing of "Approved Reduced Pressure Backflow Devices." Inspection of the installation and the final test of the unit, to assure proper operation, shall be conducted by the Seattle Water Department. RPDB’s shall be inspected and tested periodically during the life of the contract by backflow device testing certified by the Washington State Department of Social and Health Services. Units found to be defective shall be repaired or replaced.


9-15.12 CHECK VALVES

Delete this section and replace with the following:

Check valves shall be heavy duty bronze or steel. The valves shall function by means of a bunged disc engaged from the body and held in place by the valve weight. Valves shall be of the size as the pipe line on which they are placed, unless otherwise specified, and shall have union or flanged connections. Service rating (for moderate cold water) shall be 200 psi. Manufacturer’s name, type of valve and size shall be cast on the valve.

9-15.17 ELECTRICAL WIRE

Delete this section and replace with the following:

Wire for control to valves shall be NEC Type 14 UF direct burial (UL approved), red or black for the hot side, white for neutral (white copper). The auxiliary wires, where required, shall be any third color (except green). UF and BX designations shall be clearly marked on the insulation jacket of all wires.

9-15.19 SCHEDULE 40 (New Section)

Schedule 40 shall be placed under all pavement in the locations shown on the Drawings. Size and installation shall be according to the Drawings and Standard Plans. Conduit shall meet the requirements of Section 8-20.

9-15.20 INSULATING MARKING TAPE

Insulating marking tape shall consist of inert polyethylene plastic that is impervious to all known alkalis, caustic, chemical reagents, and solvents likely to be encountered in the soil, with a metallic foil core to provide the most positive detection and pipeline location. The tape shall be color coded and shall be impractically over its entire length in permanent black ink to read "Caution - Buried Waterline Below."
SECTION 9-16 - FENCE AND GUARD RAIL

9-16.1(1) GENERAL

Delete paragraph 2 of this section and replace with the following:

The base material for the manufacture of steel pipes used for posts, braces, top rails, and gate frames shall conform to the requirements of ASME Designation A 106, except the weight tolerance on tubular parts shall be applied as provided below. The base material for the manufacture of steel H columns shall meet the requirements of ASME Designation A 663.

9-16.3(1) RAIL ELEMENT

Delete the first sentence of paragraph 1 and replace with the following:

The H-beam rail elements and terminal sections shall consist of 12 gauge steel formed into a beam not less than 11 inches wide and 3 inches deep. Guard rail Type 1A (Charm berm) and the transition sections shall consist of 10 gauge steel. Design F terminal sections shall consist of 10 gauge steel.

9-16.3(2) POST AND BLOCKS

Supplement this section with the following:

Timber posts shall be square, 8 inches by 8 inches S4S and shall conform to the grade specified in Section 9-6. The posts shall be shaped as shown on the standard plan before being treated.

9-16.4(3) FENCES

Delete paragraph 3 of this section and replace with the following:

The base material for the manufacture of steel pipes used for posts shall conform to the requirements of ASME Designation A 106, except the weight tolerance on tubular parts shall be applied as provided below. The base material for the manufacture of steel H columns shall meet the requirements of ASME Designation A 663.

9-16.4(1) RAIL AND BRACKET

Delete the first sentence of paragraph 1 and replace with the following:

Steel for rail elements and terminal sections shall conform to ASME Designation A 663.
PLASTIC TRAFFIC BUTTONS

SECTION 9-20 - PLASTIC TRAFFIC BUTTONS

Delete Section 9-20 in its entirety. Refer to Section 9-21 Plastic Traffic Buttons and Lane Markers.

PLASTIC TRAFFIC BUTTONS AND LANE MARKERS

2-21

SECTION 9-21 - LANE MARKERS

Delete the title of Section 9-21 and replace with the following:

SECTION 9-21 - PLASTIC TRAFFIC BUTTONS AND LANE MARKERS

9-21.1 LANE MARKERS TYPE 1

Delete this title and section, and replace with the following:

9-21.1 PLASTIC TRAFFIC BUTTONS AND LANE MARKERS TYPE 1 (New Section)

Plastic Traffic Buttons and Lane Markers Type 1 shall be essentially in the form of a single-based spherical segment, composed of thermosetting resins and pigments and of uniform composition throughout. The color shall be yellow or white to correspond to the delineation line color.

9-21.1(1) PHYSICAL AND CHEMICAL PROPERTIES

Delete this section and replace with the following:

The exposed surface shall be free of chips, cracks, voids, and other irregularities which interfere with appearance or application. The bottom surface may have molded patterns but shall not show general convexity or concavity in excess of 1/8 inch.

The packing process shall be such that coarse aggregate particles on the curved surface are covered by not less than 1/16 inch of pigmented material.

The plastic traffic buttons and lane markers Type 1 shall meet the following requirements:

<table>
<thead>
<tr>
<th>TRAFFIC BUTTON</th>
<th>LANE MARKER</th>
<th>TRAFFIC BUTTON</th>
<th>LANE MARKER</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Description)</td>
<td>TYPE 1</td>
<td>TYPE 1</td>
<td>TYPE 1</td>
</tr>
<tr>
<td>2-21 s to</td>
<td>1/16 s to</td>
<td>1/16 s to</td>
<td>1/16 s to</td>
</tr>
<tr>
<td>1-1/4&quot;</td>
<td>1-1/4&quot;</td>
<td>1-1/4&quot;</td>
<td>1-1/4&quot;</td>
</tr>
<tr>
<td>Weight (grams)</td>
<td>9.00 ± 0.5</td>
<td>9.00 ± 0.5</td>
<td>9.00 ± 0.5</td>
</tr>
<tr>
<td>Impact Resistance</td>
<td>90% Ref.</td>
<td>90% Ref.</td>
<td>90% Ref.</td>
</tr>
<tr>
<td>Thermal Stability</td>
<td>135°F</td>
<td>135°F</td>
<td>135°F</td>
</tr>
<tr>
<td>Impact Strength (Flexural Resistance)</td>
<td>0.05 mm.</td>
<td>0.125 mm.</td>
<td>0.125 mm.</td>
</tr>
<tr>
<td>(By weight)</td>
<td>25 min.</td>
<td>25 min.</td>
<td>25 min.</td>
</tr>
<tr>
<td>(By weight)</td>
<td>25 min.</td>
<td>25 min.</td>
<td>25 min.</td>
</tr>
</tbody>
</table>
| 9-21.1(2) TEST METHODS (New Section)

Test methods shall be as follows:

(a) Reflectance: Reflectance will be measured with a photopic Reflectance Meter or its equivalent by comparing the buttons to a 75 percent brightness standard.

(b) Flexural Strength: Flexural strength will be measured by placing the button base down on two 3/8

(c) Impact Resistance: Impact resistance will be measured by allowing a 1 pound steel ball to fall 15

(d) Titanium Dioxide Content: The titanium dioxide content will be determined by using representative

298
and measuring the diameters of the fillets at about 410 millimeters. Calibration shall be with known samples using ASTM designation 691.

(c) Reinf Content: Rein content will be determined by asking and utilizing representative portions of the material.

Additional information on the test methods is available from the Materials Laboratory of the Seattle Engineering Department.

SECTION 9-22 - MONUMENT CASES

Delete the title and content of Section 9-22 in its entirety and replace with the following:

SECTION 9-22 - MONUMENT FRAMES AND COVERS (New Section)

Monument frames shall be cast iron and as indicated on Standard Plan No. 020. Castings shall conform to the requirements of ASTM Designation A-48, Class 30 and shall be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects which would impair soundness. Repair of defects by welding, or by the use of "smooth-on" or similar material, shall not be permitted. The manufacturer shall certify that the product conforms to the requirements of these specifications.

A bluestone coating meeting the requirements of Section 9-05 shall be applied to all faces.

Monument castings shall be machine finished or ground on mating surfaces to ensure non-rocking fit in any position, and interchangeability. These shall be easily available at the factory standard frames and standard covers for use by the installer in testing fit and mating.
CONCRETE CURING MATERIALS AND ADHESIVES

SECTION 9-23 - CONCRETE CURING MATERIALS AND ADHESIVES

9-23.3 TRANSIENTER CURING COMPOUND (New Section)
The compound, at the time of application, shall be a liquid that is free from suspended matter and sufficiently low in viscosity to result in an even, uniform coat when applied by spraying.

The compound shall be sufficiently transparent and free from permanent color to retain in an unbroken chain color from that of the natural concrete at the conclusion of the curing period. The compound shall remain a dye of color strength sufficient to render the film distinctly visible on the concrete for at least 4 hours after application.

The loss of moisture shall not exceed 2 grams per square meter when subjected to the Test for Moisture Retaining Effectiveness of Concrete Curing Compounds. Details of the test method are available from the Materials Laboratory of the Washington State Department of Transportation in Olympia, Washington.

9-23.4 VACANT

9-23.9 CONCRETE MIXES INCORPORATING FLY ASH (New Section)
Delete Section 9-23.9 in its entirety and replace with the following:

Concrete mixes incorporating fly ash may be utilized for all classes of concrete, unless otherwise noted in the Special Provisions. Mix proportions will be subject to approval by the Engineer and shall be in compliance with the following conditions:

(a) Fly ash may be used to replace up to 30 percent of portland cement at the rate of 1.14 pounds fly ash for each pound of portland cement replaced.

(b) Cement replacement may be used subject to confirmation and approval of the proposed mix by the Engineer for concrete Class B when used in load bearing portions of bridges, culverts and retaining walls and for all concrete Class A and Class A1 and other classes of concrete specified in the Special Provisions, which require a minimum compressive strength of 4,000 pounds per square inch, or greater, at 28 days, subject to the following mix design requirements:

(1) The Contractor shall design a mix that meets the specified strength requirements in conformance with ASTM C 94, Section 3.3, Standard Practice for Concrete Made with portland cement and Water and fly ash. The concrete strength criteria shall be per ASTM C 94, Section 3.3, using the minimum compressive strength of concrete at 28 days as listed in Section 3.3.1(3) of the Standard Specifications. A coefficient of variation of 20 percent shall be assumed unless the supplier can justify a lower value. A minimum of 30 sets of cylinder breaks, each set from a different batch of the same proposed mix design, are required to establish a coefficient of variation. A set of cylinder breaks shall consist of the average of 2 cylinders.

(2) The mix shall be approved by the Engineer and verified by submittal of ingredients and batching of specimens made from the mix prior to use in the project.

(3) Confirming mix tests shall be made with the proposed production aggregate, type and source of portland cement and fly ash, and specific brands and proportions of admixtures to be used in the project. The test mix shall be air cured at 70°F.

(c) Cement replacement may be used without further confirmation testing of the proposed mix for concrete Class D, and Class D1 and Concrete Class B for applications other than those listed in Item 3.

(d) In making calculations relative to cement factor or allowable water content, the total proportions of cement shall be considered to be the weight of portland cement plus the weight of fly ash substituted.

(e) All concrete of the same class within a structure shall contain the same proportion of fly ash.

As an alternative to the use of fly ash and cement as separate components, a blended hydraulic cement may be used. Concrete made with blended hydraulic cement shall meet the requirements listed. In addition, the origin and percentage of fly ash shall be certified on the cement mill test. The blended hydraulic cement shall comply with ASTM C 595-83 Type IV SB.
SECTION 9-27 – CRUSHING

9-27.2 FIBER-REINFORCED METAL CRUSHING
This section is deleted.

9-27.3(1) WIRE
Delete paragraph 3 and replace with the following:

Stainless steel fasteners for use with Type 3 fasteners shall be fabricated of 304 grade stainless steel. The fasteners shall be capable of sustaining a load of 600 pounds without breaking when tested in tension. The berths of the steel shall be such that the clips can be opened 1/4 inch without permanent deformation.

SIGN (New Section)

9-28

9-28.1 SIGNS (New Section)

9-28.1(1) GENERAL (New Section)

Signs to be exposed on wood utility poles (other than City Light) and signs installed overhead shall be HIGH DENSITY OVERLAY plywood. Other signs shall be either HIGH DENSITY OVERLAY plywood or sheet aluminums.

Parking and pedestrian control signs may be nonreflected. All other traffic signs shall be reflected.

STOP and YIELD sign backs and edges shall be painted with one coat of red enamel to catch the red on the sign face.

Regulatory and warning signs shall have rounded corners with the exception of STOP signs. All other signs shall have square cut corners. Borders for signs having square cut corners shall have a corner radius approximately 1/8 of the lesser side dimension of the sign up to a maximum radius of 1/2 inches. For signs with rounded corners, the borders shall be concentric with the rounded corners.

9-28.1(2) PLYWOOD (New Section)

Plywood signs shall be constructed of HIGH DENSITY OVERLAY plywood, meeting the requirements of "Products Standard PS 7-83 for Smooth Finish, Construction and Industrial" published by the Product Standards Section of the U.S. Department of Commerce. The plywood shall be free of contaminants which would adversely affect the application or life of the sheeting to be applied. Face veneers shall be Grade B or better.

Core and casement veneers shall be solid. Core veneers shall be isolated, and core gaps shall not exceed 1/6 inch in width. The entire area of each supporting veneer surface shall be bonded with a high bond adhesive that meets the requirements of the U.S. Department of Commerce for exterior type plywood.

The overlay shall be of the high density type. It shall have a minimum weight of 60 pounds per thousand square feet of surface and shall be at least 0.012 inches thick before gluing. The overlay shall have a sufficient resin content to bond itself to the plywood, with a minimum resin content of 45 percent based on the dry weight of the impregnated fiber.

Thickness—Single Panel Plywood Signs:

Up to 18 inches inclusive in width ............. 3/8 inch
Over 18 inches to 36 inches inclusive in width .... 5/8 inch
Over 36 inches in width .................. 3/4 inch

Overhead signs ...................... 3/4 inch

Street designation signs and signs mounted on sign stems or post arms shall have the sign back and edges primed with 1 coat of white exterior enamel undercoat and finished with 1 coat of interior paint. Street designation signs shall be commercially coated with a high bond exterior enamel primer undercoat and finished with 1 coat of white exterior enamel. The primer shall be as recommended by the supplier of the finish coat. The finish enamel shall meet the requirements of Federal Specification TT-E-489.

9-28.1(3) SHEET ALUMINUM (New Section)

Sheet aluminum signs shall be constructed of alloy 6061-T6.

After the sheeting has been fabricated, the sheeting shall be degreased and etched by immersion for a minimum of 3 minutes in a 5 ounce per gallon muriatic acid solution at 120 degrees F, followed, in order, by a water rinse, deoxidizer, water rinse, hot water rinse, and drying. The etching process
9-28 (New Section)

The sheeting surface shall be solvent resistant such that it may be cleaned with gasoline, NAP Naphtha, mineral spirits, turpentine, naphtha, or similar solvents.

The embossed lens sheeting, when applied according to manufacturer’s recommendations to cleaned and coated 0.033-inch x 3-inch x 6-inch aluminum, conditioned 24 hours, and tested at 72 degrees F. and 50 percent relative humidity, shall be sufficiently flexible to show no cracking when bent around a 3/4-inch diameter mandrel.

Conditioned for 48 hours, the tensile strength of the embossed lens sheeting shall be 5 to 7 pounds per linear inch when tested in accordance with AASHTO Designation 903B. Following these periods, the tensile strength per linear inch shall be more than 0.45-inch in 10 minutes or more than 0.35-inch in 24 hours in any dimension per 0.033-inch square at 75 degrees F. and 50 percent relative humidity.

The encapsulated lens sheeting, when measured, conditioned for 24 hours at 72 degrees F. and 50 percent relative humidity, shall be sufficiently flexible to show no cracking when bent around a 1/8-inch diameter mandrel with adhesive side contacting the mandrel.

The protective liner attached to the adhesive shall be easily removable by peeling without losing in waste or other solvents.

The protective adhesive backing shall be a tack free, best activated type or pressure sensitive type, either of which shall adhere to the sheeting without the necessity of additional costs of adhesive.

The adhesive shall form a durable bond to smooth, corrugated and weather-resistant surfaces and permit the reflective sheeting to adhere securely for 48 hours after application at temperatures of 70 degrees F. to 90 degrees F. The adhesive bond shall be sufficient to render the applied sheeting weather-resistant and prevent its peeling off when subjected to a stress at the service normally experienced during the application when a 5-pound test per inch which force is applied as outlined in AASHTO Designation 903B.

9-28 (New Section)

The sheeting surface shall be solvent resistant such that it may be cleaned with gasoline, NAP Naphtha, mineral spirits, turpentine, naphtha, or similar solvents.

The embossed lens sheeting, when applied according to manufacturer’s recommendations to cleaned and coated 0.033-inch x 3-inch x 6-inch aluminum, conditioned 24 hours, and tested at 72 degrees F. and 50 percent relative humidity, shall be sufficiently flexible to show no cracking when bent around a 3/4-inch diameter mandrel.

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9-28 (New Section)

The sheeting surface shall be solvent resistant such that it may be cleaned with gasoline, NAP Naphtha, mineral spirits, turpentine, naphtha, or similar solvents.

The embossed lens sheeting, when applied according to manufacturer’s recommendations to cleaned and coated 0.033-inch x 3-inch x 6-inch aluminum, conditioned 24 hours, and tested at 72 degrees F. and 50 percent relative humidity, shall be sufficiently flexible to show no cracking when bent around a 3/4-inch diameter mandrel.

Conditioned for 48 hours, the tensile strength of the embossed lens sheeting shall be 5 to 7 pounds per linear inch when tested in accordance with AASHTO Designation 903B. Following these periods, the tensile strength per linear inch shall be more than 0.45-inch in 10 minutes or more than 0.35-inch in 24 hours in any dimension per 0.033-inch square at 75 degrees F. and 50 percent relative humidity.

The encapsulated lens sheeting, when measured, conditioned for 24 hours at 72 degrees F. and 50 percent relative humidity, shall be sufficiently flexible to show no cracking when bent around a 1/8-inch diameter mandrel with adhesive side contacting the mandrel.

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The adhesive shall form a durable bond to smooth, corrugated and weather-resistant surfaces and permit the reflective sheeting to adhere securely for 48 hours after application at temperatures of 70 degrees F. to 90 degrees F. The adhesive bond shall be sufficient to render the applied sheeting weather-resistant and prevent its peeling off when subjected to a stress at the service normally experienced during the application when a 5-pound test per inch which force is applied as outlined in AASHTO Designation 903B.
9-28.2 SIGN COVERING (New Section)

Sign covering shall consist of 4 mil minimum thickness black polyethylene sheeting.
9-29

PAVEMENT MARKING (New Section)

(b) Weight per gallon = Federal test method standard 141A, Method 4621A.1.
(c) Contrast ratio = Federal test method standard 141A, Method 4621I procedure "P", method "F".
(d) Daylight reflectance = Federal test method standard 141A, Method 4621I using standard as prescribed in Par. 1.2.2.
(f) Pigment content = Federal test method standard 141A, Method 4621I.1.
(g) Dispersion = Federal test method standard 141A, Method 4641I.1.
(h) Flexibility = The paint shall show no cracking, flaking, or loss of adhesion when tested in the following manner:

Apply a set film thickness of .005 inches with a film applicator to a 3 x 5 in panel weighing 0.39 ± 0.01 lbs., per square foot previously cleaned with benzene and lightly buffed with steel wool. Dry the paint film at 70 ± 10 degrees F. in a horizontal position for 16 hours, then bake in an oven 3 hours at 212° ± 2 degrees F. Cool to room temperature for at least 1/2 hour and bend over a 1/2 inch diameter rod and examine.

(i) Dry to no-drip - The reflectorized line, when applied at a rate of 10 sq ft per film thickness and 4 pounds of glass spheres per gallon of paint, shall dry to no-drip within 10-30 seconds. For test purposes, the line shall be applied using a stripper of a thickness equal to the thickness of the line as measured with a microtome. At 10-30 seconds after the paint has dried, the stripper shall be removed from the line, and the line shall be measured with a 0-100% reading stripper with 80% reflectivity at 0.005 inch thickness. The line shall be dry to no-drip within specified time range when the pavement temperature is 75 degrees F., or more and the relative humidity is 30 percent or less, providing that the pavement is dry. Dry to no-drip test shall be performed by having a standard test vehicle, coasting across the paint stripe (no swerving or accelerating). A successful no-drip test shall be considered one in which at least 3 of 4 samples show visible paint from the striping being stripped onto the adjacent pavement when viewed standing 20 feet from the striping. Each test sample shall be evaluated by using the above procedure when complete, and the test shall be considered as completed if 3 samples prior to the no-drip test being performed. All field testing shall be performed in the field where the line is used in knowledge of which sample is from which manufacturer. All testing shall be performed without the manufacturer's knowledge. The manufacturer shall provide test results for their sample(s) upon request.

(j) Bleeding over asphalt = AFS standards.

D 90 using substrate as in Par. 3.2 except reflectance measurement over asphalt paper area is compared to reflectance measurement over taped area.

Reflectance over asphalt paper area

- REFERENCES OVER TAPED AREA - X 100 = 2 BLEEDING OVER ASPHALT

9-29.3 COMPOSITIONAL REQUIREMENTS (New Section)

(a) Pigment Composition

Pigments shall be first quality paint grade pigments. White or white with the yellow reflectorized paint used for the white traffic line, shall meet the requirements of AFS D 201-67, Type III. The Titanium Dioxide for the white traffic line shall meet the requirements of AFS D 40-07 Type II, No. 71. The inert or filler pigments must be of a type and quality generally recognized as first quality paint grade products and shall not contribute to settling of the paint on storage or be so hard as to cause excessive wear of the spray application equipment.

(b) Vehicle or Business Mixture Composition

The vehicle may be any combination of natural or synthetic resinous materials. Chlorinated rubber combined with other natural or synthetic resins and plasticizers is the preferred mixture. All resin used must be of a quality capable of resisting vapor and air pollution. The fuel or fuel oil used in the engine of the vehicle or business mixture must be suitable for use with the mixture and the vehicle or business mixture. The vehicle or business mixture shall be stored in accordance with Paragraph 9.9.1.2 of this specification. The purpose of the above requirement is to minimize buildup of the paint on the sides of tanks, paint lines, and clogging of spray equipment from incompletely dried.
9-30 WATER DISTRIBUTION MATERIALS

SECTION 9-30 - WATER DISTRIBUTION MATERIALS

GENERAL

Delete the Section "General" and replace with the following:

All materials for water distribution and transmission shall be new. Except that materials used for temporary water supply and temporary service connections shall be either new or previously used only on temporary portable water supplies, and shall be subject to Seattle Water Department inspection and approval prior to installation.

Prior to ordering any pipe to be used in a portable water supply, the Contractor shall submit the material source, in accordance with Section 9-30.1 and obtain the Engineer's approval.

9-30.1 PIPE

9-30.1A DUCTILE IRON PIPE

Delete this section and replace with the following:

(a) Ductile iron pipe shall be centrifugally cast in 10-foot marked lengths conforming to AWWA C111 and shall have a constrictor lining conforming to AWWA C150. Ductile iron pipe shall be accepted using restrained joints shall be installed in accordance with Section 9-30.1B. All other Ductile iron pipe shall be standard thickness Class 30 or the thickness class shown on the Drawings and/or Special Provisions.

(b) Non-restrained joints shall be rubber gasket, push-on type, or mechanical joint conforming to AWWA C111.

(c) Tension joints shall be as specified in Section 9-30.27.

(d) Special pipe coatings shall be in accordance with Section 9-30.22.

(e) Pipe with threaded flanges shall not be used.

9-30.1B ABSORPTION-CONCRETE PIPE

Delete this section.

9-30.1C CONCRETE CYLINDER PIPE

Delete paragraph 1 and replace with the following:

Concrete cylinder pipe shall be identified, prestressed concrete cylinder pipe with steel cylinder core. The pipe shall conform to AWWA C900, and shall be designed for the minimum pressure as specified on the Drawings or Special Provisions. The pipe manufacturer shall provide design calculations, tabulated dimensions, details of specials and fittings. Specials and fittings shall be subject to the same hydrostatic test required for square sections. Tension joints shall be provided where shown on the Drawings.

Identification marks shall include design pressure and other data outlined in Section 1.6 of AWWA C900.

Class, class marking, specials, lengths, etc., shall be as indicated on the Drawings or the Special Provisions. All items listed in Section 1.5 of AWWA C900 shall be provided for each batch of the pipe supplied. Concrete mortar lining thickness tolerance shall be not more than ± 1/16-inch.

9-30.1D STEEL PIPE

Delete this section and replace with the following:

9-30.1D(1) STEEL PIPE LESS THAN 4 INCHES DIAMETER (New Section)

Steel pipe smaller than 4 inches in diameter shall conform to AWWA Designation A 120, Schedule 40 and shall (including couplings) be hot dip galvanized inside and out. The pipe shall be coupled by using millable iron screw coupling in accordance with AWWA Specification B16.5.

9-30.1D(2) STEEL PIPE 4 INCH DIAMETER AND LARGER (New Section)

Steel pipe 4 inches in diameter and larger shall conform to AWWA C500. The type of protective coating and lining and other supplementary information required by AWWA C500 shall be included on the Drawings and/or in the Special Provisions.

9-30.1D(3) STEEL CASTING PIPE (New Section)

Steel casting pipe shall conform to the above sections and shall have a diameter and wall thickness as shown on the Drawings and/or in the Special Provisions. The pipe shall be smooth and bare.

9-30.1E POLYVINYL CHLORIDE (PVC) PIPE (4 INCHES AND OVER)

Delete paragraph 1 and replace with the following:

PVC pressure pipe shall conform to the requirements of AWWA C500, Class 200 (Schedule 40). Standard lengths shall be 20 feet (6000 mm). PVC pipe shall have the same outside dimensions as ductile iron pipe. PVC pipe for distribution pipelines shall be pressure Class 125. The pipe shall bear the seal of the National Recognition Foundation for pressure pipe. The Contractor shall furnish the purchaser an affidavit that all delivered materials comply with this specification. The manufacturer shall furnish a sample report in accordance with AWWA C500. Pipe joints shall be made with a rubber ring and thickened bell. Bell and socket joint pipes shall not be permitted. All pipe shall be listed by laboratories, Laboratories, Inc.

All PVC pipe shall be considered flexible conduit. Joints shall conform to AWWA D 3139 using a restrained rubber gasket conforming to AWWA D 475.

9-30.2 FITTINGS

9-30.2A DUCTILE IRON PIPE

Delete this section and replace with the following:

Fittings for ductile iron pipe shall be ductile iron conforming to AWWA C110 and C111 or AWWA C553 and shall be constrictor lined conforming to AWWA C150. Except where restrained joint systems are required, mechanical or push on joints may be used. Where restrained joint pipe is required, threaded flanges by restrained joint adapters shall not be longer than these pipe diameters. Threaded flanges and pipe shall conform to AWWA C553. The exterior flange lip overlapping the pipe barrel shall be sealed with a butylrubber metric. threaded flanges will be allowed only on ductile iron pipe. Pipe with threaded flanges shall not be allowed.

9-30.2B ABSORPTION CONCRETE PIPE

Delete this section.
9-30.2C CONCRETE COLUMNS PIPE
Delete this section and replace with the following:
Fittings for Concrete Cylinder Pipe shall meet requirements of AASHTO C65 and shall be in accordance with details in the Drawings or Special Provisions.

9-30.2D STEEL PIPE
Delete paragraph 1 and replace with the following:
Fittings for steel pipe 3-1/2 inches in diameter and smaller shall be available from threaded type with a right hand thread fitting of 120 psi. [Dimensioning pie] see to ANSI B 16.3. Threaded shall conform to ANSI B 1.2. Material shall conform to ASTM A 106, Grade 3510. All fittings shall be beaded and hot-dip galvanized inside and out.

Delete paragraph 3 and replace with the following:
Steel fittings for pipe 4 inches in diameter and larger shall be in accordance with AASHTO C65. The class of the fittings shall be at least the same as that of the pipe. Coatings for the fittings shall be the same as specified for the pipe. Field couplings shall be compression type. Wenn flanges are required, they shall conform to AASHTO C65. All couplings shall be coated the same as the pipe.

9-30.2E TENSION JOINTS
Delete this title and section and replace with the following:
9-30.2E RESTRAINED JOINTS (New Section)
Restrainted joints, where required on the Drawings, shall be 3R Flex Restraint Joint Pipe as manufactured by U.S. Pipe Co., or approved equal.

Where restrained joint pipe is required, threaded flanges by restrained joint adapters shall not be longer than three pipe diameters. Threaded flanges and pipe shall conform to AASHTO C155. The exterior flange lip overlapping the pipe barrel shall be sealed with a lead based mastic.

9-30.2G TRANSITION REDUCING AND FLEXIBLE COUPLINGS
Delete this title and section and replace with the following:
9-30.2G TRANSITION REDUCING, FLEXIBLE COUPLINGS AND SLEEVES (New Section)
Transition couplings, reducing couplings, sleeves, and flexible couplings for water mains shall be compression type, Smith-Bliss, Drexler, or approved equal, constructed with gray or ductile iron sleeves and ductile or malleable iron followers. Walls and walls shall be ductile iron unless otherwise noted on the Drawings and/or in the Special Provisions. Couplings and sleeves shall be the long body pattern with a minimum length of 10 inches for pipe up to 12 inches diameter and 12 inches minimum length for pipe greater than 12 inches diameter. Factory finish shall be the standard of the manufacturer.

9-30.2H RESTRAINED FLEXIBLE COUPLINGS
Delete this title and section, and replace with the following:
9-30.2H RESTRAINED FLEXIBLE COUPLINGS AND SLEEVES (New Section)
Restrainted flexible couplings or sleeves shall be in accordance with the Drawings and the Special Provisions.

9-30.2I SPECIAL FITTINGS (New Section)
Special fittings shall be in accordance with the Drawings and Special Provisions.

9-30.2J SPECIAL PIPE COATINGS (New Section)
Special pipe coatings shall be in accordance with the Special Provisions.

9-30.2K END ICH BLOW OFF ASSEMBLY (New Section)
2-inch blow off assembly shall be as indicated on the Drawings.

2-inch plastic service pipe shall be polyethylene PE 3600, and shall conform to Section 9-30.2I2. 2-inch pipe valves and operators shall be Kennedy 427, Nyno-Front 121, Slidex 8-10, or approved equal. Plastic PCCP material shall conform to Section 9-30.2I3. Ring and Cover shall conform to Section 9-30.2I4. Tether has shall conform with Section 9-30.2I5.

9-30.2L PLASTIC FLEX (New Section)
Plastic flex used in water main construction for water mains, valve chambers, valve bases, pipe protection and various pipeline uses shall meet the Federal Spec. 999-2-15722, Type 1, Class 2.

9-30.2M PORTLAND CEMENT CONCRETE (New Section)
Concrete for pipe support saddles and covers and for trench blocking shall be Class 1, 0-74.

9-30.2N POLYURETHANE ENCAPSULATION (New Section)
Polyurethane filler for encapsulation of ductile iron pipe and fittings shall conform to AASHTO C155. Minimum thickness shall be 8 mil.

9-30.2O STEEL Casing Pipe (New Section)
Steel casing pipe shall conform to Section 9-30.1D and shall have a diameter and wall thickness as specified on the Drawings. Pipe shall be smooth and bare.

9-30.2P STEEL PIPE CASING SEALS AND SLEEVES (New Section)
Casing seals shall be used to seal the ends of the casing with the water main. These seals may be Multiflex Welded Type or Half on Horizontal Type as manufactured by P.A. Wilcox Company, or approved equal.

Casing Insulators (Spacers) shall be used to isolate the steel casing pipe from the water main. The Insulator (Spacer) shall be Wilcox Model 60 as manufactured by P.A. Wilcox Company, or as manufactured by Wilcox Manufacturing Company, or approved equal.

9-30.3 VALVES
GENERAL - MANUFACTURE AND MARKING (New Section)
The valves shall be a standard pattern of a manufacturer whose products are approved by the Seattle Water Department and shall have the name or mark of the manufacturer, year valve casting was made, size, and working pressure plainly cast in raised letters on the valve body.

9-30.3A GATE VALVES
Delete this section and replace with the following:
Gate valves, 3 inches through 12 inches sizes shall conform to AWWA C500 and shall be iron body, return-rotated, double disc with bronze wearing device, non-rising stems, and 0-15 stuffing box. Valves shall open to the left, counterclockwise when viewed from above, and shall be equipped with a standard 4-inch 3-inch square operating rod.
Three certified copies of performance tests complying with ASA C600 shall be submitted to the Engineer.

Unless otherwise indicated on the Drawings, valve ends may be mechanical or push on bolts. Where restrained joints are called out, valve ends shall be flanged with appropriate flanges by restrained joint adapters per Section 9-30.2A.

The valves shall be manufactured by Russell, Stockton, Indiana, C.W. & R., American/Valve, Crane, M.V. & G., Mueller and Kennedy or approved equal in size 12 inches or less.

The Contractor has the option of furnishing butterfly valves specified in Section 9-30.10 in lieu of gate valves for 3 inches through 12 inches valves, except for 6-inch size auxiliary valves for fire hydrants.

Gate valves 2-1/2 inches and smaller shall be bronze, non-rising stem, F.L. or S.P. inlet and outlet threading conforming to ANSI B 16.1, with hand wheel type operator and shall be subject to 150 pounds water working pressure rated unless otherwise noted on the Drawings and/or in the Special Provisions. The 2-1/2 inches and smaller valves shall be manufactured by Kennedy, Bisco-Scott, Mueller or approved equal.

9-30.2A GATE VALVES 16 INCHES AND LARGER

Delete this section.

9-30.3X BUTTERFLY VALVES

Delete this section and replace with the following:

Butterfly valves shall conform to ASA C604 and shall be Class 150. The valve shall be short-body type. If flanged ends are required they shall be flared and drilled in conformance with ANSI B 16.5 Class 150. Valve shall be suitable for direct burial installation.

Unless otherwise indicated on the Drawings, valve ends may be mechanical or push on bolts. Where restrained joints are called out, valve ends shall be flanged by restrained joint adapters per Section 9-30.2A.

Valves shall be mounted on the water main or pipeline such that the operating nut is accessible from directly above.

Operator shall be manual, fully enclosed, and suitable for buried service. It shall open left (counterclockwise when viewed from above), and shall be equipped with a standard ASA 2 inches square operating nut.

Operators for 16-inch and larger valves shall be equipped with external indicators, visible from above, which show the position of the valve disc.

9-30.45 WATER DISTRIBUTION MATERIALS

The minimum number of turns from fully open to fully closed shall be as follows:

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 inches to 6 inches</td>
<td>16 turns</td>
</tr>
<tr>
<td>10 inches to 12 inches</td>
<td>28 turns</td>
</tr>
<tr>
<td>14 inches to 18 inches</td>
<td>34 turns</td>
</tr>
<tr>
<td>20 inches to 25 inches</td>
<td>41 turns</td>
</tr>
<tr>
<td>26 inches</td>
<td>51 turns</td>
</tr>
<tr>
<td>30 inches</td>
<td>61 turns</td>
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<tr>
<td>36 inches</td>
<td>72 turns</td>
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<tr>
<td>42 inches</td>
<td>86 turns</td>
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<tr>
<td>48 inches</td>
<td>96 turns</td>
</tr>
<tr>
<td>54 inches and larger</td>
<td>200 turns</td>
</tr>
</tbody>
</table>

An affidavit of compliance stating that the values furnished fully comply with ASA C604 and the modifications contained herein shall be furnished to the Engineer by the manufacturer.

The valve bodies shall be cast iron except where approved corrosion resists. Wearing surfaces shall be bronze or other approved corrosion resistant metals. Wearing surfaces shall be bronze or other approved corrosion resistant metals. Valve bodies shall be reinforced and finished to the best standard like manner, and all wearing surfaces shall be easily replaceable.

The butterfly valves shall be manufactured by Henry Pratt Company, Dresser Industries, Kennedy Valve Division of ITT Goulds Valve Company, Inc., American Valve, or approved equal.

9-30.5X VALVE BOXES

Delete this section and replace with the following:

Unless otherwise noted on the Drawings or in the Special Provisions, valve boxes shall be installed on all buried valves. The box and lid shall be cast iron, 3-place slip type with cast iron extension as necessary, conforming to requirements and dimensions of the latest City of Seattle Water Department Standards.

The cover shall have the word "WATER" or the letters "W" cast in it.

Valve box, lids and extensions of the following manufacturer and pattern are approved for use.


Top Section: G 100-27
Base Section: G 100-33
Lid Section: G 130-50

Rich Top Section and Lid 845 with Rich standard base and extension.

Each top and lid section shall beTests for accurate fit and shall be marked in sets for delivery. Valve box extension pieces shall be provided for valves with ground cover in excess of the depth of the standard valve box.

9-30.30(1) VACUUM

Delete this section.

9-30.36 VALVE BASER FOR VOLTS

Delete this section.

9-30.3X TAPPING SLEEVE AND VALVE ASSEMBLY

Delete this section and replace with the following:

Tapping sleeves for use on pipes, not having special coatings or protection, shall be Mechanical Joint Type, Galvanized, flanged joint outlet conforming to ANSI B 16.1, Class 150, Driving. Sleeves shall have a tapping gate valve retaining ring groove.

Tapping sleeves shall be of a size designed by the manufacturer to fit the pipe called for on the Drawings and/or in the Special Provisions. It is the Contractor's responsibility to determine the
outside dimension of the pipe and secure proper sleeves fit. The outlet size shall be as shown on the Drawings.

Tapping sleeves for use where Drawings and/or Special Provisions require special pipe coating or protection systems shall meet the above requirements and shall be coated with Teflon® Tape according to 490-1251. Bolas shall be stainless steel.

Prior to ordering tapping sleeves, the Contractor shall submit manufacturer's data, installation instructions and maximum air test pressure information to the Engineer for approval.

Tapping gate valves shall be of the size shown on the Drawings and shall conform to the gate valve provisions of Section 9-30.29.

In addition, the inlet end shall be flanged with retaining ring extended beyond the flange face.

The outlet end shall be mechanical joint unless otherwise noted on the Drawings and/or the Special Provisions.

The valve seat ring openings shall be larger than normal size to permit entry of full diameter tapping machine cutters.

9-30.33 OPERATING RING DIMENSIONS (New Section)

An operating ring extension conforming to the latest Department Standards Plans shall be furnished and installed by the Contractor on all valves where called for on the Drawings or where the finished grade is more than 30 inches above the valve operating area.

9-30.34 PLASTIC FORM RINGS (New Section)

Valve boxes shall have a 3 inches thick plastic form ring conforming to the dimensions of the latest Seattle Water Department Standards, installed between the base and the valve coating. The plastic form shall conform to specifications in Section 9-30.25.

9-30.35 VALUE CHAMBERS AND VALVES (New Section)

This section shall apply to the construction of standard valve chambers and special valve chambers, all to be in accordance with the Standard Plans.

Where shown on the Drawings or where directed by the Engineer, valves shall be enclosed in valve chambers set over the operating stem.

Valve chambers may be either precast, cast in place, solid concrete blocks, concrete brick or made of clay brick.

9-30.36 PRECAST VALUE CHAMBER (New Section)

Size, shape, and materials shall be as indicated in the Standard Plan, Drawings, or Special Provisions.

The chambers shall be furnished in precast concrete sections with sufficient strength to withstand 8-20 ton traffic loads, together with connecting gaskets and covers to provide the minimum clearance dimensions as shown.

The chambers shall be watertight after assembly. Grout material shall be installed in the spaces of the lower edges of each of the chamber sections as they are installed. There shall be no evidence of moisture seeping into the chambers through the walls, floor, roof, or joints.

9-30.37 CONCRETE BLOCKS FOR VALUE CHAMBERS (New Section)

Portland cement concrete blocks shall be solid, and shall conform to the requirements of ASTM Designation C 39. Overall thickness of block shall be 6 inches with optional length and width. Gasket material blocks shall be used for round valve chambers.

9-30.38 CONCRETE BLOCKS FOR VALUE CHAMBERS (New Section)

Concrete block for value chambers shall be solid and to conform to the requirements of ASTM Designation C 39.

Concrete brick shall be solid and conform to ASTM Designation C 34, Grade 16.

9-30.39 CONCRETE BLOCKS FOR VALUE CHAMBERS (New Section)

Concrete block for value chambers shall be solid and to conform to the requirements of ASTM Designation C 39.

Concrete block shall be solid and to conform to ASTM Designation C 16, Grade 16.

9-30.40 CEMENT (New Section)

Portland cement mortar shall be a part portland cement to not less than 1-1/2 parts portland cement to not more than 3 parts of plaster sand, mixed with the least amount of water necessary to provide a workable mix. Grout material, in an amount not exceeding 50 percent of the portland cement by weight, may be added to the mix at the option of the Contractor.

9-30.41 CEMENT (New Section)

Portland cement mortar shall be 1 part portland cement to not less than 1-1/2 parts portland cement to not more than 3 parts of plaster sand, mixed with the least amount of water necessary to provide a workable mix. Grout material, in an amount not exceeding 50 percent of the portland cement by weight, may be added to the mix at the option of the Contractor.

9-30.42 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.43 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.44 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.45 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.46 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.47 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.48 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.49 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.50 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.51 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.52 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.53 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.54 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.55 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.56 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.57 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.58 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.59 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.60 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.61 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.62 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.63 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.64 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.65 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.66 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.67 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.

9-30.68 CEMENT (New Section)

Concrete for chamber foundation shall be Class G.
9-30.3A VACANT

9-30.3J COATING IN THE FIELD (New Section)
The valve shall be carefully inspected for injury to the outer protective coatings. At all places where the coating has been removed or scraped off, the damaged area shall be thoroughly cleaned to expose the iron base installation, and the cleaned area shall then be coated with five chromate primer and the entire valve shall be field painted with two or more coats of Rustyton Rustoleum 612804 or equal.

9-30.3K WATER PRESSURE REGULATING VALVES (New Section)
Water Pressure Regulating Valves, 2-Inch through 12-Inch Sizes:
Valves shall be flanged both ends, Class 125 ASA drilling, with cast iron body. Valve shall be a diaphragm operated, single seat, globe valve. It shall be spring loaded and hydraulically operated. Seat ring shall be replaceable. Diaphragm shall be synthetic rubber and have a rectangular cross section. The valve shall be fitted with a bearing to the valve cover and an integral bearing in the valve seat. There shall be no piston operating the main valve.

Valves shall be designed to maintain a constant downstream pressure regardless of varying inlet pressure. They will be used heading close, cold water.

No control pilot or optional equipment is to be furnished. Valves shall be ASA Valve No. 90 or approved equal.

Water Pressure Regulating Valves, 2-Inch Sizes:
Valves shall be Mueller No. H-9310 2-Inch Water Pressure Reducing Valves or approved equal.

9-30.5 HERMANS

Delete this section and replace with the following:
Fire hydrants shall conform to ASA C202 and shall be of standard manufacture and of a pattern approved by the Seattle Fire Department. The name or mark of the manufacturer, size of the valve opening and year made shall be plainly cast in raised letters on the hydrant barrel to be visible after the hydrant is installed.

Approved Manufacturers:

Hydrants of the following manufacture and pattern have been approved for use by the City of Seattle:
(a) Pacific States
(b) Class No. 510 (Gray)
(c) Mueller "Centerline" Model B-223
(d) Mueller-Street Model 8-238
(e) Kennedy "Guards"

9-30.5A END CONNECTIONS

Delete this section and replace with the following:
The end connection shall be 6 inches, standard flange, Class 125 drilling conforming to ANSI B 16.1.

9-30.5B HYDRANT DIMENSIONS

Delete this section and replace with the following:
The dimensions and details of hydrant and nozzles shall be as follows:

| Hydrant connection pipe size inside diameter | 6 inches |

9-30.3M HYDRANT REQUIREMENTS

Delete this section.

9-30.3N HYDRANT FACTORY DEPARTMENTAL TEST (New Section)

All hydrants shall be tested by the manufacturer, as required in ASA C202. The Contractor shall furnish to the Owner all affidavit of compliance from the manufacturer for all tests.

9-30.3P HYDRANT SUPPLEMENT (New Section)

All iron parts of the hydrant shall be thoroughly cleaned and painted at the factory as follows: All inside surfaces and the outside surfaces below the ground line shall be coated with equivale zinc, Federal Specification ZZ-9-S or J-A-19-4-0, unless otherwise specified. They shall be covered with two coats, the first being filed thoroughly before the second is applied.

Following installation, the hydrant shall be painted as follows:

Prior to backfill the extension below ground portion shall be painted with Asphaltic Varnish, Rustyton Rustoleum 612804 or approved equal.

WATER DISTRIBUTION MATERIALS 9-30

Standpipe, minimum inside diameter: 7 inches.

Length of hydrant from bottom of hydrant connection to sidewalk ring (flange): 5'-6" feet.

Valve opening, minimum diameter: 5 inches.

Size of auxiliary gate valve: 6 inches.

Nozzle, number and size: 2 - 2'-0" inches.

Thread (National Board of Fire Underwriters): 7-1/2 per inch.

Total length of threaded male nipple: 1 inch.

Stream nozzle, number and size:

Concealed hydrants shall be furnished with one streamer nozzle with a sign and threads confirming to dimensions as identified on the latest City of Seattle Standard Plans for Fire Hydrants.

Drain Valve: Drain valve shall be automatic with outlet tapped or plumbed to 3'-0" female iron pipe threads.

Sidewalk flange (ring) to center of nozzle: 14 inches or more.

Face: Backer port toward the street.

All nozzles shall be fitted with cast iron threaded caps with operating nut of the same design and proportions as the hydrant stem nut. Caps shall be thread to fit the corresponding nozzles and shall be fitted with suitable removable gaskets for positive water tightness under test pressures.

9-30.3Q SHACKLING LUGS

Delete this title and section, and replace with the following:

9-30.3Q HYDRANT RESTRAINT

Shackling lug shall be 3/4 inch diameter with threaded ends, and shall meet ANSI A 36, "all-thread" standards. A 36. "All-thread" standards shall be used. If a tie bolt restraint system is used, it shall be "all-thread" based on the National Board of Fire Underwriters. All threaded end connections shall be cast iron, with a strap for the hydrant, as required in ASA C 202. The Contractor shall furnish to the Owner all affidavit of compliance from the manufacturer for all tests.

9-30.3R GROUND PETS

Delete this section.

9-30.3S HYDRANT FACTORY DEPARTMENTAL TEST (New Section)

All hydrants shall be tested by the manufacturer, as required in ASA C202. The Contractors shall furnish to the Owner all affidavit of compliance from the manufacturer for all tests.

9-30.3T HYDRANT STEP FLOWING (New Section)

All iron parts of the hydrant shall be thoroughly cleaned and painted as follows: All inside surfaces and the outside surfaces below the ground line shall be coated with equivalent zinc, Federal Specification ZZ-9-S or J-A-19-4-0, unless otherwise specified. They shall be covered with two coats, the first being filed thoroughly before the second is applied.

Following installation, the hydrant shall be painted as follows:

Prior to backfill the extension below ground portion shall be painted with Asphaltic Varnish, Rustyton Rustoleum 612804 or approved equal.

211
After backfill the outside area of the hydrant, which is above the finished ground line when backfilling is completed, shall be thoroughly cleaned and then painted with one coat of hydrant green enamel, Preserve Paint Co., No. 49-410, Service Paint Company number 6255 or approved equal.

9-30.55 HYDRANT CONNECTION PIPE (New Section)
Pipe connections from the hydrant to the water main shall be 6-inch ductile iron pipe, Class 52, in accordance with Section 9-30.64.

9-30.55 HYDRANT VERTICAL EXTENSIONS (New Section)
Hydrant barrel extensions shall have a 7-inch minimum inside diameter and shall be gray cast iron or ductile iron and shall conform to the AASHTO standards for such castings. The castings shall not have any tendency to produce noise. The fittings of the connecting flanges on the extensions shall match the fittings on the hydrant.

Hydrant vertical extensions shall also include the necessary hydrant operating stem extension, complete with safety stop couplings.

Extensions with threaded flanges shall be ductile iron and shall conform to AWWA C111. The exterior flange lip overlapping the barrel pipe shall be sealed with a butyratinastic sealer.

9-30.56 HYDRANT BILGE (New Section)
When approved by SSWD, the hydrant bilge assembly, as shown on the hydrant detail, shall be constructed of 3/8-inch polyethylene or polyethylene tubing or 3/8-inch copper tubing rated Type E, conforming to Sections 9-30.62(1), 9-30.62(5), or 9-30.62(15), as approved.

9-30.6 SERVICING CONNECTIONS
Delete this section and replace with the following:

9-30.6 SERVICE CONNECTIONS AND SERVICE PIPE (New Section)
These standards shall be used unless modified by the Drawings and/or the Special Provisions.

Service piping standards shall also be used, as modified on the Drawings for 2 inches blow off assemblies; hydrant bilge assembly.

9-30.66 SADDLES
Delete this section and replace with the following:

Saddles shall be ductile iron, or bronze, double strap with F.I.P. thread standard outlet tapping. Saddles shall be of a size designed by the manufacturer to fit the pipe called for on the Drawings and/or in the Special Provisions.

9-30.62(2) POLYETHYLENE PIPE
Delete this section and replace with the following:

Polyethylene pipe, (polyethylene pipe), when approved by the Seattle Water Department, to be used for water service lines 2 inches in size and smaller, shall conform to the requirements of AWWA C901. The pipe shall bear the seal of the National Sanitation Foundation for potable water pipe. Pipe joints shall be made in accordance with the manufacturer’s recommendations. Solvent welded pipe joints shall not be permitted. Minimum working pressure rating shall be 100 psi.

9-30.62(3) POLYETHYLENE PIPE
Delete this section and replace with the following:

Polyethylene pipe, (polyethylene pipe), when approved by the Seattle Water Department, to be used for water service lines 2 inches in size and smaller, shall conform to the requirements of AWWA C901. The pipe shall bear the seal of the National Sanitation Foundation for potable water pipe. Pipe joints shall be made in accordance with the manufacturer’s recommendations. Solvent welded pipe joints shall not be permitted. Minimum working pressure rating shall be 100 psi.

9-30.67 REEDING, FOUNDATION MATERIAL AND GRAVEL
Supplement this section with the following:

When the internal aggregate is specified by a "type" designation, it shall conform to the requirements shown on the Table in Section 9-30.7.

9-30.7 REEDING MATERIAL
Delete this section and its subsections.

9-30.78 FOUNDATION MATERIAL
Delete this section and its subsections.

9-30.7C BANK RUN GRAVEL FOR TRENCH BACKFILL
Delete this section.

9-30.8 PLASTIC FILM WRAP
Delete this section and replace with the following:

Plastic film wrap (polyethylene) shall be 8-mil polyethylene conforming to AWWA C901.

9-30.9 TRACKER TAP
Delete this section.

9-30.10 LOCATING WIRE (New Section)
Locating wire for use with PVC pipe shall be 14 gauge solid copper with neoprene coating. Connectors and splices shall be made with Non-Stick split bolt Wire Connectors, catalog No. 5-870, or approved equal.
9-30.11 ELECTRICAL PROTECTION (New Section)

9-30.11A ZINC REFERENCE ELECTRODES (New Section)

The electrode material shall be high purity zinc with a minimum content of 99.0% zinc (ASTM B318-73 Type II or equivalent). The zinc electrode shall have a minimum surface area of 50 sq. in. (323 sq. cm.). The active material shall be sealed around mild steel core.

The reference electrode shall include a lead cable consisting of a single conductor No. 12 AWG stranded copper type BBI with 600 volt yellow insulation or equivalent.

(a) The cable shall be attached to the mild steel core with a copper electrical compression crimp.
(b) The cable attachment shall be thoroughly covered with 2 half-lapped layers of electrical tape, or epoxy cap.

9-30.11B WATER METER BOX (New Section)

The water meter box and lid shall conform to Section 9-30.6G.

9-30.11B(1) TEST BOX (New Section)

(a) The 4 5/16 inch (11 cm) deep test box shall provide a single place enclosure 8 inches x 6 inches (20 cm x 15 cm) with a lid. The test box shall be Rustin No. 30690 or approved equal.
(b) The lid shall be manufactured from fiberglass and shall contain a one-piece closed cell neoprene gasket. The lid shall be secured by hold down scrapes.
(c) The test box shall comply with the NEMA Type 12 standard for all dust and drip-free enclosure. A 6 inches (15.2 cm) depth of 1 inch (2.5 cm) PVC conduit long radius 90 degree with PVC fittings shall be installed at one end of the test box.
(d) The test box shall include a 1/4 inch (6 mm) thick phenolic back panel with a terminal block assembly. Each panel No. 9005 or equivalent containing 16 terminals shall be equipped with terminals No. 12 AWG wire. Each terminal shall be specifically identified by laminated phenolic plate which indicates the origin of the attached wire.
(e) Each wire shall include at least 18 inches slack to allow lifting of the phenolic board out of the box during testing. Each wire shall be specifically identified by wiring tape.

Approximately 1.5 cu. ft. (0.06 cu. m) of crushed rock or pea gravel shall be provided to create a permeable bed 6 inches (15 cm) deep inside each water meter box.

9-30.12 VACANT

9-30.13 TURBINE METERS (METER, COLD WATER, MAGNETIC DRIVE TURBINE TYPE, 2" THROUGH 17" SIZE)

These requirements apply to Magnetic Drive Turbine Type Cold Water Meters 2-inch through 17-inch in size, manufactured for use on customer water services. Turbine Meters shall consist of a cast bronze case containing the measuring mechanism with a strainer housing attached.

Meters shall meet the requirements of ANSI C501-78, latest revision, Class II type, except as modified herein.

9-30.13(1) REGISTER AND REGISTER BOX

Registration shall be in cubic feet. Register box and cover shall be of a copper alloy.

9-30.13(2) MAIN CASE AND COVER

The main case and cover shall be constructed of a copper alloy containing not less than 75% copper.

9-30.13(3) MEASURING MECHANISM

The measuring mechanism shall be the helical, horizontal axis, high velocity turbine type, and so designed that it can be readily removed from the main case as a complete unit. The measuring mechanisms shall be capable of operating within the accuracy limits specified under "Normal Flow Limits," without recalibration when transferred from one turbine meter case to another.

9-30.13(4) INTERCHANGEABLE GEAR TRAIN

If an interchangeable gear train is utilized, it shall operate in a dry, hermetically sealed compartment, separate from the water passage by a bronze wall.

9-30.13(5) CAPACITY AND ACCURACY

The turbine meter shall register all rates of flow through it with an accuracy of 100 ± 2% at rates of flow within the limits specified under "Normal Flow Limits."

9-30.13(6) NORMAL FLOW LIMITS

<table>
<thead>
<tr>
<th>Size</th>
<th>Normal Flow Limit (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-inch</td>
<td>15 - 160</td>
</tr>
<tr>
<td>3-inch</td>
<td>15 - 300</td>
</tr>
<tr>
<td>4-inch</td>
<td>15 - 400</td>
</tr>
<tr>
<td>6-inch</td>
<td>15 - 600</td>
</tr>
<tr>
<td>8-inch</td>
<td>15 - 800</td>
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<tr>
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<td>15 - 1200</td>
</tr>
<tr>
<td>14-inch</td>
<td>15 - 1500</td>
</tr>
<tr>
<td>16-inch</td>
<td>15 - 1800</td>
</tr>
</tbody>
</table>

Note: Above flow limit shall be for continuous flows, all turbine meters shall have a 2% overcapacity for intermittent flows.

9-30.13(7) HEAD LOSS

Maximum loss of head shall not exceed 7 psi at the flow rates listed under "Normal Flow Limits."

9-30.13(8) CONNECTIONS

All male case connections shall be flanged. The flanges for 2-inch meters shall be of the two bolt coupling type. Meters shall be furnished without companion flanges.

9-30.13(9) INTERCHANGEABLE PARTS

All parts of turbine meters of the same size, make and model shall be interchangeable.

9-30.13(10) STRAINER

Turbine meters shall be supplied with a strainer attached. Strainers shall be short pattern, 1 1/2 lb. ANSI, iron body, with heavy gauge 1/4-inch perforated, stainless steel screen having an effective straining area at least double that of the meter main case inlet.

9-30.13(11) REMOTE READING

Turbine meters shall be compatible with existing Seattle Water Department Standard Recording Meters and/or switches. Manufacturer, type, and style of switch are to be submitted for approval by the City of Seattle. No other materials or accessories may be used with Seattle Water Department meters.
9-30.12 GENERAL REQUIREMENTS

Only meters manufactured by a well established firm will be considered. Only those meters of a specific model and manufacturer, samples of which have been submitted to the Seattle Water Department for inspection and approval, and carrying a one (1) year guarantee will be acceptable.

9-30.13 INSTRUCTION

All turbine meters purchased under this specification will be subject to inspection and testing by the Seattle Water Department upon receipt, and if any meter is found not to conform with these specifications, the lot or any portion thereof may be rejected.

9-30.14 GUARANTEE

All turbine meters shall be guaranteed for a period of one (1) year after installation. This guarantee shall be against defect in materials, workmanship, and construction.

9-30.15 TEST REPORT

All turbine meters purchased under this specification shall be accompanied by a notarized test report of the factory accuracy test.

9-30.16 BOREING CABLE (New Section)

Boring cable shall be stranded No. 2 AWG insulated copper conductor. The cable shall have polyethylene insulation and polyvinyl chloride jacket similar and equal to Anacorda “Type G” cable with “Grommet” jacket, or similar cable (Specification).

Bore straps and connections supplied by the pipe manufacturer shall be the approval equal to the above.

9-30.17 COATING FOR ALL BOLTS AND SHACKLE NUTS (New Section)

All bolts and shackle nuts, unless otherwise designated by the Engineer, shall be coated with 2 coats of asphaltic varnish (Exxon Rokotik 812-8A, or approved equal).

On corrosion protected water mains, all shackle nuts, concrete blocking anchor rods, and shackle clamps shall have a factory applied protective coating with factory bonded epoxy in accordance with ASTM A 755. After threading and assembly, the threaded ends, nuts, and washers shall be coated with a liquid epoxy patch kit in accordance with ASTM A 755 and manufacturer’s recommendation.

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ILLUMINATION AND ELECTRICAL MATERIALS (New Section)

SECTION 9-31 - ILLUMINATION AND ELECTRICAL MATERIALS (New Section)

9-31.1 LUMINAIRES (New Section)

Luminaires shall be “open-faced” style and shall consist of a luminaire housing, lamp, ballast, and photovoltaic cell. Luminaires shall be in accordance with Material Standard 5725-1, except as modified herein and in the Special Provisions.

Luminaires shall have attached to the housing, an NREL approval label (3 inches square) which will be readily visible from the ground, indicating lamp type by color code (i.e., blue for Mercury Vapor, gold for High Pressure Sodium, red for Metal Halides); and lamp voltage by numerical code, i.e.,

- 7 for 70 Watt
- 10 for 100 Watt
- 15 for 150 Watt
- 20 for 200 Watt
- 25 for 250 Watt
- 30 for 300 Watt
- 40 for 400 Watt
- 50 for 500 Watt
- 60 for 600 Watt
- 70 for 700 Watt
- 80 for 800 Watt
- 90 for 900 Watt
- 100 for 1000 Watt

Legends shall be a minimum of 2 inches in height and weather resistant.

Luminaires light distribution patterns shall conform to the CEC classification system for Type II medium cutoff for less than 200 watts and Type II short cutoff for 200 watts and more.

Clamps shall be accomplished by use of a flat lens. Minimum streetlight utilization shall be 59 percent at 1.1 transverse mounting height. Restriction shall be free from vibrations and hotspots.

Photometric performance will be subject to testing by the Washington State Material Testing Laboratory to ensure conformance with these specifications and the photometric data submitted. A sample luminaire shall be submitted for testing when designated by the Engineer.

9-31.1(1) HOUSING (New Section)

The luminaire housing shall be seamless provided with slipfitting and mounting for 2-inch nominal diameter pipe. The housing shall have means for leveling which shall consist of 2 sets of clamps equipped with lock washers on all 4 bolts.

The housing, complete with ballast, shall be weather tight. Gaskets and filters shall be composed of material capable of withstanding temperatures involved and shall be securely held in place. Air entering the optical assembly shall pass through a filtering medium capable of removing particulate matter and harmful gases.

The housing shall be equipped with a NEMA type bialat lock receptacle for photovoltaic cell, which shall be adjustable to allow facing the photovoltaic cell north.

Luminaires shall have their components secured to the luminaire frame with stainless steel mounting hardware (nuts, bolts, washers, hinges, etc.). The stainless steel shall be ASTM A 570 series, chromed nickel glass.

The housing exterior shall have an acrylic electrocoat finish. The color shall be grey N60 70.

The reflector shall be flat, clear, heat and impact-resistant glass. Reflectors shall be mounted in the door frame assembly which shall be hinged to the luminaire and secured in the closed position by means of an automatic-type latch. "Bird guards" shall be provided at the slipfitting to prevent the entry of small birds into the ballast area.

The reflector shall be securely mounted such that the normal operation of the door does not affect the photovoltaic.

The lamp socket shall be permanent, enclosed equal with integral lamp grip to ensure electrical contact under conditions of normal vibration. The subject shall be raised to extend the lamp starting voltage. All components shall be provided to a terminal board with clearly identified contacts.
ILLUMINATION AND ELECTRICAL MATERIALS (New Section)

9-31.2 LAMPS (New Section)

Clear lamps suitable for operation in any position shall be used (unless noted otherwise on the Drawings).

High pressure sodium lamps shall meet the following minimum ratings:

<table>
<thead>
<tr>
<th>VOLTAGE</th>
<th>HIGHEST</th>
<th>INITIAL</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>277 V</td>
<td>0.000</td>
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<td>25.000</td>
<td>25.000</td>
<td>25.000</td>
</tr>
<tr>
<td>690 V</td>
<td>25.000</td>
<td>25.000</td>
<td>25.000</td>
</tr>
</tbody>
</table>

9-31.3 BALLAST (New Section)

The ballast shall be designed to properly operate the type of lamp at the specified operating voltage. The ballast shall be made to start lamps at temperatures as low as 70 degrees Fahrenheit.

Ballast shall be the regulator type, high power factor. Ballast shall be capable of operation with plus or minus 10 percent input voltage variation. All ballasts shall be multi-tap to allow field adjustment of voltage.

Ballast core laminations shall be of high quality electrical grade steel welded together to minimize noise and assure trouble free operation over the life of the ballasts.

Ballast coil shall be precision wound on foamed insulating bobbin and terminals shall be of a push on type connection.

Components to provide the high starting voltage required by the high pressure sodium lamp shall be mounted on a printed circuit board which shall be easily accessible without disturbing other components of the integral ballast assembly.

The ballast shall be capable of starting and operating high pressure sodium lamps from a vertical 60-kilowatt power source within the limits specified by the lamp manufacturer. The ballast, including starting aid, shall protect itself against normal lamp failure modes. The ballast shall be capable of operation with the lamp in an open or short circuit condition for 6 months without significant loss of ballast life.

For nominal line voltage and nominal lamp voltage, the ballast design center shall not vary more than 5 percent from rated lamp watts.

As lamp voltage, frequency, and line voltage variation at rated lamp voltage shall not exceed 10 percent for 10 percent line voltage variations.

For 70 watt, 100 watt and 120 watt lamps, socket voltage shall be rated at 55 volts. For 200 watts and above, socket voltage shall be rated at 100 volts.

Each ballast shall have a name plate attached permanently to the case listing all electrical data.

Supply voltage shall be as indicated on the Drawings.

9-31.16 PHOTOCELL CONTROL (New Section)

Photocell controls shall be used with all luminaires and shall meet the requirements of National Standard 5063.1. Photocell controls shall be 350C-type solar graded-in devices in accordance with 5063.1. photocell controls of the type so designated shall range between 100 and 1000 footcandles to control the light output of a luminaire. The unit shall consist of a light sensitive element connected to necessary control relays. The light sensitive element shall have a spectral response that is essentially sensitive to north sky illumination.

The unit shall be so designed that a failure of any electronic component will energize the lighting circuit.

Hinderns form current ratings shall be 100 ampere for 120 volt and 55 ampere for 240 volt service. Photocell cells shall be provided with an integral lightning arrestor.

ILLUMINATION AND ELECTRICAL MATERIALS (New Section)

9-31.2 BRACKET ARMS (New Section)

Luminaires bracket arms shall be manufactured as indicated on the Standard Plans and in accordance with ANSI Z211.9 Standard Specification for Structural Supports for Highway Lighting Luminaires, and Poles, Signals, to support a luminaire of 50 pounds, a 12 square foot Effective Projected Area for an 800 lumen output and 20 degrees of tilt. Bracket arms shall include the lamps, arm and brackets (galvanized for wood and steel pole mounting and stainless steel for aluminum pole types). Bracket arms shall be the same style as depicted on the Drawings. Small differences in dimensions may be acceptable when structural calculations accompany the Shop Drawings.

Luminaires bracket arms shall accommodate a slipfitter luminaire attachment. The terminal end of the arm shall be a straight, tubular section with external dimensions of 2 inches x 2 inches by 6-7/8 inches long.

Bracket arms mounted on metal poles shall be constructed of the same material as the poles. If the bracket arm and metal poles are of dissimilar metals, they shall be separated by an approved plastic diaphragm pad of 1/2 inch minimum thickness. The longitudinal axis of the luminaires end of the luminaries support arm shall not be less than 1 inch nor more than 4 inches above the horizontal with the luminaires installed.

All tubing used for aluminum arms shall be seamless. All tubing made of aluminum shall be treated electrically before fabrication. Aluminum arms shall meet the requirements of EC-110-137 & 139. Steel luminaires arm shall meet the requirements of EC-110-137 & 139.

9-31.3 WIRE (New Section)

Street light wire in conduits shall be stranded copper single conductor, with 600 volt type THW or equivalent material, with outer diameters of 0.092 inches for standard conduit. Wire with outer diameters of 0.117 inches for large conduit. Conduit shall be made of a copper alloy meeting the requirements of B111.3, Type A.

Conduit shall be of standard double wall, with outer diameters of 0.224 inches for standard conduit. Conduit shall be made of a copper alloy meeting the requirements of B111.3, Type A.

Wires used inside of poles and bracket arms (including wood pole mounted bracket arms) or housed to signal splitters shall be No. 10 stranded copper "Wire and bracket" type wire with an insulation thickness of 42 mils and a gald thickness of 70 mils. Where the proper combination of conductors is unavailable in "Wire and bracket" type wire, No. 12 20-30 cable per National Standard 6014-4 may be substituted when approved by the Architect.

Triple wire shall consist of one black conductor and one white conductor for circuits with one "hot" conductor and one neutral conductor; and one black conductor and one red conductor for circuits with 2 hot conductors. Multiple conductors shall be color coded in accordance with the NEC. Neutral wire shall always be white. Grounding wire shall always be green. The first hot conductor shall be black, the second hot conductor shall be red, and the third hot conductor shall be blue. Triple wire shall be used for overhead applications, and shall conform with National Standard 6007-8 except shall be as indicated on the Drawings. Color coding will not be required for triple wire.

Wires shall be continuously color coded. (Color coding not required for triple wire).

Taping at terminations is not acceptable.

Plastic tubing for covering wire attached to the side of wood poles shall be per National Standard 501M.

9-31.4 MINERAL INSULATED (MI) CABLE (New Section)

Conductors shall be solid copper, 600 volt rated, of the size noted on the Drawings.

The Conductor shall be made of solid copper with 2 or more conductors. All conductors serving a device shall be in the same sheath. This shall not prevent normal passageways such as the power conductors to a switch being in one sheath and the load conductors being in a second sheath.

The sheath shall be copper, and unless noted otherwise on the Drawings or in the Standard Specifications, shall be covered with a factory provided polyethylene jacket. The sheath shall be considered the grounding conductor.

The sheath shall be terminated at junction boxes or conduits as shown on the Drawings, using glands and nuts provided by the cable manufacturer. The glands shall be used for the cable used and U.L. Listed.
The conductors exposed beyond the end of the sheath shall be covered by insulation provided with the sheath. The normal length of the insulation is 10 inches. Power circuits shall be color coded per NEC.

The sheath shall be sealed against moisture at the glands with seal provided by the cable manufacturer. The seal shall be suitable for prolonged submersion in water.

9-31.5 WIRE SPLICES (New Section)

This standard applies to wire connections other than 60 cable made in above grade or below grade installations except where the wires are attached directly to the terminal boxes. All connectors shall be UL or equivalent, listed approved for the intended use.

(a) Above Grade Installations: (Including connections to pole head boxes)

(1) Copper to Copper Connector — The connector shall be a high strength bronze alloy of the split bolt type specified in Material Standard 6618.7.

(2) Copper to Aluminum Connector — The connector shall be of the one or two bolt type labeled and include an approved spacer bar.

(3) Aluminum to Aluminum Connector — The connector shall be of the 1 or 2 bolt type and meet the requirements of Material Standard 6615.3.

(4) Split bolt connections shall be insulated with 3 layers of electrical tape.

(b) Below Grade Installations:

(1) Below grade splices shall be made in a 2 piece rigid body transparent moisture proof spliced enclosure. The body shall be lined with a material resistant to corrosion and the enclosure shall be supported at intervals that will not allow the cable to sag. The enclosure shall be of durable, weather resistant material (Nylon-reinforced epoxy may be approved if each splice is approved by the Engineer prior to installing enclosures.)

(2) Connectors shall be as described in (a) above or a copper mechanical crimp type may be used when approved by the Engineer and/or approved by splice manufacturer. Mechanical crimp splices shall be made with an approved crimping tool.

(c) Inside Cabinets and Panels:

Wire nuts may be used only inside cabinets and panels. Copper or silver plated terminals shall be used at terminals blocks.

9-31.6 FUSES AND FUSE HOLDERS (New Section)

The bridge fuse holder shall consist of a fuse, a two-section fuseholder body and two insulating boots, all rated at 600 volts. The fuse shall be of the voltage and ampacity specified. Fuses rated at 30 amps and less shall be 13/32 inches by 1-1/2 inches in a 30 amp rated boot. Fuses rated 30 to 60 amps shall be 1/2 inches by 2-1/4 inches in a 60 amp rated boot.

The fuseholder body shall be made of waterproof molded plastic. In two sections, the line-side section and the load-side section. Their purpose is to provide a visible means of disconnect for circuit repairs or maintenance. The fuse shall be held in the load-side section only. Each section shall be held securely enclosed in the wire enclosure and the sections shall be joined by a threaded, gasketed joint. The fuseholder body shall be designed to carry any electric arc, should the fuseholder be closed on a live circuit.

Fuse holder terminals shall be compression type, sized for the actual wire utilized. Only one wire shall be installed in any terminal.

Where the fuse is in the base of the metal pole, it shall have a high-speed receptacle used as a mechanical weak link to physically interrupt the circuit under impact in addition to the requirements for the fuse switch.

Insulating boots shall be waterproofed wire connections. The type of insulating boot shall be a single conductor boot for the load-side and a single conductor boot for the line-side.

The fuse shall be a current limiting type with a high speed opening and an interrupting rating of 100,000 rms symmetrical amperes. The fuse shall have a minimum time delay of 25 seconds at 250 percent load, but not great enough to result in a safety loss during overload or short-circuit conditions.

The fuse shall be designed so that the carrying capacity or opening time is little affected by ambient temperature and will operate with low watt loss to reduce heating.

Individual fusehorns fuses shall be rated at 10 amps except for 400 watt hornfanes at 120 volts which shall be rated at 15 amps.

9-31.7 GROUND RODS AND CLAMPS (New Section)

Ground rods shall be fabricated from cold-finished carbon steel shifting in accordance with ASTM Designation A 100 as it applies to Grade 105. Galvanized ground rods shall not be used.

The covering of the core steel shall be a sheath of electrolytic-grade copper having a minimum thickness of 0.010 inches. The rods shall have rolled threads at each end for joining together with couplings. Rods shall be 10 feet in length and 5/8 inch diameter. Rods shall conform to Material Standard 5640.1, except for length.

Gaskets for sectionalized rods shall be made of high-strength, corrosion-resistant bronze, internally threaded to fit standard rods.

Driving studs shall be made of high-strength, hardened steel of SAE 1045 or equal quality.

Ground rod clamps shall meet the requirements of Material Standard 5640.3.

9-31.8 ENCLOSURES (New Section)

Enclosures located outside shall be weather-proof type, NEMA Type 3R. All doors and covers shall be gasketed. All enclosure metal shall be formed of Grade gauge galvanized steel or aluminum as noted on the specification and shall be constructed to the dimensions shown on the Drawings. All doors shall be provided with a heavy duty key suitable for padlocking.

All joints shall be seam welded. Enclosures shall be fabricated to allow for anchor bolt mounting.

A permanent sign shall be attached to the exterior of the enclosure cover or door. The sign shall be engraved into a 3-high x 4-inch stainless steel plate with a minimum thickness of 18 gauge. The lettering shall be in 3 lines:

TELEPHONE
HIGH VOLTAGE
KEEP OUT

The lettering shall be 1/2-inch high with a stroke width of 3/16-inch, and will be filled with a red paint.

The completed sign shall be coated with a clear polyurethane enamel with exterior catalyst and attached to the enclosure cover with a minimum of 3 stainless steel drive rivets.

Circuit breakers shall conform to Federal Specifications M-W-375B. All 100 amp frame breakers shall be Class 3a for single pole breakers, and shall be Class 1b for multiple pole breakers; 250 amp frame breakers shall be Class 1b.

Circuit breakers shall be of the rating shown on the Drawings or as called for in the Special Provisions.

Circuit breakers shall be of the non-configured molded case circuit type with end conductor terminals, suitable for surface mounting in the cabinet on a false back or bracket.

Circuit breakers shall be labeled to indicate the circuit controlled.

Overcurrent protection and relay equipment, as called for on the Drawings or in the Special Provisions, shall be installed according to the best common practice, with switching and installation meeting all applicable requirements of the National Electric Code (NEC) and the Seattle Electrical Code.

Contactors shall be "lighting" type specifically rated for tungsten, fluorescent and mercury lamp loads, electrically held.

331
9-31.9 SWITCHES AND RECEPTACLES (New Section)

All single switches shall be 20 amp, 120 volt, AC type, grounded, specification grade, conforming to Underwriters' Laboratories' Specification UL-609 and shall be UL listed. Switches shall be National 122-2 single pole, or approved equal.

Receptacles:

All duplex receptacles shall be 20 amp, 125 volt, AC type, Hospital Grade receptacles, to be UL listed "Hospital Grade" under UL No. 485. Receptacles shall be National CF-800, or approved equal.

Cover plates for switches and receptacles shall be stainless steel.

Device boxes shall be standard surface except box-plated steel type at least 1-1/2 inches deep, single or grouped at size to accommodate devices shown. All boxes shall be equipped with cover plates.

9-31.10 FULL CORD (New Section)

Full cord shall be 1/4 inch polypropylene per Material Standard 7722.2.

TRAFFIC SIGNALS SYSTEM (New Section)

SECTION 9-32 - TRAFFIC SIGNALS SYSTEM (New Section)

9-32.1 CONTROLLER ASSEMBLY (New Section)

The controller assembly shall consist of the controller, associated equipment and specified auxiliary equipment all in the specified cabinet, as indicated in the Controller Assembly Table and other Exhibits as found in the appendix of the Special Provisions, and the Drawings.

9-32.1(1) GENERAL (New Section)

Controllers shall be pre-timed or actuated as indicated on the Controller Assembly Table.

The controller assembly for each location shall be capable of controlling traffic flow in conformance with the respective Initial Controller Timing Exhibit and the Phase Sequence Diagram or Signal Sequence Diagram, or both, for each intersection as specified in the Controller Assembly Table.

The controller shall be micro-processor based, modularly constructed and shall be completely enclosed in a sheet metal case, with a protective finish, which shall serve as a mounting frame. A drive or passive electronic components, other than the power supply, shall be attached to a part of the case.

Controller inputs and outputs shall be made at the front panel through a MNA type (MIL-C-26482) connector. The connector shall be metal or plastic.

All circuits and their associated components shall be grouped in plug-in printed circuit assemblies. Printed circuit shall conform to the "printed circuit assembly" standard, MIL-STD-893, Contact shall be gold-plated. The circuit reference symbol for each component shall be clearly identified by means of printed designation on the assembly board. Circuits shall be plug connected and systematically arranged so that they may be readily removed without considering or handling individual components.

External logic circuits shall be installed or required to provide special functions (e.g., pre-emption, special phasing, etc.) and shall conform to the special logic specifications as detailed on the Drawings and/or the Controller Assembly Table. External logic shall use digital methods and solid state construction. Logic units shall be modularly constructed, enclosed in a sheet metal case and all inputs and outputs shall be through MNA Type (MIL-C-26482) connector. The connector shall be metal or plastic.

Automatic changes via time clocks or interconnection from flashing to normal operation shall be made at the beginning of the major green street interval. Automatic changes from normal operation to flashing shall be made at the end of the major green street interval. The change from flashing to normal or normal to flashing by any signal shall be made at the time, except changes from flashing to normal through the "DARKENED FLASH" switch shall be made at the beginning of the major green street interval. The controller shall be powered up in the major street yellow.

All necessary programs for each controller to change the timing of the controller.

All timing shall be set with push buttons from the front panel.

All timing shall be set in decimal hours. It shall be possible to change the timing without removing any part of the controller and without using any special tools and to change timing without placing the intersection into the flashing mode.

All timing functions except offsets shall be in seconds (decimal minutes) and not in percentages. It shall be possible to program any time to zero timing to allow that intersection to be stopped.

All illuminated displays and manual input timing shall be clearly visible in bright sunlight.

Any power volatile memories such as random access memory (RAM) which contains input timing not stored in non-volatile memory shall be battery-supported for non-volatility for a period of not less than 5 days. The battery shall be a rechargeable type with automatic charging circuitry and lithium type with a 10 year shelf life and an accumulating runtime time of one 1 year lifetime.

Each controller model shall be provided with an internal or external unit to program all programmable read-only memories used in each type of controller, unless one unit is capable of programming all models provided.

332
TRAFFIC SIGNALS SYSTEM (New Section)

To prevent the conflict monitor from tripping during relamping of a green or yellow in a single head per phase position, a 10 watt white bulb (6000 ohms resistance) on the yellow and green outputs to neutral shall be wired into the circuit for the appropriate circuits.

The following exhibits included herein shall apply to the controllers:

Exhibit  Title
A  Controller Assembly Table
B  Police Panel
C  Auxiliary Panel
D  Computer Interface
E  Field Wiring Diagrams
F  Phase Sequence Diagrams, Signal Sequence Diagrams, and Initial Controller Timing
G  Functional Test Procedure for Controller Assemblies

9-32.1(C) PRE-TIMED CONTROLLER (New Section)

The following table defines the minimum timing patterns which shall be provided:

<table>
<thead>
<tr>
<th>Timing Element</th>
<th>Minimum #</th>
<th>Minimum Range</th>
<th>Maximum Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/C</td>
<td>1</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Signal Sequence</td>
<td>2</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Intervals</td>
<td>30</td>
<td>30-120 sec.</td>
<td>5 sec.</td>
</tr>
<tr>
<td>Cycle</td>
<td>3</td>
<td>1 to 99 sec.</td>
<td>1 sec.</td>
</tr>
<tr>
<td>Skips</td>
<td>3 per Cycle</td>
<td>1 to 119 sec.</td>
<td>1 sec.</td>
</tr>
</tbody>
</table>

It shall be possible to program the start-up interval, to select the interval in which the controller will change a timing pattern, and to select the interval and amount of random change that can occur during one cycle for the dwell interlock function.

Each controller shall accept the following inputs:

TRAFFIC SIGNALS SYSTEM (New Section)

a) Ground
b) 120 Vac
   c) 120 Vac Neutral
   d) Loop Time
   e) Interval Advance
   f) Offset
   g) Offset
   h) Cycle 1
   i) Cycle 2
   j) Cycle 3
   k) Interval Advance Enable
   l) To Low (computer control)
   m) To High (computer control)
   n) Time advance/change
   o) Logic Ground
   p) Relay

Terminals or support logic, or both, shall be provided to allow the controller to meet in any designated dwell phase position until a push button actuation. Contact closures or remote signal permits the controller to cycle with a minimum dwell phase increment. The controller shall complete one cycle and return to rest in the designated dwell phase increment. This operation shall be suitable for school crosswalk locations.

9-32.1(D) SIGNAL CIRCUITS (New Section)

The controller unit shall provide a minimum of 30 lead switch control-circuits, at RMU logic level.

Signal circuits shown on the wiring diagram shall be complete in each controller, including flash transfer relay, controller monitor capacity and signal lead switch units to provide 120 Vac, 15 ampere signal circuits controlled by the output of the fixed time controller.

A minimum of 12 signal circuits shall be programmable to flash.

9-32.1(D) 120 VAC INTERCONNECTION INTERFACES (New Section)

Pre-timed controller assemblies shall be wired to operate on a standard 120 VAC 3-cycle, 3-offset interconnection system:

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>120 Vac Common</td>
</tr>
<tr>
<td>2</td>
<td>Cycle 1 Transfer (120 Vac)</td>
</tr>
<tr>
<td>3</td>
<td>Cycle 2 Transfer (120 Vac)</td>
</tr>
<tr>
<td>4</td>
<td>Offset (1 percent/cycle ground at zero)</td>
</tr>
<tr>
<td>5</td>
<td>Offset (1 percent/cycle ground at zero)</td>
</tr>
<tr>
<td>6</td>
<td>Offset (1 percent/cycle ground at zero)</td>
</tr>
</tbody>
</table>

9-32.1(C) MASTER CONTROLLER SYSTEM (New Section)

It shall be possible to program the controller to function as a master controller. In this mode the controller shall supply a logic ground signal, which provides a grounded output for five percent of cycle length selected. The controller shall be furnished as a master controller if specified.

9-32.1(D) ACTIVATED CONTROLLER (New Section)

9-32.1(D) RMU STANDARDS (New Section)

The controller shall conformed to RMU standard TS 1-100 and shall provide all functions (except that volume density can be less need not be provided) which are provided for in the standard. Controllers shall be provided with two modules, and each module is identical and are not interchangeable with the same module in a RMU standard controller shall be marked, in a permanent manner, as a non-RMU standard module. All overlap functions shall be programmable.
TRAFFIC SIGNALS SYSTEM (New Section) 9-32

9-32.1(18) MANUAL INPUTS (New Section)
The following manual inputs shall be provided:
(a) Minimum Green
(b) Passage
(c) Yellow Orange
(d) Red Clearance
(e) Max I
(f) Max II
(g) Walk
(h) Don't Walk
(i) Maximum Recall
(l) Minimum Recall
(m) Pedestrian Recall
(n) Looking over-locking detection

9-32.1(27) VISUAL OUTPUTS (New Section)
The following visual outputs shall be available by observing switch positions or illuminated displays on the front panel:
(a) Per Phone:
   (1) Phone on
   (2) Phone next
   (3) Vehicle call
   (4) Vehicle actuation
   (5) Pedestrian actuation
   (6) All interval time settings listed above in section "Manual Inputs"
(b) Per Ring:
   (1) Initial
   (2) Passage
   (3) Walk
   (4) Pedestrian clearance
   (5) Yellow
   (6) Red clearance

9-32.1(30) CONSTRUCTION STANDARDS – WIRING (New Section)
Inputs and outputs of the controller and accessories shall be brought out through the wiring harness and connector(s) and terminated on terminal strips in the cabinet.

9-32.1(33) CONTROLLER PERSPECTIVE SEQUENCE (New Section)
The basic operation of the controller will be to rest in the "GREEN/DOE WALK" position as it may advance to the next phase immediately after the vehicle clearance intervals (yellow/wall red).

The controller shall also have the ability to rest in the "GREEN/WALK" position in any phase.

When the controller is in the "GREEN/DOE WALK" rest position, it shall be capable of pausing directly to the "GREEN/WALK" position upon actuation of the street push button providing no demand is registered on the other phases.

When demand is provided by a co-ordination, the variable yield shall determine when the control may return to the walk position even if no calls are present on the opposing phases.

336
TRAFFIC SIGNALS SYSTEM (New Section)

9-32.1(3) MANUAL INPUTS (New Section)
The following manual inputs shall be provided:
(a) Midnight Green
(b) Passage
(c) Yellow Orange
(d) Red Clearance
(e) Max I
(f) Max II

9-32.1(3) VISUAL OUTPUTS (New Section)
The following visual outputs shall be available by observing watch positions or illuminated displays on the front panel:
(a) Per Phase:
(1) Phase on
(2) Phase next
(3) Vehicle call
(4) Vehicle actuation
(5) Pedestrian actuation
(6) All interval time settings listed above in section "Manual Inputs"
(b) Per Ring:
(1) Initial
(2) Passage
(3) Walk
(4) Pedestrian clearance
(5) Yellow
(6) Red clearance

9-32.1(3)(D) CONSTRUCTION STANDARDS - WIRING (New Section)
Inputs and outputs of the controller and accessories shall be brought out through the wiring harness and connector(s) and terminated on terminal strips in the cabinet.

9-32.1(3)(E) CONTROLLER INTERVENTION SEQUENCE (New Section)
The basic operation of the controller shall be to rest in the GREEN/WALK position so that it may advance to the next phase immediately after the vehicle clearance intervals (yellow/all red). The controller shall also have the ability to rest in the GREEN/WALK position in any phase.

The controller in the GREEN/WALK reset position, it shall be capable of returning directly to the GREEN/WALK position upon actuation of the major street push button provided the interval is registered on the other phases.

When yield is provided by a co-prioritizing, the variable yield shall determine when the control may return to the walk position even if no calls are present on the opposing phases.

TRAFFIC SIGNALS SYSTEM (New Section)

9-32.1(4) ASSOCIATED EQUIPMENT (New Section)
Both installed and actuated controller assemblies shall be equipped with the following associated equipment:

9-32.1(4)(A) TERMINAL STRIP/PLUG IDENTIFICATION (New Section)
Each conductor terminal and each terminal strip shall be permanently tagged with an identifying circuit number as indicated on the drawings. Wire numbers shall be attached with type printed with the circuit numbers for each circuit available. Wire markers shall be applied within 6 inches of the terminations. Wire marker requirements apply only to field wiring.
The bottom row of terminal strips shall be located a minimum distance of 6 inches and a maximum distance of 8 inches above the bottom of the cabinet.

9-32.1(4)(B) POLICE PANEL (New Section)
The police panel shall have two toggle switches, each with two positions. Switch No. 1 shall be on the left side and its upper position shall be labeled "EMERGENCY OFF." In this position, the signals shall cease and the controller shall return to the normal position. Switch No. 2 shall be on the right side and its upper position shall be labeled "EMERGENCY FLASH." In this position, the signals shall flash with the pedestrian signals dark, and the controller shall run. The lower position shall be labeled "MAP" and in this position, the signals and controller shall operate normally. Switch No. 1 shall override Switch No. 2. The controller shall start up in major street green when being returned from flashing operation through Switch No. 2.

9-32.1(4)(C) AUXILIARY PANEL (New Section)
A panel shall be provided inside the cabinet door and shall include the following items, as specified in Exhibit C (included in the Appendix to the Special Provisions).

Switches and junctions shall be oriented and labeled. The door switch shall cause all display lights to be turned on when the door is open and off when the door is closed. Switches shall be toggle type except for "OFF/ON" MASH switch.
(a) A "NORMAL FLASH" switch which shall cause the signals to flash and shall allow the controller to run.
(b) A "SERIAL CONTROL" switch which causes the controller to stop after each pre-warned interval until manually advanced by actuation of the manual push button. Actuated type controllers shall remain in the same position once the push button is released.
(c) A "PRE-EMPT TEST" switch which shall cause a pre-empt signal to activate the appropriate sequence.
(d) A "TEST/RESET" switch which shall substitute all detector inputs to the controller, except the manual call button on the operator board or auxiliary panel.
(e) A "COORD/RESET" switch which shall, when in the "TEST" position, free the local controller from coordination input but leave the controller energized.
(f) A "CONTROLLER ERROR" switch which shall de-energize the controller.
(g) A "SIGNALLIGHTS" switch which shall turn the signals off and allow the controller to run.
(h) A "TEST TIME" switch which shall stop the controller in the interval it is in when the switch is activated.

337
9-32.10(1) LOAD SWITCHES AND Bases (New Section)

Each cabinet shall be furnished with the number of load switch bases specified in the Controller Assembly Table. Each base shall be wired for control circuits, flash chaser relay, and conflict monitor.

Load switches shall be supplied in the quantities specified in the Controller Assembly Table. Load switches shall be solid state, plug in, trip, according to MVA Standards, 20-l-Part 5. Indicating lights for each circuit shall be provided on each load switch.

9-32.10(2) OTHER EQUIPMENT (New Section)

An internally mounted thermostat which will activate the fan at temperatures above 70 degrees Fahrenheit and the light at temperatures below 20 degrees Fahrenheit. The thermostat shall have a minimum cycle of 5 degrees Fahrenheit between turn-on and turn off of either the fan or the light.

An internally mounted electric exhaust fan mounted near the top of the cabinet with ball or roller bearings and a capacity of 150 cubic feet per minute. The fan shall be weatherproofed and weatherproofed to the outside and be weatherproofed. The fan shall be thermostatically controlled. The fan circuit shall be fused.

Weatherproof vents with a glass fiber air filter, (1" x 10" x 10") for Type II and III cabinet) or of sufficient size to allow the fan to pass 100 CFM.

An incandescence light pocket door switch controlled and thermostatically controlled (thermostat switch in parallel with door switch) with 67 watt light bulb. The light shall be located near the bottom of the cabinet.

A radio interference suppressor shall be rated at 300 amps or more.

A 20 amp circuit breaker for the controller, accessories, and signal lights and a 15 amp circuit breaker for illuminated signs and convenience outlets. Wherever 5 or more vehicle phases are provided, the primary circuit breaker shall be 45 amps.

A 15 amp MVA standard convenience outlet with a ground contact and a ground fault interrupter.

Electrical Interface shall be provided in the central cabinet wiring to provide the electrical signal from the controller and the controller to the interface and the computer interface (See Exhibit D in the Appendix to the Special Provisions).

Controller Interface: A computer interface panel will be required in each controller assembly and a connecting harbor. Some shall be provided adjacent to the computer interface panel for a communications amplifier (see Signal Model 100-204). The interface panel shall be assembled and connected when required in all cabinets. The computer input of the computer shall have circuitry that will allow control of the back-up system. Presence of the computer input will automatically allow control to return to the back-up system.

The communications unit for interfacing the controller assembly with the computer located in the Municipal Building shall be an SLP-200 Model 100-352 either pneumatic or data transmission as required in the exhibit of the Special Provisions.

Interconnection Cable Interface: An interface panel shall be provided to connect the 120 volt A.C. direct with interconnection meaning commands to MVA logic for the controller coordinator.

The flasher and flash relay shall be in accordance with the current MVA Standards for flashers. The flasher shall have two circuits rated at 10 amps each.

The flasher relay shall be electromechanical, enclosed in a dust cover and格局 mounted. The relay shall be rated at 150 volt and 120 volt 12 amp contacts. The relay shall apply power to the flash sequence and allow the controller to run when the energized state.

A manual push button with a 4 foot flexible cord shall be installed on the side of the door with a box or hook to keep the cord from dangling more than 6 inches.

9-32.10(3) AUXILIARY EQUIPMENT (New Section)

Controller assemblies shall be furnished with the following auxiliary equipment as specified in the Controller Assembly Table.

338

339

Traffic Signals System (New Section)

9-32.11(1) DETECTIVE LOOP DETECTOR AMPLIFIER (New Section)

Loop vehicle detector amplifier units shall be configured in 2 channels and/or a channel digital, sequentially, "counting" type, adaptable for either shell or shell mounting which will provide the minimum number of amplifier units, as indicated in Exhibit A as found in the Appendix to the Special Provisions. The unit shall employ a single sensing coil with adequate number of turns to accommodate input and output for the specified channels, AC power input and equipment ground.

Amplifier units shall be self-testing. Range controls of any kind shall not be acceptable. Range shall employ a digital system which is completely automatic and is accomplished within 2 minutes after turn-on. Operation of the detector shall automatically compensate for changes in loop parameters caused by sediments and temperature variations.

Amplifier unit dimensions shall not exceed 24 x 24 inches wide, 6 inches high, and 9 inches deep, including connector.

All controls, cable connectors, and indicators shall be located on the front panel. Each channel shall have an associated "write-on" led to indicate traffic phase or other relevant information.

An indicator (incandescent or LED) shall be provided for each channel to indicate output status.

Amplifier unit shall operate in the "counting" principle—only 1 channel adding a loop/load-in system at any one point in time—and shall provide for channel-to-channel automatic digital processing of loop induction data over two channels and/or four channels as specified.

"Cross-talk" between channels of the same amplifier unit shall be isolated within the unit by sequential scanning of the channels.

"Cross-talk" between amplifier units shall be minimized by a front panel mounted control switch.

Sensitivity, pulse or presence mode and "OFF" position for each channel shall be selectable by a multi-position switch. A wide range of sensitivity levels shall be provided to allow detection of small vehicles, motorcycles (or motorcycles) at the higher levels and elimination of vehicle detection on anything lower.

In the pulse mode, each pulse shall provide an output pulse of 100 ± 25 milliseconds. A vehicle stopped over the loop shall generate a pulse upon entering the loop and shall be "crossed out" within 2 seconds at which time the detector channel shall return to full performance, so that additional vehicles shall trigger calls over the loop or other loops connected to the same channel.

In the presence node, the minimum hold time for detectable vehicles shall be 4 minutes, and no more than 120 minutes. In the presence mode the detector channel shall recover to normal sensitivity within 1 second after termination of vehicle presence in the zone of detection regardless of the duration of the presence.

Each of the channels of the amplifier unit shall automatically self-test to any standard loop or combination of loops, from 6 to 200 microsecond, within 10 seconds after operation or interruption of power.

Each channel of the amplifier unit shall provide continuous operation on a loop, or loops, which are shorted or leaking to ground.

A broken loop or loss-on-cable on any channel shall cause that channel to place a continuous call (false call).

Each channel shall provide unaltered detection of continuous traffic without loss of detection in long, peak-hour traffic volumes. Vehicle movement over loop shall restart presence hold time.

The output circuit for each channel shall be compatible for interfacing with solid-state digital equipment.

Lighting protection shall be installed inside the loop detector.

(a) The protection shall enable the detector to withstand the connection of a microfarad capacitor charge to ± 1000 volts directly across the detector input induction phase with no loop load present.

(b) The protection shall enable the detector to withstand the connection of a microfarad capacitor charge to ± 1000 volts directly across either the detector input inductive phase or from either...
side of the detector input inductance plate to earth ground. The detector shall be grounded and the detector input inductance plate shall have a daisy resistive load attached equal to 1 ohm.

(a) Variations between the power line loads shall be included to limit power line peak transient voltage to not more than 200 volts DC.

9-32.15) COORDINATING UNIT (New Section)

The coordinating unit shall provide the following minimum functions:

(a) 4 Cycles
(b) 3 Split/Cycle
(c) 3 Offsets per cycle
(d) 3 Force-off circuits
(e) 3 Rupture periods
(f) 3 Hold circuits
(g) Free ride
(h) Flash operation

(1) Pedestrian Lock-out

The unit shall be a digital, solid state device constructed as an integral part of the controller. All timing shall be done through the front panel by push button keyboard. Input shall be directly from the 120 VAC interconnecting cable; output shall be 120 VAC logic.

9-32.15C) TIME BASE COORDINATOR (New Section)

The term "Time Base Coordinator" shall describe a unit that is capable of providing timing functions for any standard traffic signal controller on a Stand- Alone basis without any external power. The unit shall be capable of accommodating additional timing units such as those of other manufacturers. The unit shall also be able to synchronize through a power failure of up to 60 hours and resuming operation with all outputs indicating synchronization identical to any other unit in a system which have not had a power interruption.

The unit shall be programmable on a weekly basis with the capability of programming on a yearly basis for events such as daylight savings time changes, holidays and special events. The unit shall be self-contained, modular in design using circuits consistent with the latest solid state digital technology.

All programming shall be done on a front panel keyboard or by downloading.

The unit shall have an illuminated display on the front panel which will show all output functions currently in effect and also all programming that is placed in memory.

Time Base Coordinators shall be housed in one of the following ways:

(a) A single fully enclosed metal housing with easy accessibility for internal maintenance.

(b) Separate module of the controller front panel.

The unit shall provide negative true outputs (maximum 0 volts) for each programmed function. Each output shall be an 800 open collector capable of sinking 100 mA and shall be capable of interfacing directly with solid-state control equipment using true logic inputs per ANSI standard C3-1970, Section 3.12.5.2-4. The units shall provide 120 VAC output via sensitive mechanical relays (old relays) for all functions for operating electro-mechanical controllers, interconnecting cable systems or sign fixture.

For traffic-actuated controls, the unit shall provide a hold-force-off program for 4 phases of an actuated control with the following minimum functions:

(a) Phase 1 hold

(b) 3 force-off circuits (output adjustable in length)
(c) Programmable free operation

(d) 2 unscheduled outputs

(e) 4 cycle lengths
(f) 3 splits

(g) 3 offsets per cycle

For preprogrammed controls, the unit shall provide a dial-set program with the following minimum functions:

(a) 4 cycle length
(b) 3 splits
(c) 3 offsets per cycle
(d) 2 unscheduled outputs

The zero point for each cycle shall be set by a push button on the front of the case or shall be based on an automatic reset of all cycles which occurs at midnight every 24 hours.

The unit shall execute up to 99 programs over a 7-day period with a 1 minute resolution between programs. Additional programming shall be available to provide dynamic savings data counting and to provide adjusting of normal programming for 10 holidays on a yearly basis.

Each unit shall have a standby battery that will retain all timing functions and all "zero" points for at least 40 consecutive hours with an accuracy of ±0.5 percent over that period. During normal operation the battery shall be maintained by a trickle charge. The battery shall be a sealed lead acid type.

Each unit shall have the capability, when fully programmed, of programming (downloading) another unit by means of a connecting cable.

9-32.15D) TIME CLOCKS (New Section)

The clock shall be solid state design with all programming through a push button keyboard. The clock shall be capable of driving all functions specified for a controller or a controller based on 120 VAC logic.

The clock shall provide a minimum of 0 output functions with an additional output for a synchronizing pulse for each cycle in effect. Timing functions shall be in seconds and minutes, not in percentages.

The clock shall provide a minimum of 100 on/off functions for a weekly program. The weekly program shall have the capability of adjusting any day.

An illuminated display shall be provided to indicate the setting and program output.

The clock shall provide 4 discrete timing cycles from 30 to 256 seconds. The normal clock circuit shall provide a 10 percent synchronously for any selected cycle. The clock shall be individually set and shall be maintained through programmed cycle changes of battery backup operation as though the cycle had occurred in continuous operation.

Battery backup power shall be provided to allow operation of the timing, memory, program, and preprogrammed operations. The transfer to battery power and return to AC power shall be automatic and without interruption. The recharging of the battery shall be automatic. Battery operation shall not accumulate an error greater than ±0.05 percent over 100 hours. The battery shall be a sealed lead acid type.

Ticking shall be crystal controlled and synchronized to the 60 Hz AC line frequency. Ticking error shall not exceed plus or minus 1 second per month on 60 cycle AC power.

The unit shall be enclosed in a metal cabinet suitable for shelf mounting or may be an integral part of the controller. Displays and connections shall be on the front panel.
9-32.15(6) COMPATIBLE MONITOR (New Section)
The compatible monitor shall meet NEMA Standards and shall monitor all 120 volt AC outputs of generation, voltage and limit valves, for conflicting indications as well as the absence of red indications. It shall also monitor controller power. Conflict monitors shall provide indications for each channel.

Conflict indications or removal of the conflict monitor shall stop the controller and cause the signals to flash all phases red and turn all pedestrian signals black.

Conflict monitors shall be capable of monitoring the number of circuits specified in Exhibit A. The monitor shall only detect conflicts after a minimum duration of approximately 0.3 seconds and not more than 0.4 seconds before transferring the timer to flashing operation.

The design of the sensing unit of the monitor shall be completely solid state with NEMA program board to program overlaps and NEMA plugs and harnesses.

The sensing unit shall detect both positive and negative alternations of the sine wave or full wave voltage signals.

The sensing unit shall detect a minimum of 25 volts.

An indicating light and reset button shall be provided on each channel.

Conflict monitors shall be modularly constructed, and shall be completely enclosed in a sheet metal case.

Conflict monitors shall be constructed as separate units, not integral to the controller. It shall have its own integral power supply and a separate connector for all inputs and outputs.

9-32.15(7) MAP DISPLAY BOARD (New Section)
The map display board shall include a monitor contact switch to simulate detectors and push button for each phase.

The выход call button and colored signal indicator lights, with phases indicated and labeled, shall be mounted in the appropriate positions on the map display board of the intersection. North shall be at the top of display panel.

The map display board shall graphically represent the intersection and shall be no smaller than 14 inches square and shall be mounted on the cabinet door.

White indicator lights shall show pedestrian and vehicle detector activations and any special functions (e.g., pre-set, etc.) for each phase. Indications shall be visible in bright sunlight.

9-32.15(10) CONTROLLER ASSEMBLY CAGE (New Section)
The controller shall be housed in a cabinet type as shown in the Controller Assembly Table. If the cabinet size specified does not meet the requirements of the equipment, a larger size cabinet may be substituted, but only with the approval of the Engineer. The Engineer shall be given written justification and a proposed cabinet layout with the proposed dimensions. Each cabinet and the arrangement of components therein shall be to accommodate the largest load switch allowed according to NEMA Standard, 12-F, Part 5.

Cabinets shall be weatherproof meeting NEMA 3 specifications and constructed of aluminum. The maximum overall height of the complete assembly shall be 66 inches. Term shall be a police door in the main cabinet door. Door hinge plane shall be stainless steel. Term shall be secured with gaskets. The main door shall be fitted with a door stop having at least two positions with an extreme position of not less than 10 degrees and an intermediate position of 90 degrees. The door shall be provided with an opening mechanism which will accept a 3/4 inch allen wrench for opening instead of a permanent door handle.

The main door shall have a vent lock or equal with a construction core and the control panel door shall have a standard police lock. A reset pushblock (3-bolt section) or equal with a construction core and an 1/8 inch shackles shall also be provided. The City will exchange the construction core for a Seattle "A" master core at the time of turn over. One key for the construction core and one key for the police lock shall be furnished with each assembly. A sliding keyhole cover shall be provided to prevent ice and snow build-up in the key hole.
9-32.21) COURSE CONTENT AND MATERIALS (New Section)

The course shall include, but not necessarily limited to:
(a) Operation of the local controllers and coordination units.
(b) Operation of the local master units.
(c) Routine maintenance and repair of local controllers and auxiliary equipment including diagnostic and trouble shooting procedures.
(d) Routine maintenance and repair of communications system including diagnostic and trouble shooting procedures.
(e) Routine maintenance of system master units including diagnostic and trouble shooting procedures.

The Contractor shall provide 8 sets of instructional material including training’s workbooks, instructor’s guide, training aide, equipment and system technical manuals, wiring diagrams, block diagrams, and all other necessary documentation and material sufficient to permit routine maintenance and trouble shooting.

9-32.3 SIGNAL HEADS, VEHICLE (New Section)

9-32.3.1) GENERAL (New Section)

Signal heads shall be in accordance with the "Institute of Transportation Engineers" publication, latest edition of "ADJUSTABLE FACE VEHICLE TRAFFIC CONTROL SIGNAL HEAD STANDARDS" and the following additional requirements.

The equipment shall be designed for operation under temperature and humidity conditions encountered in the Pacific Northwestern United States.

Materials and workmanship shall conform to the best commercial standards of the industry.

The City reserves the right to return any signal head or heads, within 1 year from the date of receipt, fail to comply with these specifications. The Contractor shall fully reimburse the City for all such heads.

A terminal block of an approved type shall be mounted inside at the back of each signal head. All sockets shall be so wired that a white wire will be connected to the signal socket and a wire, the color of the lens, to the end terminal of the socket. These wires shall in turn be connected to the terminal block external to the housing. The terminal block shall have sufficient studs to terminate 1 field wire and have spaces independently to the block with separate access. The terminals to which field wires are attached shall be permanently identified to facilitate field work.

All signal heads shall be installed as indicated on the blue prints and as designated by the Engineer.

The housing, door, visor extender and mounting hardware/framework shall be dark green in color. The visor extender and both sides of the back plate shall be optical black or black in color. The paint shall be of the best quality synthetic enamel paint.

Adjustable signal heads shall consist of separate signal sections, expandable type, for vertical or horizontal mounting rigidity and securely fastened together by weather-tight signal assembly. The signal sections shall be 8 inches or 12 inches as indicated on the blue prints.

Each section shall consist of a housing, door assembly and optical unit and backplate shall be so constructed as to provide complete interchangeability of parts.

Weather-resistant withstands shall be provided between the housing and door assembly and between the lens and reflector, which shall exclude dust and moisture.

9-32.3.2) HOUSING (New Section)

The housing shall be cast from aluminum alloy free from flaws, cracks, blowholes and other imperfections.
9-32 TRAFFIC SIGNALS SYSTEM (New Section)

No boxes or scores will be permitted. Back plates shall not interfere with either the operation of the door or the mounting of the signal. No other patterns shall be permitted on signal head housing. The front and back of the back plates shall be finished with 2 coats of flat black enamel.

Back plates shall be permanently attached so as to provide a 5 inch header for either 8 inch or 12 inch signal heads.

Back plates shall be provided with a minimum of 2 mounting holes per signal section, one on each side. The 2 top and 2 bottom backplate mounting holes shall be a minimum distance of 1 1/4 inches from the corners of a 6 inch signal housing, and 2 1/2 inches from the corners of a 12 inch signal housing.

9-32.2(2) BI-MODEL VEHICLE SIGNALS SECTION (New Section)
The signal section shall display both yellow and green arrow indications from the same face and shall use a dual-lamp 2-lens system to direct either color light into a fiberoptic display. The section shall be adaptable to conventional 12 inch vehicle signal heads.

9-32.2(3) OPTICALLY PROGRAMMED VEHICLE SIGNAL SECTION (New Section)
The signals shall permit the visibility zone of the indication to be determined optically and require no boxes or scores. The projected indication may be selectively visible or visible anywhere within 15 degrees of the optical axis. No indication shall result from external illumination nor shall one light unit illuminate a second.

The components of the optical system shall comprise: lamp; lamp reflector; optical limiter - diffuser; and objective lens.

The lamp shall be sealed 120 watts (75 watts for distance limiting applications); 120 volt DC, three-pin, sealed beam having an integral reflector with straight cover and an average rated life of at least 2,000 hours (or 24 months when operated at 120 volts DC for 72 hours per week, 52 weeks per year) in normal service conditions. The lamp shall be ganged to simplify replacement and can be changed without removing the lens mounting and securing the specular reflector. The diffusing element may be discrete or integral with the convex surface of the optical limiter.

The optical limiter shall provide a fiber optic surface at focus on the optical axis for objects 900 to 1200 feet distance, and print an effective velum spot to be variously applied as determined by the desired visibility zone. The optical limiter shall be provided with positive indexing means and composed of heat resistant glass.

The objective lens shall be a high resolution planar incremental lens hypocycloidal sealed with a flat lamina of wax or received acrylic or approved equal. The lens shall be symmetrical in outline and may be rotated in any 90 degree orientation about the optical axis without displacing the primary lamp.

The optical system shall accommodate projection of diverse, selected indicia to separate portions of the roadway such that only one indication will be simultaneously apparent to any viewer after optically limiting procedures have been accomplished. The projected indication shall conform to ITS transmission and chromaticity standards.

9-32.3(4) DIRECTIONAL LAMPS (New Section)

Means as indicated on the drawing, lamper shall be furnished and installed in signal visors. Directional lamps shall be so constructed as to have a snug fit in the signal visor. The outside cylinder shall be constructed of 1/4 U.S. gauge sheet steel, and the visor shall be constructed of 3/16 U.S. gauge sheet steel. Illumination and arrangement of lamps shall be as indicated on the drawing.

Lamper shall be galvanized after fabrication by the hot dipped process in conformance with A.S.M. Designation A 153 and painted flat black.

9-32.4 SIGNAL HEADS, PEDESTRIAN (New Section)

360
of the Clearance View (New Section)

Each signal shall be provided with an aggregate type face designed to eliminate sun phante.

The aggregate type face shall be installed parallel to the face of the crossbar message panel and shall be held in place by stainless steel screws. The aggregate assembly shall consist of vertical members and horizontal members. The completed assembly shall be approximately 11/16 inches deep.

The basic material used in construction of the aggregate shall be nominally 0.030 inches thick and shall be phosphor-bronze alloy. Additional members may be employed outside the two legged areas but are not required unless dictated by structural strength of the particular assembly technique employed.

The assembly shall be enclosed in a mounting frame constructed of 0.060 inches minimum thickness aluminum or polycarbonate plastic. The frame shall be approximately 11/16 inches deep and may contain alternate mounting holes for use on alternate types of pedestrian signals.

9-32.4(5) TRANSFORMERS (New Section)

2 transformers shall be provided with recessed secondary contacts. Both transformers shall have a minimum 400 volt, 30 millihenry secondary.

Each transformer shall have 120 volt (maximum) primary wattage and a power factor of 90 percent minimum.

A fused switch consisting of 2 cartridge fuses and a lever for disconnecting the fuses shall be provided inside the case as a terminal block for de-energizing the transformer primary circuit. The terminal block shall accommodate no less than 5 terminals.

9-32.4(6) OPTICAL PEDESTRIAN SIGNAL (2-Sections) (New Section)

Each signal head shall permit the visibility zone of the indication to be determined optically or visually by means of eyes or lenses. The projected indication may be observed through angles of 30 degrees to 15 degrees of the optical axis. No indication shall result from external illumination nor shall light be emitted internally a second.

The components of the optical system shall comprise: 1) lamp; 2) lamp holder; 3) optical limiter—diffuser, and 4) objective lens.

The lamp shall be rated 75 watt incandescent or 120 volt d.c. three-wire, sealed beam having a material reflector of cylindrical cover and an average rated life of at least 5,000 hours. The lamp shall be types T1-6, T1-7, or T1-10, as determined by the manufacturer.

The optical limiter may be discrete or integral with the convex surface of the optical limiter.

The optical limiter shall provide an imaging surface on the optical axis for objects 900 to 1,000 feet distance, and permit an effective viewing angle to be seriously limited as determined by the desired visibility zone. The optical limiter shall be provided with positive indexing means and composed of best resistant glass.

The objective lens shall be a high resolution planar incremental lens permanently sealed with a flat lens assembly containing acrylic or epoxy resin. The lens shall be semicircular in outline and may be rotated to any 90 degree orientation about the optical axis without displacing the primary lens.

The optical system shall accommodate projection of diverse, selected hazards to separate portions of the crosswalk such that only one indication will be simultaneously apparent to any viewer after optically limiting procedures have been accomplished. The projected indication shall conform to IRC transmission and chromaticity standards.

The signal head shall display International symbols. The top section lens shall provide a horizontal horizontal bar symbol and the bottom section lens shall provide a linear white "VH" symbol.
9-32.8 INTERCONNECT CABLE (New Section)

9-32.8(1) UNDERGROUND (New Section)

Multiple pair communication cable rated at 300 volts for underground installation shall be #19 AWG solid or stranded copper conductors, shielded cable with a polyethylene-polyethylene filling compound. Conductors shall be insulated with heat stabilized polyethylene or polyethylene, and the jacket shall be polyethylene. Electrical shielding shall be copper or aluminum. The number of pairs shall be as indicated on the drawings.

9-32.8(2) AERIAL ("FIBER 8") (New Section)

Multiple pair communication cable rated at 300 volts for aerial installation shall be #19 AWG solid copper conductors, shielded cable with integral stranded, galvanized Cu-steel messenger. Conductors shall be insulated with heat stabilized polyethylene. The jacket shall be polyethylene. Electrical shielding shall be copper or aluminum. The number of pairs shall be as indicated on the drawings. Aerial communication cable shall be supported throughout the run by Feeder Cable Hanger 22225 or equal. Suspension and horizontal angle turns shall be supported by automatic dead-end devices.

9-32.8(3) TELEPHONE LINE INTERCONNECT (New Section)

Where shown on the Drawings, communications cable shall be used to interconnect traffic signal controllers within the traffic signal interconnect system. The telephone company will furnish and install the cable from their facilities to a junction box at each of the intersections. The Contractor shall furnish and install the junction box, which shall contain a weatherproof station protector. The box shall be rated for 120 VAC, 50 cycles, and shall be located in a weatherproof enclosure. The station protector shall be mounted on the traffic signal pole. The conductors shall be terminated at the station protector, and shall be wired in accordance with the specifications provided by the telephone company.

9-32.9 INTERCONNECT CABLE (New Section)

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9-32.10 AERIAL TERMINAL COMPONENTS (New Section)

The aerial component shall be capable of accommodating the depth of "F" type and "P" type non-pressurized electrical cable and shall accommodate "K" type splice cable. The component shall be watertight.

The terminal block shall have sufficient studs to terminate a minimum of 36 field circuits independently to the terminal block with separate across. The component shall be cast aluminum or polymethylene. All external hardware shall be stainless steel.

9-32.11 SIGNAL WIRING (New Section)

9-32.11(1) TRAFFIC SIGNAL CABLE (New Section)

Color Code

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Signal Cable shall have solid copper conductors and shall conform to UL-UL specification No. 204 (polyethylene insulated, polyethylene jacketed signal cable).
TRAFFIC SIGNALS SYSTEM (New Section)

9-32.11(2) PEDESTRIAN PUSH BUTTON CAGES (New Section)

Pedestrian push button cable shall be single pair 16 AWG, 16/29 stranded copper, polyethylene insulated, AC coated, twisted pair cable with copper or aluminum-polyester shield and a No. 18 AWG stranded tinned-copper drain wire. The conductors shall be twisted together approximately 3 turns per foot.

9-32.11(3) ELECTRICAL SERVICE CONNECTIONS (New Section)

All traffic signal services shall be 2 parallel 120 volt, 60 HE AC electrical services with accompanying equipment.

Individual service conductors shall be color or number coded type BSM No. 6 8/20 stranded copper. The outer jacket of cable shall be flame resistant, suitable for use in sun light resistant thermoplastic or cross linked synthetic polymer suitable for underground conduit or aerial installation with suitable non-laponite fillers.

All fixed, connections and energizing of signal systems (overhead secondary or secondary in vaults or other enclosure) shall be performed by City Light, at no cost to the Contractor.

9-32.11(A) FUSES AND FUSE BLOCKS (New Section)

The fuse block shall consist of a 2-position fuseholder body, 2 insulating boots and a fuse. The fuse shall be of the voltage and amperage specified with the fuseholder body, and insulating boots rated at 60 amperes, 300 volts.

The fuse shall be a current interrupting type with a high interrupting rating, high speed opening, and high breaking capacity to prevent arcing while opening due to automatic short circuit overload. The fuse shall have a capacity of 35 to 50 amps as specified at 300 volts and shall have a minimum breaking rating of 300,000 nms symmetrical amperes and a maximum delay of 25 seconds at 200 percent load.

The fuse body shall be made of molded plastic. In two sections - the line side section and the load side section - to provide a visible area of disconnect for circuit repairs or maintenance. Each section shall be closed with the wire outside and the sections shall be joined by means of a 7/8 inch and ground joint. The fuse shall be held in the line side section only. The fuseholder body shall be such that the fuseholder be closed on a live circuit, any arc is confined within the fuseholder body. Each section of the fuseholder shall have a clip type connector to take a 12/2 or 60 solid or stranded copper wire.

Insulating boots shall be used to seal the wire connections and eliminate tags. 2 types of insulating boots may be used. A single conductor boot for the load side and either a 1- or 2-conductor boot for the line-side (one conductor boot when required for tapoff).

The design of the fuse shall be such that the carrying capacity or opening time is little affected by ambient temperature and will operate with low watt loss to reduce heating.

9-32.11(5) POLE JUNCTION BOXES AND TERMINAL BOXES (New Section)

Junction and terminal boxes shall be watertight (MDMA 4) rated, cast from brass or aluminum. Finish shall be hot dipped galvanized. Doors shall meet with a weather gasket and buttons cover across. Top and bottom conduit boxes shall be hinged, drilled and tapped. Conductors in rear of terminal boxes shall be drilled and tapped. The threads in poles and junction boxes shall be sealed to prevent water entry and rusting. Cabinet sizes shall be as indicated in the drawings.

9-32.11(6) GROUNDING AND bonding (New Section)

Ground rods shall be 5/8 inch diameter by 10 feet long copper clad steel rods. A ground rod shall be driven in each new foundation.

Bonding jumpers and equipment grounding conductors shall be stranded or solid, bare copper wire of the same cross-sectional area as No. 6 AWG unless a larger equipment grounding conductor is required by Code. Where parallel circuits are enclosed in a common conduit, the equipment grounding conductor shall be sized by the largest governing device serving any circuit contained in the conduit.

Ground rods shall be fabricated from cold-finished carbon steel sheeting in accordance with ASTM Specification A 109 as it applies to grade 1020.

The covering of the steel core shall be a mechanically-joined sheet of electrolytically-plated copper having a minimum thickness of 0.010 inches. The rods shall have threaded ends at each end for joining together with couplings.

Couplings for sectional rods shall be made of high-strength, corrosion-resistant bronze, internally threaded to fit standard rods.

Driving stakes shall be made of high-strength, hardened steel of AISI 4340 or equal quality.

Plate electrodes shall conform to Article 250-63-MEC.

The body of the ground clamp shall be manufactured of forged, cast or high-conductivity drawn copper alloy. Clamps shall provide high pressure contact directly between wire and rod by means of a set screw. The screw is of silicon bronze and shall have a square or hexagonal head.

Drawn copper shall be a 220 Alloy (nominal 90 percent Cu, 10 percent zinc) and have a minimum Rockwell hardness of 95 on the B scale. Clamps shall conform to Material Std. 5665.3.

9-32.11(7) SQUEEZE CAGE FITTINGS (New Section)

Cable fittings for entry of cable through metal walls of poles, signs and signals shall be squeeze-cage type cable fittings with water-tight secure fittings. Screws shall be carefully chosen to match the cable diameter to assure a water-tight fitting without damaging the cable.

9-32.12 SHAIN WIRE (New Section)

Shain wire shall be 5/16 inch, 7-strand aluminum covered steel open wire conforming to ASTM B415 with rated breaking strength of 10,200 lbs. per Department of Lighting Material Standard No. 5.5.4.1.

Galvanized open wire shall be 7/16 inch, 7-strand aluminum covered steel open wire conforming to ASTM B415 with rated breaking strength of 20,000 lbs. per Department of Lighting Material Standard No. 5.5.4.1.

9-32.13 POLE LINE HARDWARE (New Section)

Strain insulators shall be wet process, porcelain, conforming to KEI-69PA 7MD-54 as follows:

5/16 inch wire - Class S-2
7/16 inch wire - Class S-2

Tether wire shall be 1/8 inch galvanized steel stranded wire conforming to ASTM A575, extra high strength steel (rated at 1500 pounds minimum), Class A galvanized unless otherwise noted.

Rigging (pursue rope) shall be 1/2 inch galvanized steel wire rope conforming to ASTM A495 or better with an ultimate strength of 25,000 pounds. The rigging shall be sized with a safety factor of 5, unless the use of the unloaded steel. The rigging shall be galvanized and the steel shall be 1/4 inches in diameter and shall form a ring at the ends. The rings shall be galvanized and higher strength steel shall be used when more than 4 rigging heads are being supported.

All pole hardware, bolts, plates, nuts, bollards, clamps, wire guards and pole bands shall be hot-dipped galvanized in conformance with the requirements of ASTM designation A153, or shall be stainless steel.

All miscellaneous pole line hardware required to complete the project as planned shall be standard material manufactured for pole line construction.

9-32.14 GALVANIZING REPAIR Painting (New Section)

Field repair of galvanized surfaces shall be a coating of heated zinc alloy solder to a minimum thickness of 2 mils in accordance with ASTM A 765.
SECTION 9-33 - POLES, PIERSTARS AND FOUNDATIONS (New Section)

9-33.1 GENERAL (New Section)
All metal poles, mast arms and ladder extensions shall be designed and fabricated to conform with the requirements of AEGIS "Pole, Mast Arm and Platform Specifications" for suspension by hangers and 'U'bolts or other means as specified. All land requirements shall be met as indicated in the Drawings.

Poles shall be galvanized, either by the hot-dip or the zine coating process, in accordance with the specifications of AEGIS. The normal treatment shall consist of a double coat. All steel poles, mast arms and ladder extensions shall be galvanized as specified.

9-33.1(1) ANCHOR RULES (New Section)

Steel anchor bolts and nuts shall be as specified on the Drawings and shall be provided with each pole, mast or ladder extension. Anchor bolts shall be of the same material as specified on the Drawings and shall be capable of resisting, at yield strength stress, the loading moment of the shaft at its yield strength stress. Each anchor bolt shall have a hexagonal tightening nut with a washer for leveling and a bushing nut with a flat washer and a bolt washer that the top of the anchor bolt, which is the top of the anchor plate, will be flush with the bushing nut. All anchor plates shall be made of steel and shall be galvanized in accordance with AEGIS. No field cutting of threads will be allowed.

Anchor bolt extensions (above nuts), where required, shall be of a strength greater than the existing anchor bolts. The bolt extensions shall have a hexagonal tightening nut and shall be galvanized in accordance with AEGIS.

9-33.1(12) GALVANIZING (New Section)

Before galvanizing, all visible sides on the pole shaft, mast arm and ladder extension shall be ground flat to bare metal, and all sharp edges shall be removed on the interior to prevent damage to the wires in the pole.

Structural material shall be pickled in hot-dip process in accordance with AEGIS A 123 and the final coating shall consist of 0.006 inches or more in thickness as determined by a magnetic thickness gauge. The finished product shall be coated with a zinc blanket and the resulting product shall be coated with a zinc blanket and be suitable for use as described in AEGIS. The final coating shall be of a type suitable for use as described in AEGIS. The final coating shall be free from sharp edges to prevent damage to wires.

9-33.1(13) GROUND LUGS (New Section)

Metal poles shall have a 3/4 inch tapped hole in the bottom edge of the handhole inside the pole. A 3/8 inch stainless steel bolt with stainless steel lock washer suitable for grounding shall be provided.

9-33.1(14) CRIMINAL DAMAGE (New Section)

On metal lighting poles the Contractor shall furnish and install criminal damage covers to cover anchor bolts and nuts. Covers shall not extend beyond the outside edge of the pole flanges. Criminal damage covers shall be made of stainless steel and shall be provided. Covers shall be made of the same materials as the pole and shall be provided by the pole manufacturer.

9-33.15 CONCRETE WEIGHTS (New Section)
Poles, mast arms, and ladder extensions shall be within plus or minus 1/16 inch of perfect round with a constant taper of approximately 0.1 inches per foot and of uniform thickness.

9-33.2 STEEL POLES, MAST ARM, AND LADDER EXTENSIONS (New Section)

9-33.2(1) GENERAL (New Section)

The term "steel struts poles" as used here refers to any steel pole subjected to a span wire load (including all trolley loads) or mast arm load. Ladders or other street lighting appurtenances may be mounted on a "struts pole". The term "struts lighting pole" refers to any steel pole which carries a ladder but does not carry a span wire or mast arm load.

The length of the mast arm, height of pole, and size and type of ladder extension shall be as indicated on the Drawings. An aluminum or stainless steel pole identification plate shall be securely attached immediately above the handhole and shall indicate gauge, manufacturer, bolt circle, distance from pole to pole, length, and date of manufacture.

Outside diameter of pole shafts shall be not more than 11 inches for supporting mast arm lengths 30 feet and under, and shall be not more than 14 inches for supporting mast arm lengths of 35 and 40 feet. Outside diameter of steel struts pole shall be (at the base), no greater than 11 1/2 inches unless otherwise noted on the Drawings.

9-33.2(2) STRENGTH AND DEFORMATION REQUIREMENTS (New Section)

The pole shall have strength sufficient to support all indicated loads.

The following design loads shall be used: Dead load shall consist of the weight of the structure, lampposts and brackets, signs and supporting structure, and associated appurtenances; and live load shall be as indicated by AEGIS. The signal dead mast arm shall be of such size and gauge as to resist the bending moment.

The design of steel struts poles that support overhead trolley loads shall be governed by AEGIS Transit design standards as detailed on the Drawings.

Structural steel having a yield point of 33,000 psi or more shall be used for all structural parts. Mill test of the steel shall be no more than 0.06 percent to prevent discoloration during galvanizing.

The total deflection at the top of metal poles resulting from all dead loads applied shall not exceed 0.025 percent of the pole height.

The deflection of the mast arm after loading shall not cause the end of the mast arm to extend beyond a horizontal line from the center of the mast flange. The maximum rise of the mast arm after loading from a horizontal line shall be 2 degrees.

The taper for the handhole shall be between 1 and 4 degrees above horizontal with the handhole installed and all other loads applied to the pole.

9-33.2(3) MAST CIRCLE (New Section)

Mast arm flanges and pole base bolt circles shall be as indicated on the Standard Plans.

9-33.2(4) MAST (New Section)

Circumferential butt welds shall be permanent back-up rings and full penetration for 100 percent of the circumference. All exposed butt welds shall be ground flush. All welds shall conform to the requirements of Section 6-03, 04(4).
9-33.3(25) HANDBOLES, PISTONS AND WIRE INLETS (New Section)

Poles shall be equipped with a 6 x 6-1/2 inch handhole, and a 3-3/4 x 3-3/4 inch footman outlet, reinforced as to resist in use of shear strength. The handhole shall be matching cover attached with stainless steel bolts. The cover shall be designed to be removable and can be secured with two bolts. The handhole shall be fabricated into the pole in a position 30° oblique from the side on which the bracket arm or mast arm is attached.

Wire inlets (or outlets) as shown on the Drawings shall be Schedule 40 steel pipe extending downward from the pole. Both ends of the pipe shall be rounded for wire protection. Later shall be installed, drilled and edges rounded before galvanizing.

9-33.2(26) Masts ARM COUPLINGS (New Section)

Couplings for signals shall be 2 inch, Schedule 80 steel pipe extending out 4-1/8 inches from the mast arm with a 3/8 inch diameter hole for mounting plugs per the detail on the Drawings or in the appendix to the Project Manual. Both ends of the pipe shall be rounded for wire protection. The coupling shall be installed, drilled and edges rounded before galvanizing.

9-33.3(27) ANCHOR BASE PLATES (New Section)

A one-piece steel anchor base plate shall be secured to the lower end of the shaft by two continuous electric arc welds. The base plate shall be fabricated with a hole sized such that the shaft will slip through. The base plate shall be provided with a fillet between the end of the shaft and the inside of the pole, which shall be welded around the full circumference. A second weld shall be made around the full periphery where the shaft enters, making a bolt hole in the base plate. The welded connection shall develop the full strength of the adjacent shaft section.

9-33.3(28) POLE AND MAST ARM CUPS (New Section)

All metal parts (except duct poles) and mast arms shall be equipped with a raintight pole cap constructed of the same material as the pole, and attached with stainless steel bolts.

9-33.3 ALUMINUM POLES (New Section)

Aluminum street light poles shall meet the requirements of Material Standard 5789.8, except as modified herein and on the Drawings. The shaft shall be round with a continuous taper of approximately 1/8 inch per foot, and shall be made of a high-strength, corrosion-resistant aluminum alloy. The shaft shall be a butt finish, and shall be provided with a wrapping during shipping and installation. A rip cord shall be provided for easy removal of the wrapping. An aluminum pole cap shall be attached with stainless steel bolts. Bracket arm flanges shall be not employed on the Drawings. The diameter at the top of the pole shall be 4-1/2 inches plus or minus 1/8 inch. Poles shall have an oval 6-inch x 6-inch aluminum handhole fabricated into the pole in a position 90° oblique from the side on which the bracket arm is located and reinforced so as to resist in use of shear strength. The handhole shall have a matching aluminum cover attached with stainless steel bolts and shall be located 18 inches above the base plate. One aluminum anchor and transformer base shall be made of high-strength, corrosion-resistant aluminum alloy of sound and uniform quality.

Anchor base poles shall have a 3/8 inch tapped hole in the bottom edge of the handhole and 3/8 inch stainless steel bolt and lock washer for grounding. Transformer base shall have the ground lug inside the base adjacent to the access door. The leg shall be equipped with a stainless steel bolt (1/4 inch minimum) and lockwasher.

Anchor bolts for aluminum poles shall be the same as required for steel poles. (See Section 9-33.2(27)).

9-33.4 WOOD POLES (New Section)

Strain poles shall be either Douglas Fir, class 1, or Western Red Cedar, class 1.

Street light poles shall be Western Red Cedar, class 4.

356

9-33.5 STEEL PIPE (New Section)

Shafts shall be constructed of welded structural steel, open-hearth lap welded steel, or standard steel pipe conforming to the requirements of AWS A51. Shafts shall be 6-1/2 inches (6.5) Schedule 40 galvanized steel pipe with threaded end for meaning to the base. The overall height of the shaft and base shall be as indicated on the Standard Plans.

9-33.4(1) DOCKS FOR (New Section)

Poles shall conform to the latest AWS Specifications and Dimensions for Wood Poles.

Poles shall be round, sound, well proportioned from butt to top, without short knotholes or cracks, and shall be one of the class and length noted on the Drawings or Specifications.

Poles shall be machine smooth full length, and shall be free from "barber pole" and "wheel going" depressions.

Poles shall be incised full length after shaping but before seasoning. Minimum incising depth shall be 1/2 inch.

No check exceeding 3/8 inch is permitted. Adjacent maxima acceptable checks closer than 3/4 inch are not permitted.

Poles shall be roof eased.

Poles shall be full length pressure treated in accordance with ASA C1 and ASA C4. Net retention of preservative in poles after treatment shall be not less than 0.4 pounds of pentachlorophenol per cubic foot of wood (equivalent to 8 pounds of 5 percent solution).

The depth of wood preservative penetration shall be not less than 3/4 inches as determined by boring. Preservative shall be pentachlorophenol conforming to the requirements of ASA M.

Solvent for pentachlorophenol shall be a heavy petroleum conforming to the requirements of ASA M.

9-33.4(2) WESTERN RED CEDAR (New Section)

Poles shall be cut from live timber, and shall meet the requirements of ANSI 05.1, with the following additional requirements.

Poles shall have an average of at least 8 annual rings per inch, counted radially on the butt's surface between a point 3 inches from the center of the pole heart and the periphery of the pole.

The maximum top circumference for any class pole shall not exceed the minimum for that class by more than 3 inches.

Poles shall be machine smooth above the groundline. Shaved areas shall be free from "barber pole" and "wheel going" depressions.

Poles shall be flat-roofed at an angle of approximately 15 degrees, with the roof sloped from the face of the pole to the back of the pole.

The tops of full-length treated poles shall not be cut, except upon approval of the Engineer. If cutting is deemed necessary, the top of the pole shall be gauged with crescent compass and gauged completely with a copper or aluminum cup plate. Under no circumstances shall the butt of the pole be cut.

Preservative shall be pentachlorophenol conforming to ASA M.
Pedestrian base shall be of cast iron conforming the requirements of ASTM A 48, Class 40 and made in accordance to the configuration on the Standard Plans. Bars for pedestals shall be threaded, octagonal cast iron equipped with an access door for raising. A 1½-⅞ inch diameter bolt circle size shall be used. The base shall have a grounding lug inside which is accessible from the handle. The base shall be silver in color.

9-33.6 PEDESTRIAN PAVEMENT TESTS (New Section)

Pedestrian pavement tests shall be performed on 2 inch I.D. Schedule 40 galvanized steel pipe with length as indicated on the Drawings. The water test collar, pipe flanges, bolts, nuts and washers shall conform to the details of the Drawings.

9-33.8 BACKWASH ASSEMBLIES (New Section)

Unless otherwise specified in the Special Provisions, Guy Wire shall be 7/16 inch, aluminum covered steel strand wire conforming with Department of Lighting Material Standard 15696.1. Guy assembly components including the bowed grip, the percolate strain insulator, and the automatic feed-through deadeal shall be sized so as to meet or exceed the rated breaking strength of guy wire.

Guy assembly components shall conform with the requirements of Department of Lighting Material Standards as follows:

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<tr>
<th>Component</th>
<th>Material Standard</th>
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<td>Guy Hook with Integral Spur</td>
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<tr>
<td>Bowed Grip</td>
<td>5601.23</td>
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<td>Percolate Strain Insulator</td>
<td>6901.7</td>
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<tr>
<td>Automatic Feed-through Deadeal</td>
<td>5600.8</td>
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<td>Anchors for back guys shall consist of one of the following types:</td>
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<td>(a) A 4-way or 6-way steel expanding anchor, having a minimum of 320 square inches, made of pressed steel, coated with asphalt or similar preservative and fitted with 3/4 inch minimum guy eye anchor rod 8 feet long.</td>
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<tr>
<td>(b) Plate anchor meeting the requirements of Material Standard 5600.7 fitted with 3/4 inch minimum guy eye anchor rod 8 feet long.</td>
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<tr>
<td>(c) A cast steel anchor, such as a power installed steel hanger anchor with extension rods, extension rod coupling, and strap eye nut. The single strand guy eye shall be per Material Standard No. 5601.1. The steel anchor will be sized based upon its load and soil conditions by the Engineer.</td>
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The pipe brace shall be galvanized extra strong steel pipe.

9-34 - ELECTRICAL AND SIGNAL CONDUCTS (New Section)

9-34-1 GENERAL (New Section)

Conduit shall be PVC coated galvanized rigid metal, galvanized rigid metal, or Schedule 80 PVC complying to Articles 9-33 and 9-34, respectively of the NEC as indicated on the Drawings. All conduit and metallic junction boxes shall be U.L. approved.

Conduit installed totally within the enclosures and disconnect enclosure shall be rigid metal and may be without the PVC coating.

Where galvanized coating on any material has been damaged it shall be thoroughly painted with galvanized repair paint per Federal Spec MIL-P-23035 per the manufacturer's written instructions.

Conduit cable reuse shall be parallel to building lines and grouped together where possible.

Factory bends and elbows shall be utilized in all cases where they provide the required deflection.

Field bends, when required, shall be performed so as to result in no flattening of conduit or damage to the galvanizing or PVC coating.

It shall be the option of the Contractor to use larger size conduit when approved by the Engineer. Where larger size conduit is used, it shall be for the entire length of the run from outlet to outlet. Reducing couplings will not be permitted. Conduit shall not change size between branches, or conduit access point.

Conduit terminating in enclosures (poles, cabinets, pedestals, etc.) shall extend vertically above the foundation a distance of 1 inch, unless indicated otherwise on the Drawings.

Conduit entering through the bottom of a hazard shall be located near the end walls to leave the major portion of the box clear. Conduit shall enter from the direction of the run, terminating 6 to 8 inches below the handhole lid and near the box wall.

9-34-2 RIGID STEEL CONDUIT (New Section)

Rigid steel conduit shall be of 1 inch diameter, including threads, except field cut threads, shall be uniformly and adequately sized coated by a hot dip galvanizing process. The average weight of zinc coating shall not be less than 0.60 ounces of zinc per square foot of single surface area as determined by tests on 12-inch samples taken from a standard length of conduit of each size. The weight of zinc coating on any individual test specimen shall not be less than 0.4 ounce of zinc per square foot of single surface area. The weight of zinc coating will be determined in accordance with AISI P-90-65, Determinations and nominal weights shall conform to the requirements of the Underwriters Laboratory Publication No. 6 (latest edition). In addition, the exterior as well as the interior conduit samples shall withstand 4 dips in the WRDS test in accordance with ASTM A 239.

Every length of rigid metal conduit shall bear the label of Underwriters Laboratories, Inc., or the label of the Canadian Standards Association, if affected issues of Canadian manufacture are approved for use on the project. Installation shall conform to appropriate articles of the NEC.

Rigid steel conduit may be substituted where PVC is indicated on the Drawings at the Contractor's option when approved by the Engineer, except on pole risers.

Fittings for field and factory bends shall be identical and interchangeable.

9-34-2(1) THREADS (New Section)

The exposed threaded ends of rigid steel conduit shall be hot-dipped galvanized in accordance with the foregoing. Field cut threads shall be painted with galvanized repair paint.

9-34-2(2) COUPLINGS (New Section)

Couplings and fittings for rigid steel type conduits shall be hot-dip galvanized, with the same quantities of zinc mixed above. Couplings shall withstand 4 dips in the WRDS test as specified above.

359
9-34.2(3) PVC COATING (New Section)

All conduit shall be polyvinyl chloride (PVC) coated where indicated on the Drawings, dark grey, and G.I. Resistant Type.

The inside surface prior to plastic coating shall be conditioned with chromic acid to provide an anchor for the plastic coating.

The exterior shall be coated with an epoxy acrylic primer not to exceed 0.0005 inches thick prior to the application of the PVC coating.

A PVC coating shall be bonded to the outside of the pipe (excluding the thread) with a thickness between 0.005 inch and 0.003 inch. The PVC coating shall be applied by the plastic dip method and shall contain ultraviolet inhibitors.

A coupling with the same PVC coating shall be furnished loose with each length of conduit and shall have a plastic sleeve expands 1/2 pipe diameter or 3 inches (whichever is less) beyond the end of the coupling. The body of the coupling shall have a bore of the same as the outside diameter of the conduit pipe. The wall thickness of the plastic sleeve shall be the same as the plastic coating on the pipe. The bond between the metal and the PVC coating shall be equal to or greater than the tensile strength of the PVC coating.

A phenolic coating shall be fusion bonded to the inside of the pipe with a nominal 0.003-inch thickness.

All conduit fittings which are hollow and serve as part of the raceway shall be coated with the same PVC coating on the outside and phenolic coating on the inside as described above. The fittings shall have PVC sleeves at all female openings similar to the sleeves on the couplings.

All plastic coatings shall be applied by the same manufacturer who produces the hot-dip galvanized conduit.

The coated conduit shall conform to NEA Standard No. 851-1976 (Type A).

All coated conduit brackets, supports, clamps, NEA 4 section boxes, drums, branches, expansion/deflection fittings, seals, etc., shall be PVC coated by the producer of the conduit. Field repairs and touch-up shall be made with materials approved by the specifier.

9-34.24 EXPANSION FITTINGS IN CLASS I Group D AREAS (New Section)

Conduit expansion fittings shall be PVC coated and installed as noted on Drawings.

Expansion fittings shall be explosion proof rated for Class I Group "D" use.

9-34.25 EXPANSION/DEFLECTION FITTINGS IN NON HAZARD AREAS (New Section)

Expansion/deflection fittings shall be installed in all structures expansion joints. The expansion portion of the set shall provide for 6 inches of movement, 3 inches in each direction, unless specified greater on the Drawings. The deflection portion of the set shall provide for a movement of 30 degrees from normal in all directions, and an angular movement of 30 degrees from normal in any direction. Fittings shall be O.I. Gnutty Type AEX or approved equal.

9-34.26 CONDUIT SEALS AND BRACKETS IN CLASS I Group D USE (New Section)

Conduit seals and brackets shall be rated for Class I Group "D" use and PVC coated.

9-34.3 PVC CONDUIT (New Section)

Plastic conduit and fittings shall be rigid PVC Type PVC Schedule 80.

PVC rigid non-metallic conduit may be used for all installations except the first 10 feet above ground on a pole riser and the adjacent bend, or where specifically called out otherwise on the Drawings or Specifications.