Seattle Parks & Recreation

Date: December 18, 2025, updated January 8, 2026

To: City of Seattle Landmarks Preservation Board

CC: Erin Doherty, Landmarks Preservation Program Staff

From: David Graves, AICP, Strategic Advisor

Subject: Gas Works Park Cracking Towers – Pedestrian Appurtenance Removal Certificate of Approval Application

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Certificate of Approval Request

Seattle Parks and Recreation is requesting a Certificate of Approval from the City of Seattle's Landmarks Preservation Board to: Remove **all** pedestrian appurtenances (ladders, catwalks and stairways, and associated supports) from the cracking towers and also remove one elevated pipe that extends beyond the existing fence that connects the north and south cracking towers. Seatle Parks and Recreation (SPR) objectives at Gas Works Park are to (1) reduce the attractiveness of the site to trespassers, (2) reduce the risk that trespassers will be injured by making the towers less climbable, and (3) reduce the risk that additional metal could fall on SPR staff when working around the towers for maintenance purposes.

Background

Gas Works Park, including the Cracking Towers and other industrial remnant elements, is a City of Seattle Landmark and is also listed on the National Register of Historic Places. The park is the site of a former manufactured gas plant. Due to the known contamination at the site, it is managed by the Washington State Department of Ecology under the State's Model Toxics Control Act (MTCA), under a deferral agreement with the US Environmental Protection Agency (EPA). The upland area including the fenced area containing the cracking towers is the subject of a Consent Decree. The City and Puget Sound Energy are actively working on a remedy to address the existing contamination along the shoreline, in the groundwater and in the sediments offshore. The current target for implementation of the sediment remedy is 2029 with an estimated cost of $80 Million.

The fence around the Cracking Towers is considered Institutional Control as part of the Consent Decree for the upland cleanup work and maintenance and improvement of the fence, if necessary, is required. The fence is designed to keep people out of the area around the towers and there are No Trespassing signs on the fence and inside the fenced area. Pursuant to the Consent Decree, SPR staff inspect the soil cover and fence on a regular basis (approximately weekly), needed repairs are typically handled through SPR's work order system, minor work that can be done by the grounds crew in the regular course of their activities at the park may not generate a work order. In addition, the Northeast District maintenance staff are at the park on a daily basis and also call-in work orders if they see issues with the fence or gates. A fence has been in place around the towers since 1975.

Timeline (approximate - updated)

SPR has been working to address unpermitted access to the cracking towers since 2015. The following is an approximate timeline of SPR's actions:

June 26, 2015 – SPR briefed the Architectural Review Committee (ARC) of the Landmarks Preservation Board (LPB) –to discuss removing some or all of the stairs and landings/platforms to deter climbing of Towers 1 & 2, the south towers. ARC suggested starting with more focused removals of obvious access points.

2016 - SPR hires PSM Consulting Engineers to undertake a Climbing and Safety Evaluation of Towers 1 & 2 (southerly large towers).

August 7, 2019 –SPR applies for a Certificate of Approval (CoA) to perform selective removal of climbable features and undertake limited alterations to Towers 1 & 2, the south towers, to deter climbing. LPB approves the Certificate of Approval (CoA).

2019-2023 – SPR Metal Shop Crew undertakes approved work on Towers 1 & 2. Ongoing repairs were also being made to the fence and gates intermittently, as it was cut or otherwise manipulated/vandalized, ostensibly to gain access into the restricted area.

2023 – SPR hired All City Fence to do a complete restoration of the chain-link fence, restore the barbed wire on top of the fence, add steel mesh panels over the chain-link and reconstruct the gates with the steel mesh to resist cutting and strengthen the gates, which occurred in 2023. SPR received a Certificate of Approval for the fence work, dated April 25, 2023.

2023 – SPR hired a landscape contractor to remove all vegetation and trees that were growing around and amongst the towers to make the area more open and remove potential access point(s) to the towers. Note that SPR crews have been and continue to remove blackberries and mow the lawn areas around the towers within the Cracking Tower fenced area. They generally avoid working directly under the towers due to safety concerns/potential falling metal.

2024 – A leaning support element within the Cracking Tower area, between the North and South Towers, was removed with a Certificate of Approval from LPB issued on June 26, 2024. The Approval included removal of an access ladder and platform.

2023-2025 – SPR facilities continues to monitor and address access points; 3 of the 4 gates have been welded shut; area(s) under the gates have been paved to strengthen the gates and limit the possibility of digging under a gate for trespassers to gain access to the towers.

2025 – SPR submits a request for a Certificate of Approval for "[t]he proposed selective removal of maintenance access equipment, appurtenances, and associated supports at the former gas generating equipment in Gas Works Park, 1901-2101 N Northlake Way" which is denied by the Board; the oral decision was given on October 15 and the written decision is dated October 22, 2025.

2025/2026 – SPR submits a new Certificate of Approval application in December 2025, providing new information in response to the Landmarks Board's requests.

Incidents

The following is a list of reported incidents that have occurred at the Cracking Towers since 2008. This list is based on aid calls that Seattle Fire Department (SFD) responded to and it has been provided by SFD:

Date and Time	Victim Details	Description	Outcome
10/11/2008 0400 hours	Male, age 22	Climbed fenced-off structure; catwalk gave way, fell onto another catwalk.	Non-life-threatening (possible dislocated shoulder)
12/13/2009 0023 hours	Female (age 25)	Fell off structure.	Life-threatening injuries; survived
5/25/2012 0010 hours	Male, age 19	Fell off towers. Was visiting Seattle from Massachusetts.	Death
3/29/2013 0517 hours	Male (age 19)	Fell off structure; unconscious with liver and head injuries.	Life-threatening injuries; survived
7/19/2014 0322 hours	Female, 19	Fell 35 feet while writing graffiti.	Multiple broken bones; survived
1/25/2015 0033 hours	Male (age 21)	Fell off structure.	Life-threatening head and internal injuries; survived
2/1/2015 2210 hours	Male (age 19)	Fell off structure but remained conscious.	Injuries; transported to HMC
12/11/2016 2213 hours	Male (age 23)	Fell off structure while intoxicated after he missed a hole in catwalk; rescued by SFD.	Open femur fracture, possible pelvic fracture, etc.; survived
1/1/2019 2213 hours	Male (age 40)	Climbed while intoxicated; fell.	Significant injuries; survived
2/21/2022 0117 hours	Male (age 26)	Fell off structure; rescued by SFD.	Broken leg, head laceration; survived

Date and Time	Victim Details	Description	Outcome
9/17/2022 0242 hours	Female - Only known female victim. (age 20)	Fell through an opening in the walkway while climbing with friends on the south towers. They had all been drinking.	Death
11/23/2023 0030 hours	Male (age 16)	Fell off refinery; unconscious, no pulse.	Survived with brain damage.
3/29/2024 2318 hours	Male (age 19)	Fell 60 feet; walking and talking.	Injuries; treated at HMC
7/10/2025 2230 hours	Male (age 15)	Fell off towers after a classical music concert in the park.	Death

Proposal

Seattle Parks and Recreation is now proposing to:

- Remove **all** "Pedestrian Appurtenances" that are designed to convey human beings vertically and horizontally along the towers, designed for the purposes of maintaining/servicing and operating the former gas works facility. The working assumption is that these appurtenances provide platforms and access for graffiti and have been accessed by trespassers to climb the towers, notwithstanding fencing and signage. Falls have occurred resulting in serious injury and death. Removing the appurtenances will eliminate them as a means of access, promoting public health and safety. SPR is also proposing to remove one elevated pipe that extends beyond the existing fence that connects the north and south cracking towers and is a likely means of access to the towers from outside the fence. The selective deconstruction plan is reflected in Osborne's 8/7/25 site plan.

This application is different in several respects from the one recently denied by the Landmarks Preservation Board in October. First, it goes further than the recent proposal. Second, it addresses issues raised by the Landmarks Preservation Board regarding the most recent application. Third, it is supported by extensive expert analyses of potential alternatives to selective deconstruction. That analysis submitted with this Application and discussed below supports the conclusion that the appurtenances are a target for trespassing climbers and there is no height at which the appurtenances could be removed where they would no longer be a target.

The pedestrian appurtenances were designed to accommodate gas plant workers access to the cracking towers for maintenance and operations of the facility. These appurtenances were constructed long before the creation of OSHA in 1970 and they do not meet current OSHA standards, much less standards for access by the general public. While Parks intermittently paints the structures to cover graffiti, no additional maintenance work has been planned or built into the capital facilities planning because these structures are not intended to be used by the public. As a structure exposed to the elements, over time the structure will fail. SPR has not planned or budgeted other maintenance work for these structures to extend their expected life. SPR's budget is dedicated to providing parks, programs and services to the public at facilities where public access is allowed; no public access is allowed to the cracking towers and/or the area around the towers.

These appurtenances have become a target for unpermitted access. Without removal of the pedestrian appurtenances, this target will continue to exist. See Report by Drs. Reed and Suderman (discussed in more detail below under Expert analysis).

SPR is supportive of the vision of Richard Haag, the original designer, to preserve the towers as a reflection of Seattle's industrial past. The pedestrian appurtenances and pipe can be removed and the actual gas works retained in honor of that vision. While removal of portions of the historic material are now proposed, this intervention is not sought lightly and is necessary given the ongoing safety issues that continue despite the steps taken by SPR to limit climbing of the towers and in light of the Seattle Structural and GEAR reports.

Included below are excerpts from the Landmarks and National Register nominations, the original Myrtle Edwards, now Gas Works Park Master Plan documents and Rich Haag's original design drawings for the park. SPR's view is that taken together, all of the references and plans show Rich Haag's intention to retain the towers and piping associated with the towers ("the gas works"), given their visibility and monolithic nature. The National Register nomination notes that the "[g]as processing towers were always the distinguishing features of the gas works…." There is **no** reference to the pedestrian appurtenances, and they are not shown on the plans. Note also Rich Haag's statement in the Master Plan that "[a]ll structures will be modified, etc. to meet applicable safety codes."

SPR specifically points out that:

- The design intent, as conveyed in the following drawing excerpts and document citations, was to allow the volumes of the towers/tanks to remain. This did not necessarily include all the attachments/ pedestrian appurtenances. The Master Plan specifically references the monolithic nature of the towers which is what SPR is trying to maintain by preserving the towers and proposing to remove only the pedestrian related appurtenances.
- This facility is not structurally sound which is one critical reason why public access is precluded and the area fenced in addition to the contamination. There is no long-term management/conservation plan for the towers and no identified budget to maintain the structural integrity of the structures.

- While in 2002, the Friends of Gas Works Park funded an analysis of the south towers which found that the Towers themselves were sound, the information noted issues and potential safety hazards associated with the ladders, catwalks and piping (Mayes report). That analysis is now almost twenty-five years old. The structures and particularly their appurtenances are likely beyond repair. A structural analysis would require a visual inspection/site verification of each element, assessment of any associated footings and there is no reliable information on any of the appurtenances. This analysis would be extremely expensive and cost prohibitive.

From the Landmarks nomination (p.6):

(2). Identifiable Visual Feature

Gas Works Park and its Towers are of a scale and form easily perceived from any location around Lake Union. The park is a tangible, highly visible piece of Seattle's early history and of industrial revolution era technology. The Towers are a gothic sculptural presence and the contrast of these monolithic forms superimposed on the city skyline is unique and visually exciting. The experience is further enhanced by changes in perspective gained by moving around and through these forms of another era. "The black shapes of the towers on their grassy point leap out with startling clarity against the bright collage of the shoreline, silhouettes that might be the pictogram for the works of industrial man." (Landscape Australia, February 1980)

Gas Works Park Landmarks Nomination Page 7

From the National Register Nomination:

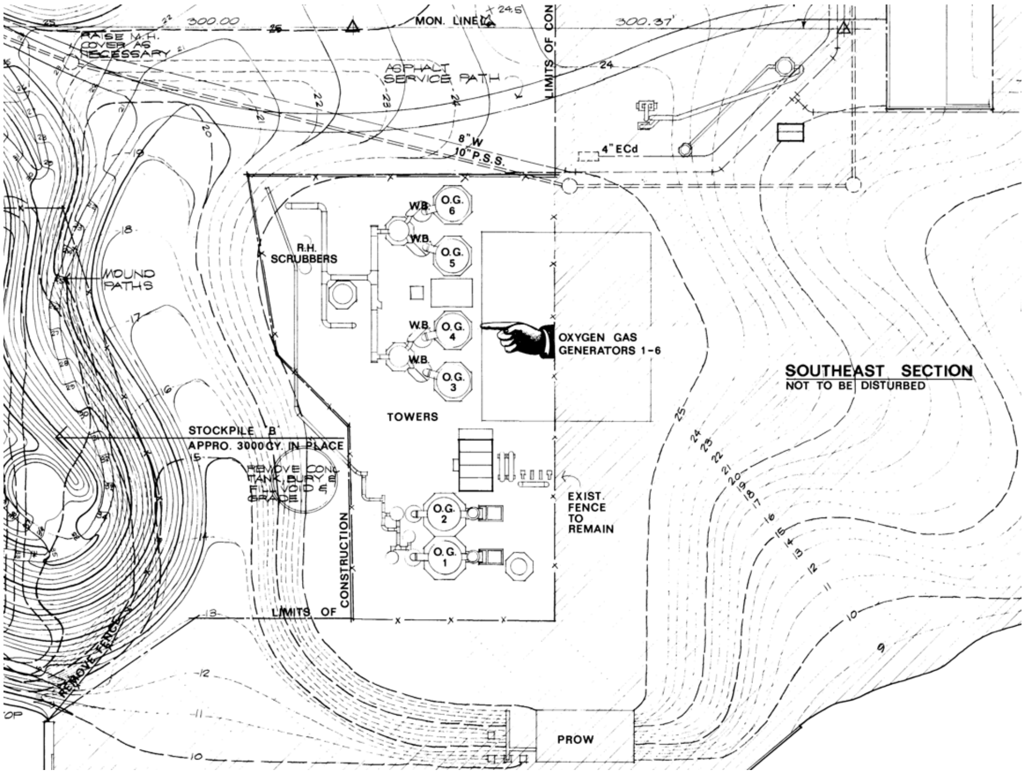
The groups of gas processing towers were always the distinguishing feature of the gas works; through their retention the present Gas Works Park retains the feeling of an industrial complex. The major structures removed in the design of the Park include the large oil tanks and city gas holders, all located to the west and north of the Towers.

From Rich Haag's Myrtle Edwards (now Gas Works) Park Master Plan:

Structures:

Of the 5% of site structures to be retained, (see D-5) about one-half will be reconditioned in initial park development. The remaining half, mainly the generator towers, will be preserved and restricted from public contact by a shallow water moat until specific programs are designated. New structures will be provided in response to community priorities and budget considerations. New structures to be included in initial development will be wooden stalls in an open air market/concession area. All structures will be modified, etc. to meet applicable safety codes.

Haag's vision for the cracking towers was that they would be accessible to the public. If that were to ever happen in the future, all of the pedestrian appurtenances would have to be removed, similar to what was done to the towers that exist in the park that are accessible to the public.
Portion of Rich Haag's 1975 Site Plan showing the Towers and surrounding area:



Landmarks Nomination package; Rich Haag's drawing showing structures to be preserved:

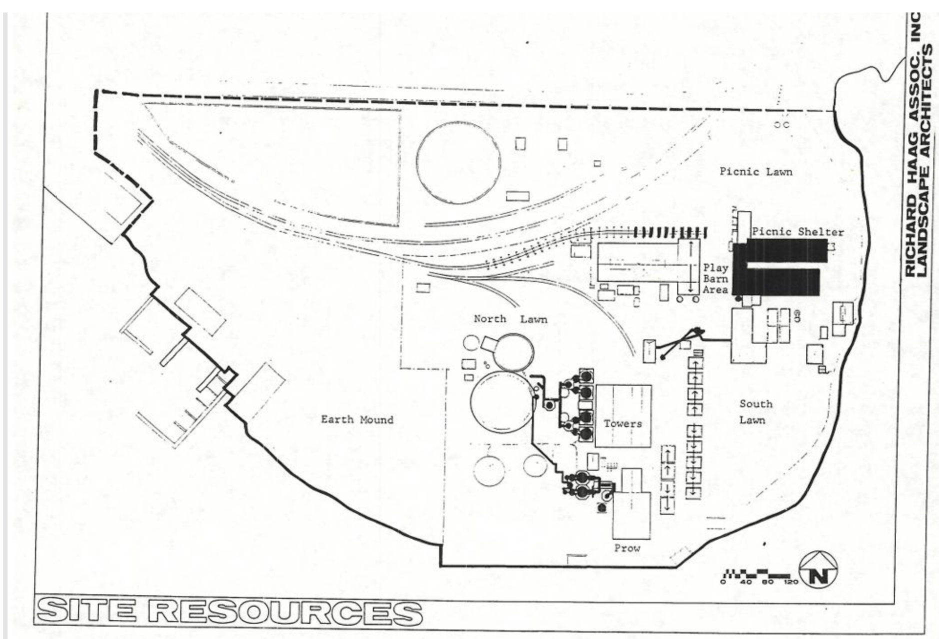


Figure 5: Plan showing preserved structures shaded in black and names of park areas.

Landmarks Nomination package; Rich Haag's drawing showing preserved structures:

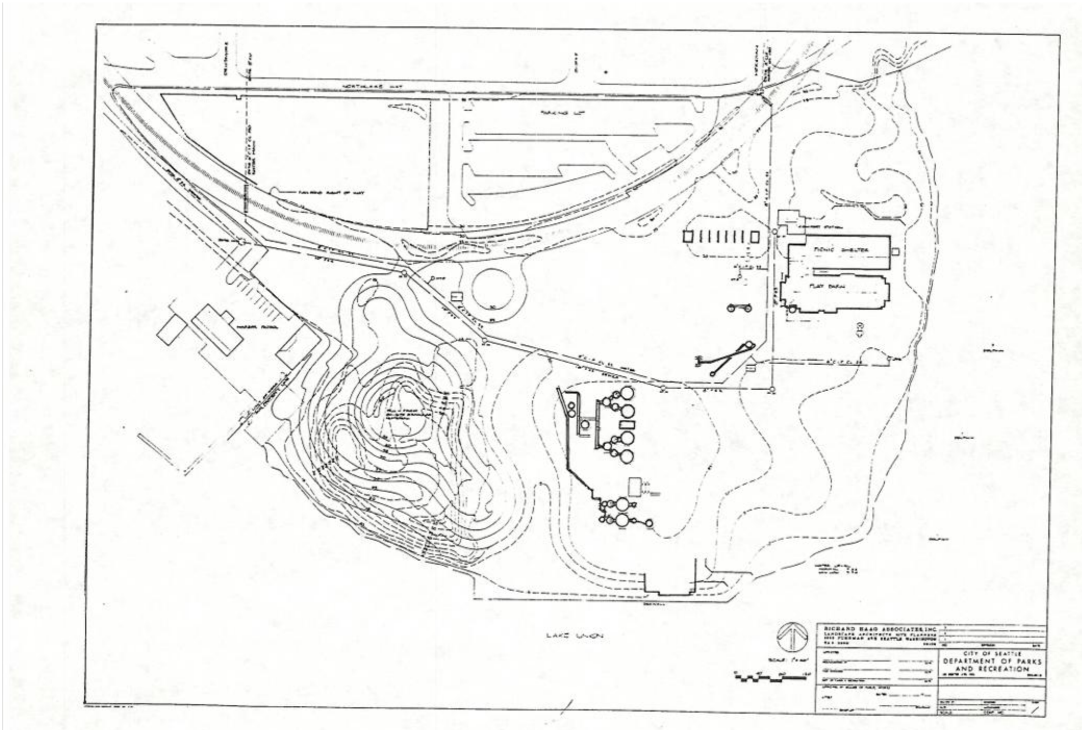


Figure 6: Plan showing topography of the park site and preserved structures.

Expert Analysis

As part of SPR's last application to the Landmarks Board, the Board requested expertise from outside the City for assessment of security, structural testing and engineering. The City hired several experts to assess the towers and provide recommendations based on their expertise. Howard Burton, a Structural Engineer and owner of Seattle Structural, provided the following structural condition assessment based on a site visit and his firm's review and analysis of past structural reports, photographs, plans and SPR's current proposal:

> "[T]he catwalks and ladders, which have small-dimensioned elements, and small welded and bolted connections, may eventually fail completely, even with efforts to apply paint and repairs. The 2025 Selective Deconstruction plans seem to properly address the fragility of the catwalks and ladders through removal."
>
> "Catwalks, ladders and appurtenances can in general be removed, as outlined in the 2025 Selective Deconstruction plan, without jeopardizing the stability of the main structural elements. In those cases where catwalk framing elements support main structural elements, these should be examined on a case-by-case basis, with the removal of unsupported main elements, or the addition of new supports so that these elements can be maintained."

The complete structural report is included as part of this request for a Certificate of Approval as is the Mayes Report of 2002.

The City also hired Drs. Reed and Suderman, human factors and biomechanical experts to review both the access to the pedestrian appurtenances, their attractiveness and effectiveness of potential deterrent measures. Their report provided the following conclusions:

1. The existing appurtenances are an attractive target for trespassers, and trespassers have been able to access those appurtenances despite prior efforts to limit access.
2. Any appurtenances left on the towers would continue to be an attractive target to motivated trespassers.
3. The site has a history of trespassers using assisted climbing methods to reach the appurtenances.
4. Additional fencing, video surveillance, lighting, signs and/or an alarm system are unlikely to deter all trespassers.
5. Although 99 percent of the general population would have a vertical grip reach height of less than 8 feet and a jump-reach height of 11 feet, trespassers would be able to use assisted climbing methods to reach appurtenances higher than that
6. Given the nature of the towers, there will continue to be protruding structures and horizontal bars on the tower structures that [are] potential handholds that could be used for climbing, including to reach any remaining appurtenances in the future.
7. While the signs posted on the perimeter fence of the Gas Works Park structure are reasonable and appropriate at alerting the public that access to the structure is prohibited, these signs do not deter individuals who are motivated to penetrate the fence barricade and/or access the structure.
8. While the perimeter fence around the Gas Works Park structure is appropriate and efficacious in limiting public access to the structure, the fence is not an effective barricade for individuals who are motivated to penetrate the fence.
9. As a public park, future visitors to Gas Works Park will include individuals who possess inherent risk factors to disregard signs and barricades, and/or engage in risk-taking behaviors; due to the presence of climbing affordances on the structure, these factors will increase the likelihood that a future climbing incident will occur.

While the report notes that people will continue to climb the towers, removing the pedestrian appurtenances that are the potential targets will likely limit the number and type of individuals who can climb the towers to those more skilled in climbing. It should also eliminate the risk of people falling through gaps in the current appurtenances. The towers outside the fence that have no appurtenances are climbed by more skilled individuals and there are no documented serious injuries or fatalities associated with those towers. The complete report is included as part of this request for a Certificate of Approval.

Other alternatives

SPR has evaluated other alternatives available to achieve its objectives at Gas Works Parks (GWP). As noted above, SPR's objectives at GWP are to (1) reduce the attractiveness of the site to trespassers, (2) reduce the risk that trespassers will be injured by making the towers less climbable, and (3) reduce the risk that additional metal could fall on SPR staff when working around the towers for maintenance purposes.

The Landmarks Board previously asked SPR to evaluate alternatives including focusing on lower-level elements first, suggested other less physically impactful strategies like introduction of new lighting, increased patrols at night, further fortifying or enlarging the fence, or possibly removing the fence, suggested repairing elements rather than removing them. These are addressed in turn below.

Other alternatives considered include:

Removing only lower-level elements first. SPR did seek a Certificate of Approval to remove pedestrian appurtenances on the towers approximately ten feet and lower in 2016, which the Board approved. However, additional injuries and deaths have occurred since that time. As reflected in the Reed/Suderman Report, the presence of climbing affordances on the structure and the availability of assisted climbing mean that trespassers could still reach any remaining appurtenances. This alternative also does not reduce risk for SPR staff.

Less physically impactful strategies such as adding additional fencing, fortifying existing fencing, video surveillance, lighting, signs and/or an alarm system. As noted in the Reed/Suderman Report, all of these suggestions are not likely to deter all trespassers and as noted in the Seattle Structural Report, these suggestions will not reduce risk for SPR staff; therefore these alternatives do not meet any of SPR's objectives.

Another less physically impactful strategy suggested was adding private security or police monitoring of the Park. Adding private security or police staff for continuous surveying indefinitely is not economically feasible for SPR.

SPR has determined that it would not be practical to address all remaining potential handholds on the cracking towers once appurtenances are removed. Generally, the appurtenances appear to be the cause of most injuries at the site, and modification or removal of all potential hand and footholds is impractical given the nature of the site.

The Reed/Suderman report made reference to anti-climbing devices. SPR is not pursuing the installation of anti-climbing device(s) at this time given the nature of the site, which has multiple structures with vast targets and potential handholds which are too many to surround with anticlimbing devices. SPR has determined that this is not a practical solution and would not address assisted climbing to access the tower appurtenances as outlined in the report from

Guidance Engineering. It would also not eliminate current climbing targets for those likely to engage in risky behavior, as noted in the Guidance Engineering report.

Removing the fence: Removing the fence would remove a visual cue to the public that these towers are not safe to be climbed. These towers were not built for public access and are not intended for that purpose. At this time SPR does not have a long-term plan or any City Council-appropriated funds for removal of the Cracking Tower fence and any associated soil remediation or other activities that would be necessary before the public could be allowed to access the area around the towers. The cost of such work is beyond typical City-wide maintenance fund allocation and would require capital investment approved by City Council. The near-term plan of the City for GWP through SPU and SPR is the design and future construction of the sediment clean-up at and off shore of Gas Works Park and the adjacent Waterways 19 and 20 and the Harbor Patrol facility.

Repairing all pedestrian appurtenances: As reflected in the Seattle Structural report, much of the pedestrian appurtenances are deteriorated, have small-dimensioned elements, and small welded and bolted connections, which may eventually fail completely, even with efforts to apply paint and repairs. This structure is in a high moisture environment with increased risk of corrosion. Wind and snow loads may exceed the reduced load bearing capacity of the aged structure. Repair will not meet SPR's objectives of making the site less attractive to trespassers.

Examine other industrial ruins located in parks/public spaces for alternatives: Parks like Landschaftspark Duisburg-Nord are great examples of the reuse of industrial sites, and so is Gas Works Park. Not every area of Larkschaftpark is accessible to the public – the Landschaftspark informational materials note that "[c]limbing over railings and entering sealed and fenced off areas is prohibited as this would pose a danger to life, and this is especially true of parkour." There are also two parks in Alabama that contain industrial remnants, both are old ironworks. Brierfield Ironworks and Tannehill Ironworks are public parks set in much more rural environments with camping facilities, forests and trails, and remnants of the original ironworks. Both are much different than Gas Works Park; the historic ironworks facilities are not climbable (and never were), the ironworks are now part of fee-generating museums, and they are not located in the middle of urban parks. The bulk of Richard Haag's vision for Gas Works Park has been implemented. Once the shoreline/sediment remedy has been implemented, that work will complete the park and afford the public the significant element that has been lacking at the park – access to the water and Lake Union. The towers are easily viewable from all areas of the park and Kite Hill provides that promontory view of the Seattle skyline and down into the towers. A complete overhaul of the towers with viewing platform(s) would duplicate a view that is already available at the park and does not meet SPR's objectives for the park of providing access to the land and water at the park, clean and safe restroom facilities, a children's play area and unprogrammed open space. Similar to other alternatives already discussed, building a viewing platform would not deter all trespassers and therefore this alternative does not meet SPR's objectives at Gas Work Park.

Complete demolition: Another alternative to eliminate any risk of falls would be to seek complete demolition of the towers within the fenced area. This alternative would remove all of the monolithic features that were part of Richard Haag's vision, rather than removing some of the attachments to the towers, which would leave them in a similar condition to those located outside of the fence.

Conclusion

SPR's plan to remove the pedestrian appurtenances, and the one pipe that extends beyond the fence, is in keeping with Richard Haag's vision to preserve the towers as the monolithic representation of the historic gas works. Removing the appurtenances also reduces the risks to SPR staff who maintain the park. Finally, SPR's proposal is supported by the expert analysis outlined above and attached as part of this request for a Certificate of Approval.

Gas Works Park
Cracking Towers
Tower Photographs

David Graves, Strategic Advisor | December 15, 2025

Seattle
Parks & Recreation

Healthy People, Thriving Environment, Vibrant Community

#SeattleShines

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#SeattleShines


DAMN

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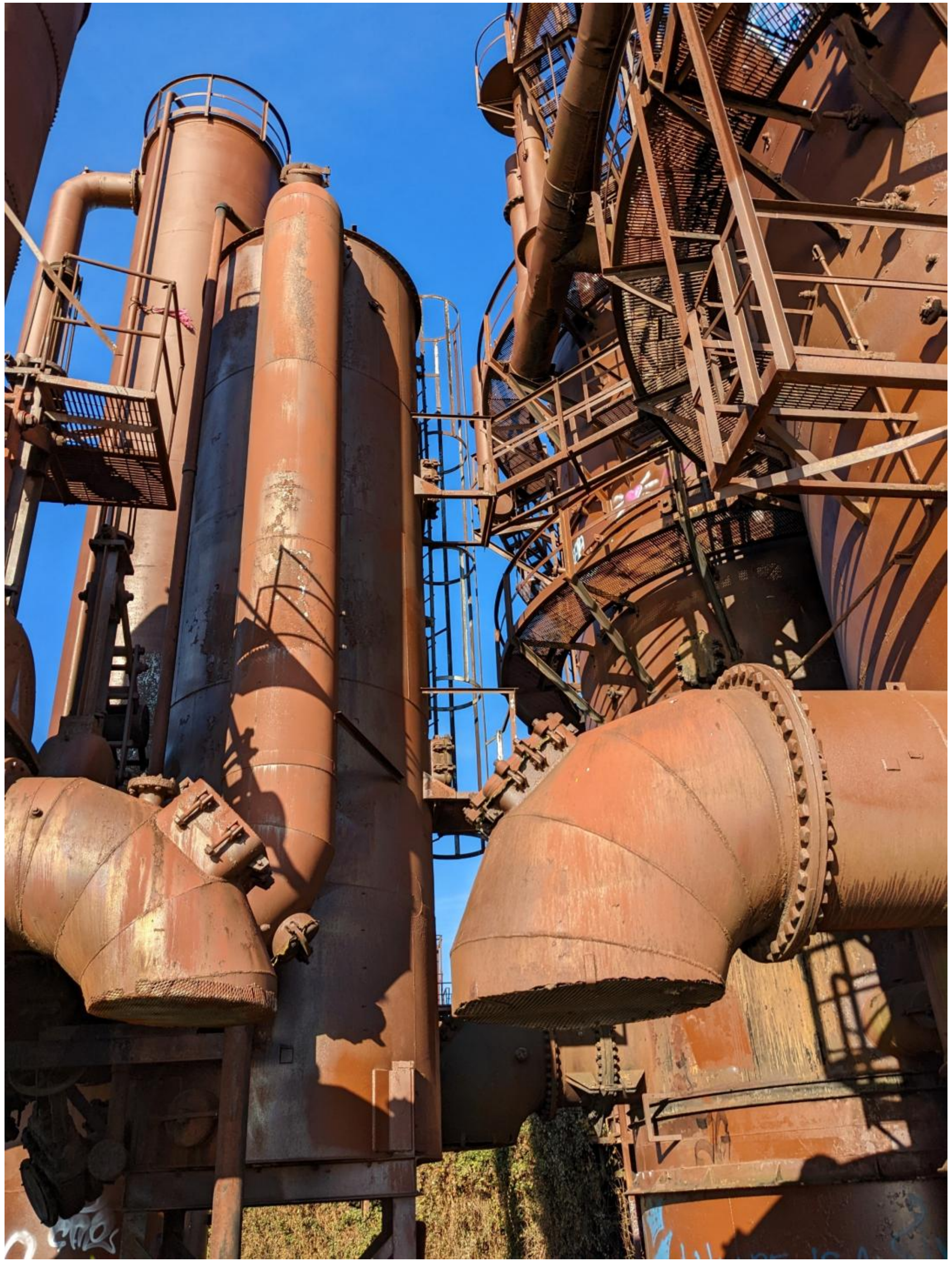

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GAS WORKS PARK "CRACKING TOWERS": EMERGENCY SELECTIVE DECONSTRUCTION

1901 N NORTHLAKE WAY 98103

VICINITY MAP
GAS WORKS PARK - NOT TO SCALE

PROJECT TEAM

OWNER
SEATTLE PARKS AND RECREATIONS
100 DEXTER AVE N, SEATTLE, WA, 98109
CONTACT: MIKE SCHWINDELLER
PHONE: 206.615.1165
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ARCHITECT
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1001 SW KLICKITAT WAY, STE 204
SEATTLE, WA 98134
CONTACT: JERRY OSBORN
PHONE: 206.920.6348
EMAIL: JOSBORN@OAIPS.COM

HAZMAT CONSULTANT
CONTACT: RYAN HUNTER
PHONE: 484.269.2138
EMAIL: RYAN.HUNTER@PBSUSA.COM

SITE INFORMATION

PROPERTY ADDRESS: 1901 N NORTHLAKE WAY 98103
OWNER: SEATTLE PARKS AND RECREATION
ZONING: UI U/45
PARCEL NUMBER:124970-0005

SCOPE OF WORK

SELECTIVE REMOVAL OF PIPING, CATWALKS, LADDERS AND SUPPORT SYSTEMS FROM TOWER STRUCTURES LOCATED WITHIN GAS WORKS PARK. EMERGENCY SECURITY LIGHTING SYSTEMS.

SHEET LIST

GENERAL NOTES

1. (E) PAINT COATINGS CONTAIN LEAD. RE FOR WORKER SAFETY AND DISPOSAL REQUIREMENTS.
2. EXISTING SOILS ARE CONTAMINATED. NO SOIL DISTURBANCE IS ANTICIPATED.
3. (E) TANKS OR PIPING MAY CONTAIN REMNANTS OF HYDROCARBONS. CONTRACTOR RESPONSIBLE FOR CUTTING EQUIPMENT AND TECHNIQUES EMPLOYED TO ENSURE WORKER SAFETY.

APPROVED FOR ADVERTISING:
FAS PURCHASING AND CONTRACTING DIRECTOR

Seattle, Washington ________ 20 ____
Date

Signature: ______________
Director, Purchasing & Contracting

NO.	REVISION - AS BUILT	DATE
3		
2		
1		

REVIEWED: ______________ ________
PARK ENGINEER DATE

All work done in accordance with the City of Seattle Standard Plans and Specifications in effect on the date shown above, and supplemented by Special Provisions.

6273 REGISTERED ARCHITECT
JERRY D. OSBORN
STATE OF WASHINGTON

OAI ARCHITECTURE + PLANNING
1001 SW Klickitat Way, Ste #204 | Seattle, WA 98134
p. (206) 631-8442 | http://www.oaips.com

Seattle Parks & Recreation

GAS WORKS PARK

EMERGENCY DEMOLITION

COVER SHEET

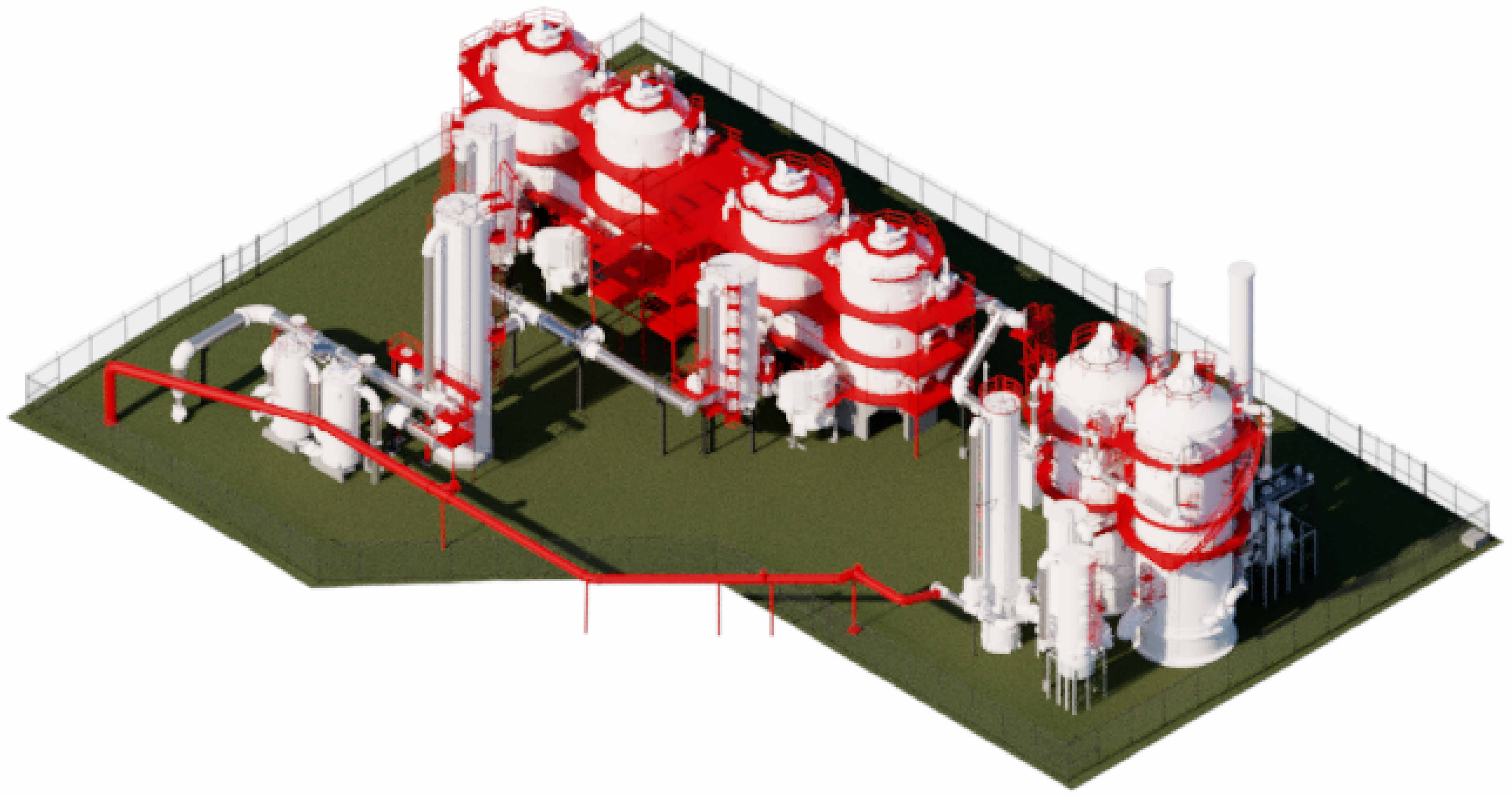
DESIGNED	Author	DATE	08/07/25
DRAWN	Designer		
CHECKED	Checker	SHEET	____ OF ____
ORDINANCE NO.			**G1.00**
CONTRACT NO.			
SCALE	1 1/2" = 1'-0" (U.N.O.)		

C:\Users\Amy\Desktop\Gas Works Park Scan_BASE.rvt

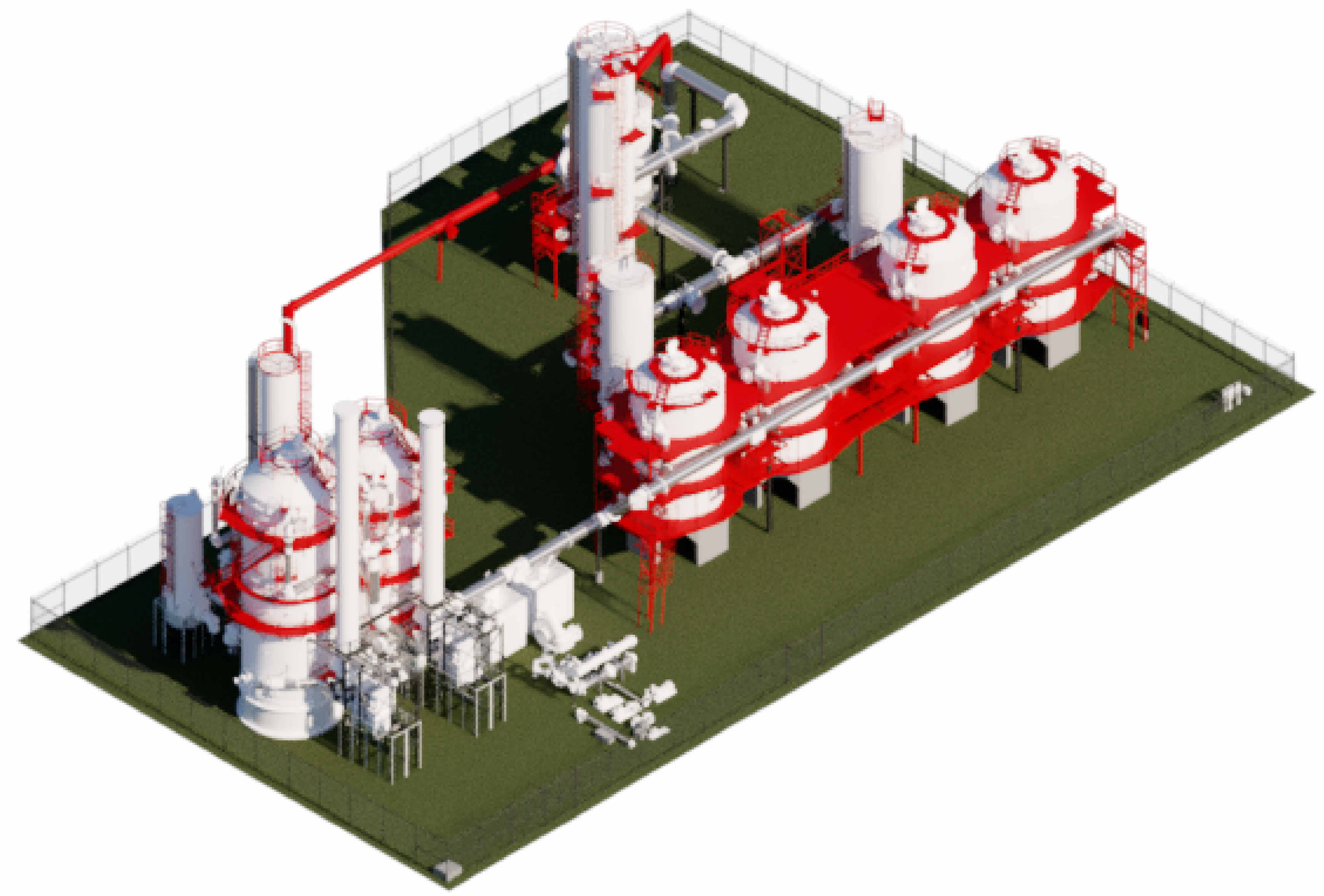
9/11/2025 11:12:35 AM

GENERAL NOTES

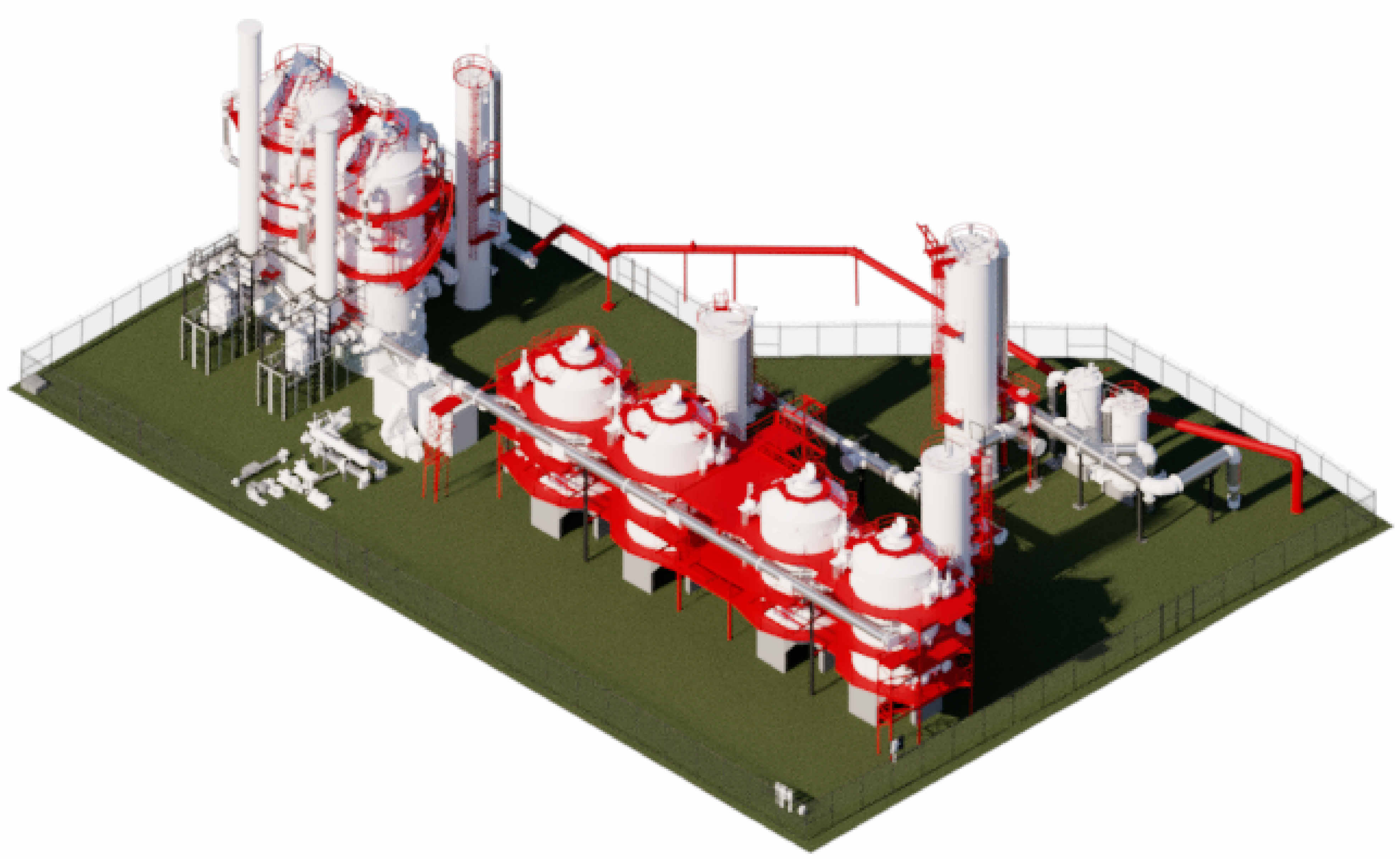
- ITEMS RENDERED IN RED ARE SELECTED FOR REMOVAL AND DISPOSAL (TYP.)
- CUT-OFF VERTICAL FRAMING AT GROUND LEVEL
    - SOIL DISTURBANCE IS EXCLUDED FROM THIS PROJECT.
- CAPPING OF UTILITY PIPING IS INCLUDED IN THE SCOPE OF THIS PROJECT.



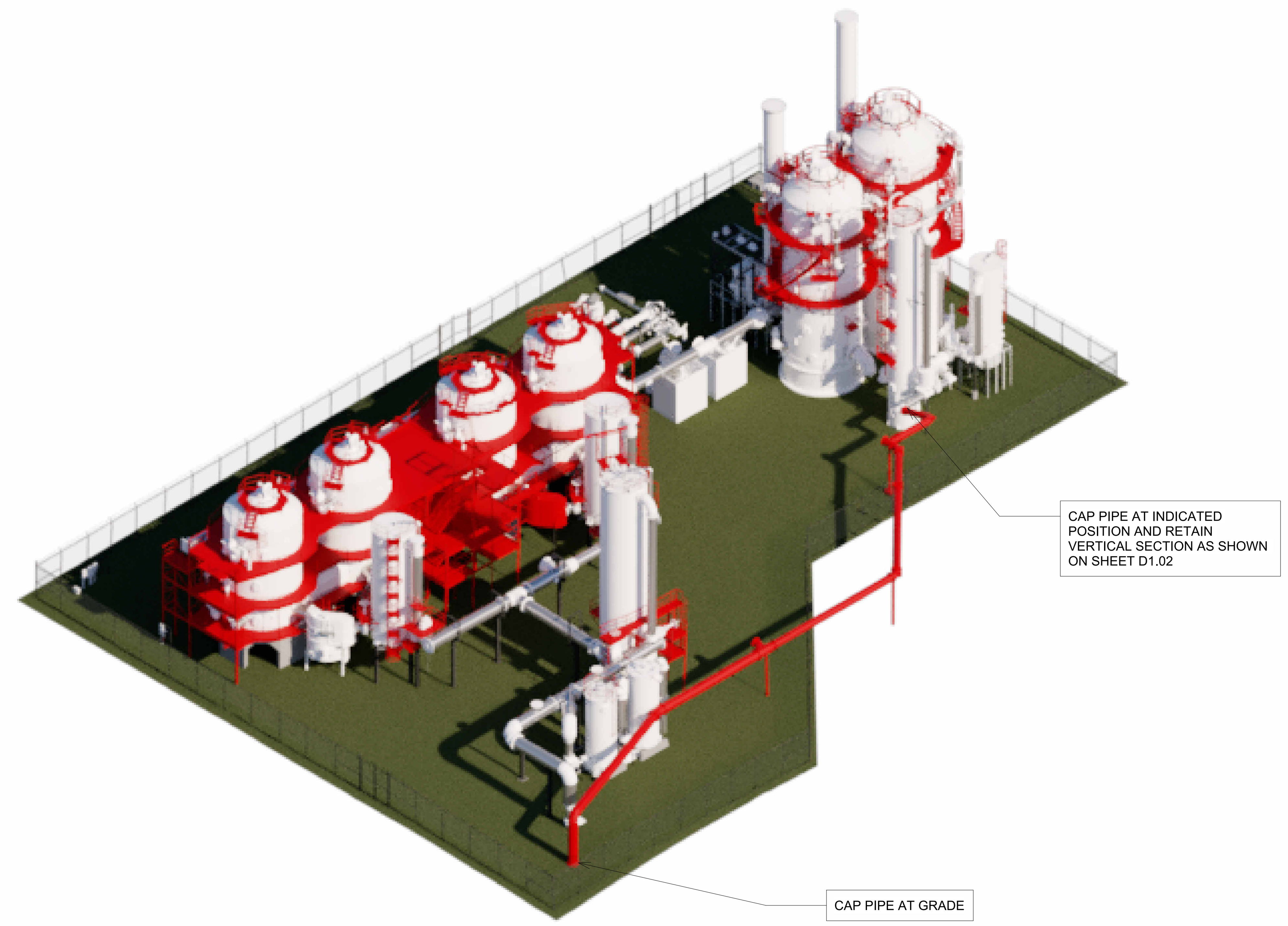
1 SW PERSPECTIVE
NTS



2 SE PERSPECTIVE
NTS



3 NE PERSPECTIVE
NTS



4 NW PERSPECTIVE
NTS

APPROVED FOR ADVERTISING:
FAS PURCHASING AND CONTRACTING DIRECTOR

Seattle, Washington ______________ 20 ______
Date

Signature: ______________
Director, Purchasing & Contracting

NO.	REVISION - AS BUILT	DATE
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2		
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REVIEWED: ______________ PARK ENGINEER ______________ DATE

All work done in accordance with the City of Seattle Standard Plans and Specifications in effect on the date shown above, and supplemented by Special Provisions.

6273 REGISTERED ARCHITECT
JERRY D. OSBORN
STATE OF WASHINGTON

OAI ARCHITECTURE + PLANNING
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p. (206) 631-8442 | http://www.oaips.com

Seattle Parks & Recreation

GAS WORKS PARK

EMERGENCY DEMOLITION

DECONSTRUCTION PERSPECTIVE RENDERINGS

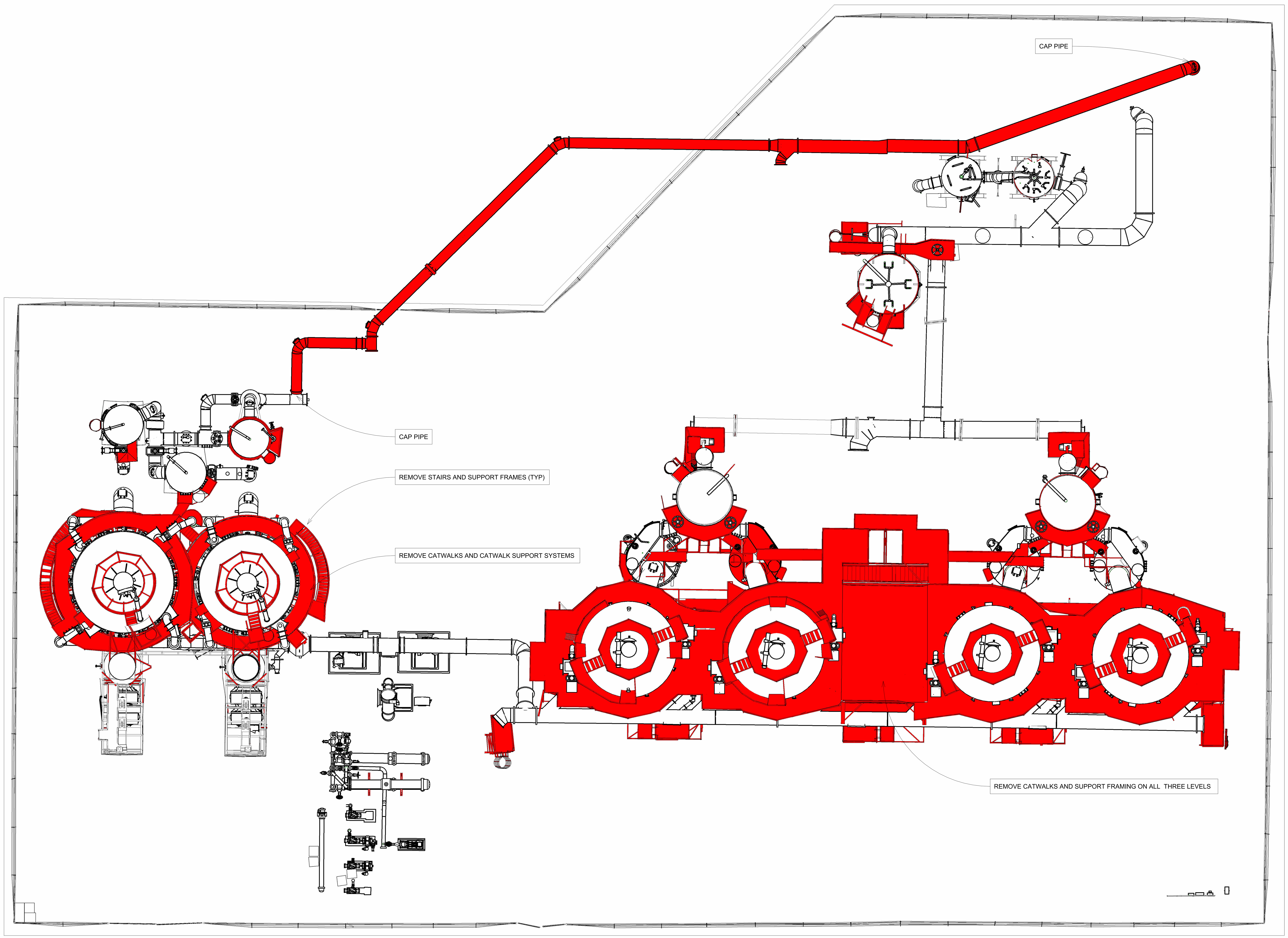
DESIGNED	Author	DATE	08/07/25
DRAWN	Designer	SHEET	____ OF ____
CHECKED	Checker		

ORDINANCE NO. ______
CONTRACT NO. ______
SCALE NTS (U.N.O.)

D1.01

GENERAL NOTES:

1. DECONSTRUCTION SHOWN ON THIS PLAN DOES NOT REPRESENT THE COMPLETE SCOPE OF DECONSTRUCTION REQUIREMENTS.



1 SELECTIVE DECONSTRUCTION PLAN
AS NOTED

0' 5' 10' 20' 40'

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FAS PURCHASING AND CONTRACTING DIRECTOR

Seattle, Washington ______ Date ______ 20 ______

Signature: ______ Director, Purchasing & Contracting

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STATE OF WASHINGTON

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GAS WORKS PARK

EMERGENCY DEMOLITION

SELECTIVE DECONSTRUCTION PLAN

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CONTRACT NO.			
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SCOPE OF DEMOLITION

1. DEMOLISH (E) PIPING
2. DEMOLISH (E) RAILING
3. DEMOLISH (E) CATWALKS
4. DEMOLISH (E) CATWALK SUPPORT STRUCTURE
5. DEMOLISH (E) LADDER ASSEMBLY AND SUPPORT SYSTEM
6. DEMOLISH (E) PIPE SUPPORTS - CUT OFF FLUSH WITH GRADE

GENERAL NOTES

- REMOVE ALL ELEMENTS INDICATED IN RED.
- APPLY "CORROSIONX HD" CORROSION-INHIBITING COATING (OR APPROVED EQUIVALENT) TO ALL EXPOSED STEEL THAT HAS BEEN CUT OR TORCHED.
- CAP EXISTING PIPE AT CUT/TORCH LOCATIONS USING A 1/2" STEEL PLATE, FIELD-WELDED TO THE PIPE END. PAINT THE CAP AND WELDS WITH THE SPECIFIED CORROSION-INHIBITING COATING.
- SCOPE INCLUDES REMOVAL OF CATWALKS, LADDERS, AND ASSOCIATED SUPPORT FRAMING. REVIEW IN-FIELD CONDITIONS WHERE PIPING SYSTEMS NOT SCHEDULED FOR REMOVAL MAY BE SUPPORTED BY CATWALK STRUCTURES.
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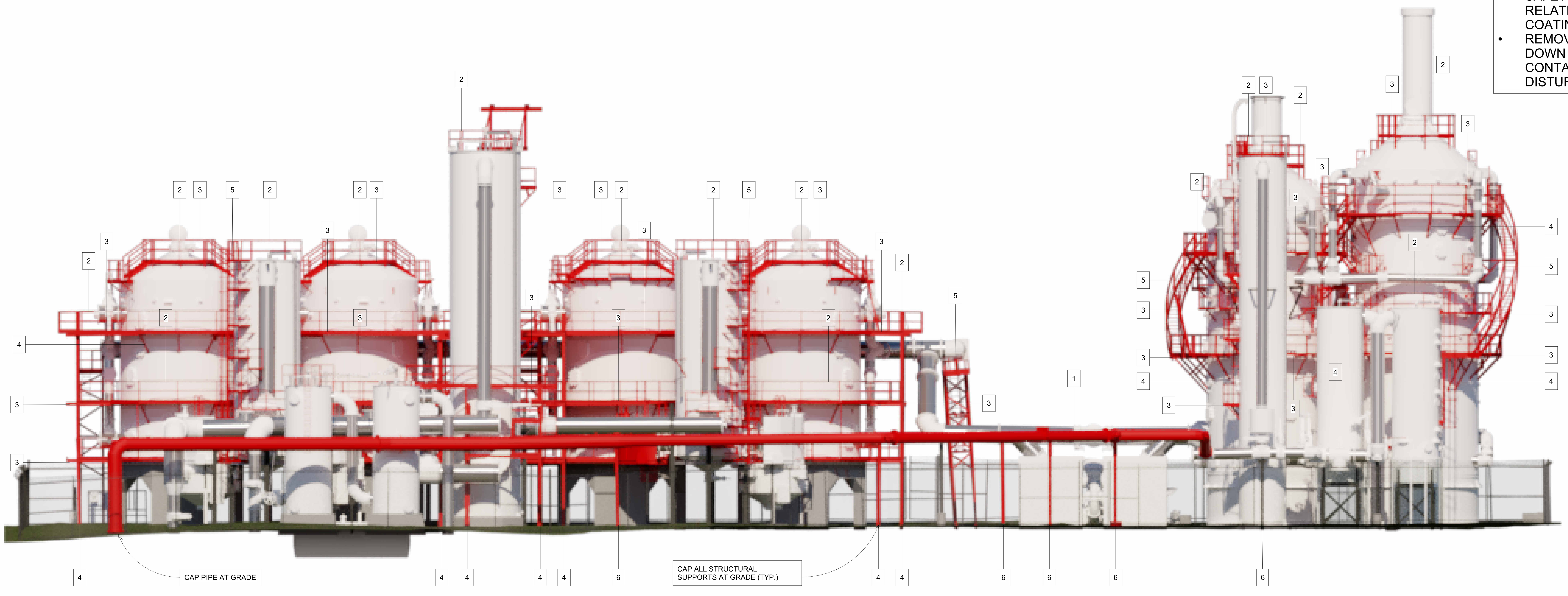
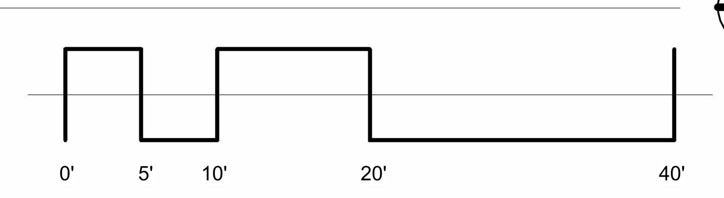
- REMOVE ALL STRUCTURAL SUPPORTS DOWN TO GRADE. NOTE: EXISTING SOILS CONTAIN HYDROCARBONS—DO NOT DISTURB NATIVE SOIL.



1 WEST DECONSTRUCTION ELEVATION
AS NOTED



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EMERGENCY DEMOLITION

WEST DECONSTRUCTION ELEVATION

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CONTRACT NO.			
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1 NORTH DECONSTRUCTION ELEVATION
AS NOTED

0' 5' 10' 20' 40'

SCOPE OF DEMOLITION

1. DEMOLISH (E) PIPING
2. DEMOLISH (E) RAILING
3. DEMOLISH (E) CATWALKS
4. DEMOLISH (E) CATWALK SUPPORT STRUCTURE
5. DEMOLISH (E) LADDER ASSEMBLY AND SUPPORT SYSTEM
6. DEMOLISH (E) PIPE SUPPORTS - CUT OFF FLUSH WITH GRADE

GENERAL NOTES

- REMOVE ALL ELEMENTS INDICATED IN RED.
- APPLY "CORROSIONX HD" CORROSION-INHIBITING COATING (OR APPROVED EQUIVALENT) TO ALL EXPOSED STEEL THAT HAS BEEN CUT OR TORCHED.
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- REMOVE ALL STRUCTURAL SUPPORTS DOWN TO GRADE. NOTE: EXISTING SOILS CONTAIN HYDROCARBONS—DO NOT DISTURB NATIVE SOIL.

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PARK ENGINEER DATE

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EMERGENCY DEMOLITION

NORTH DECONSTRUCTION ELEVATION

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ORDINANCE NO.			**D1.04**
CONTRACT NO.			
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SCOPE OF DEMOLITION

1. DEMOLISH (E) PIPING
2. DEMOLISH (E) RAILING
3. DEMOLISH (E) CATWALKS
4. DEMOLISH (E) CATWALK SUPPORT STRUCTURE
5. DEMOLISH (E) LADDER ASSEMBLY AND SUPPORT SYSTEM
6. DEMOLISH (E) PIPE SUPPORTS - CUT OFF FLUSH WITH GRADE

GENERAL NOTES

- REMOVE ALL ELEMENTS INDICATED IN RED.
- APPLY "CORROSIONX HD" CORROSION-INHIBITING COATING (OR APPROVED EQUIVALENT) TO ALL EXPOSED STEEL THAT HAS BEEN CUT OR TORCHED.
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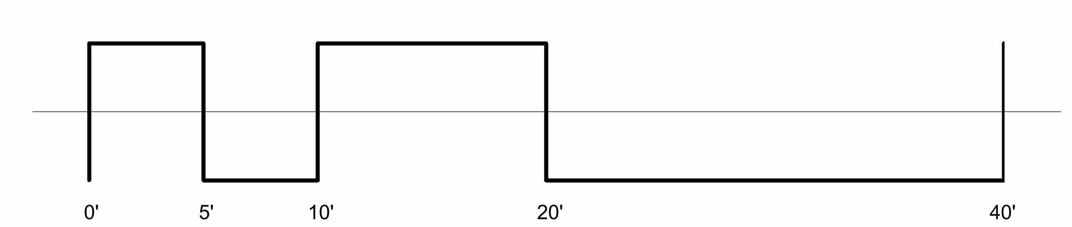
2 SOUTH DECONSTRUCTION ELEVATION
AS NOTED



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Date

Signature: ______________________
Director, Purchasing & Contracting

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EMERGENCY DEMOLITION

SOUTH DECONSTRUCTION ELEVATION

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CONTRACT NO. ______

D1.05

SCALE AS NOTED (U.N.O.)

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SCOPE OF DEMOLITION

1. DEMOLISH (E) PIPING
2. DEMOLISH (E) RAILING
3. DEMOLISH (E) CATWALKS
4. DEMOLISH (E) CATWALK SUPPORT STRUCTURE
5. DEMOLISH (E) LADDER ASSEMBLY AND SUPPORT SYSTEM
6. DEMOLISH (E) PIPE SUPPORTS - CUT OFF FLUSH WITH GRADE

GENERAL NOTES

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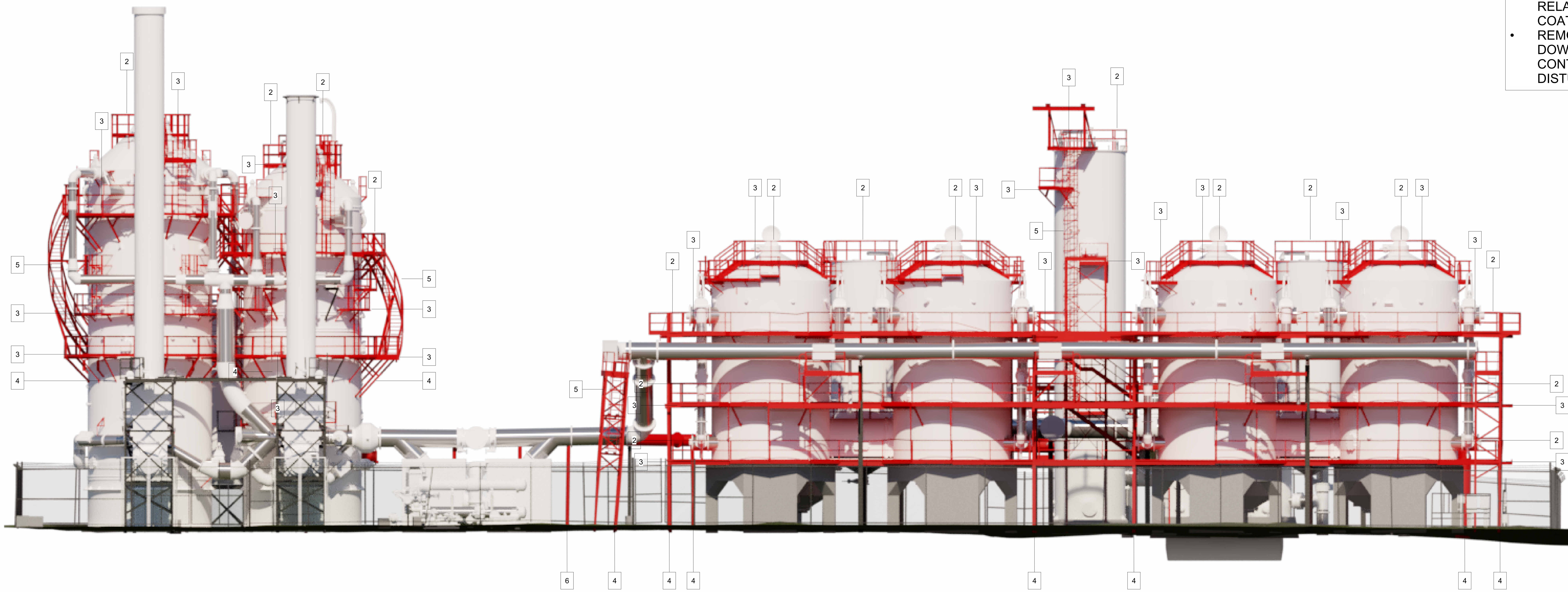

2 EAST DECONSTRUCTION ELEVATION
AS NOTED

0' 5' 10' 20' 40'

APPROVED FOR ADVERTISING:
FAS PURCHASING AND CONTRACTING DIRECTOR

Seattle, Washington ____ Date ____ 20 ____

Signature: ____ Director, Purchasing & Contracting

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REVIEWED: ____ PARK ENGINEER ____ DATE

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EMERGENCY DEMOLITION

EAST DECONSTRUCTION ELEVATION

DESIGNED Author
DRAWN Designer
CHECKED Checker

DATE 08/07/25
SHEET ____ OF ____

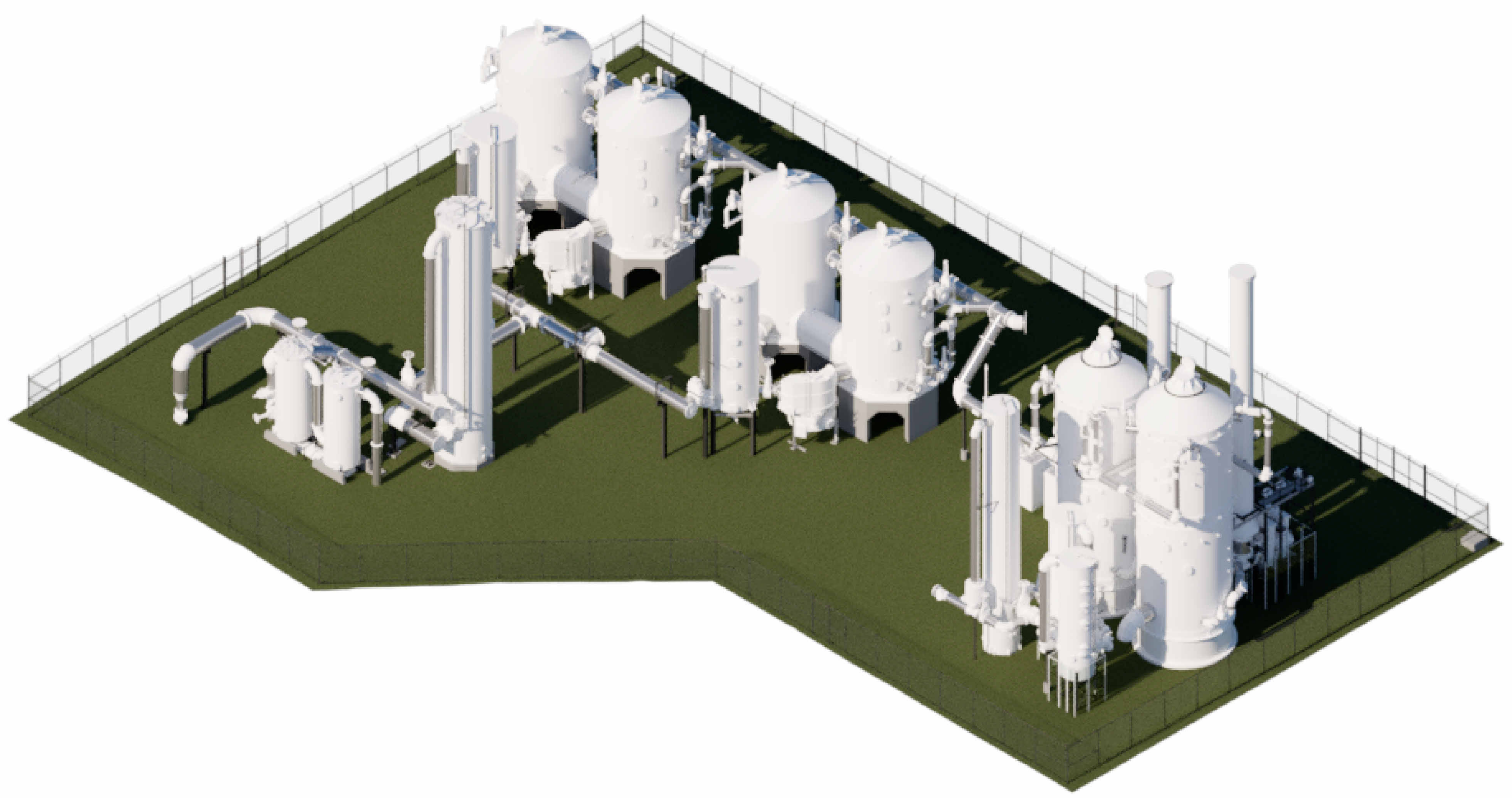
ORDINANCE NO. ____
CONTRACT NO. ____

SCALE AS NOTED (U.N.O.)

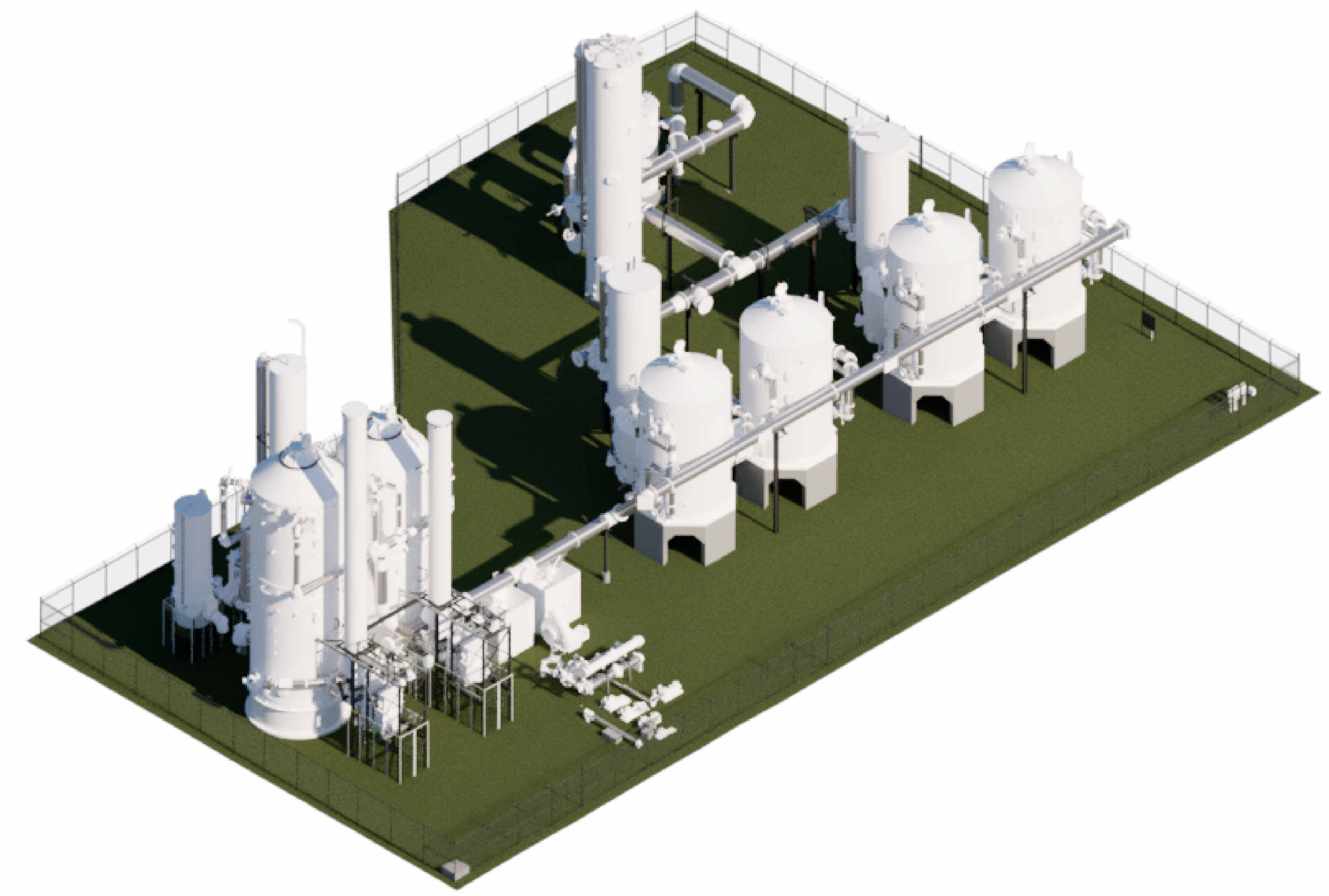
D1.06

GENERAL NOTES

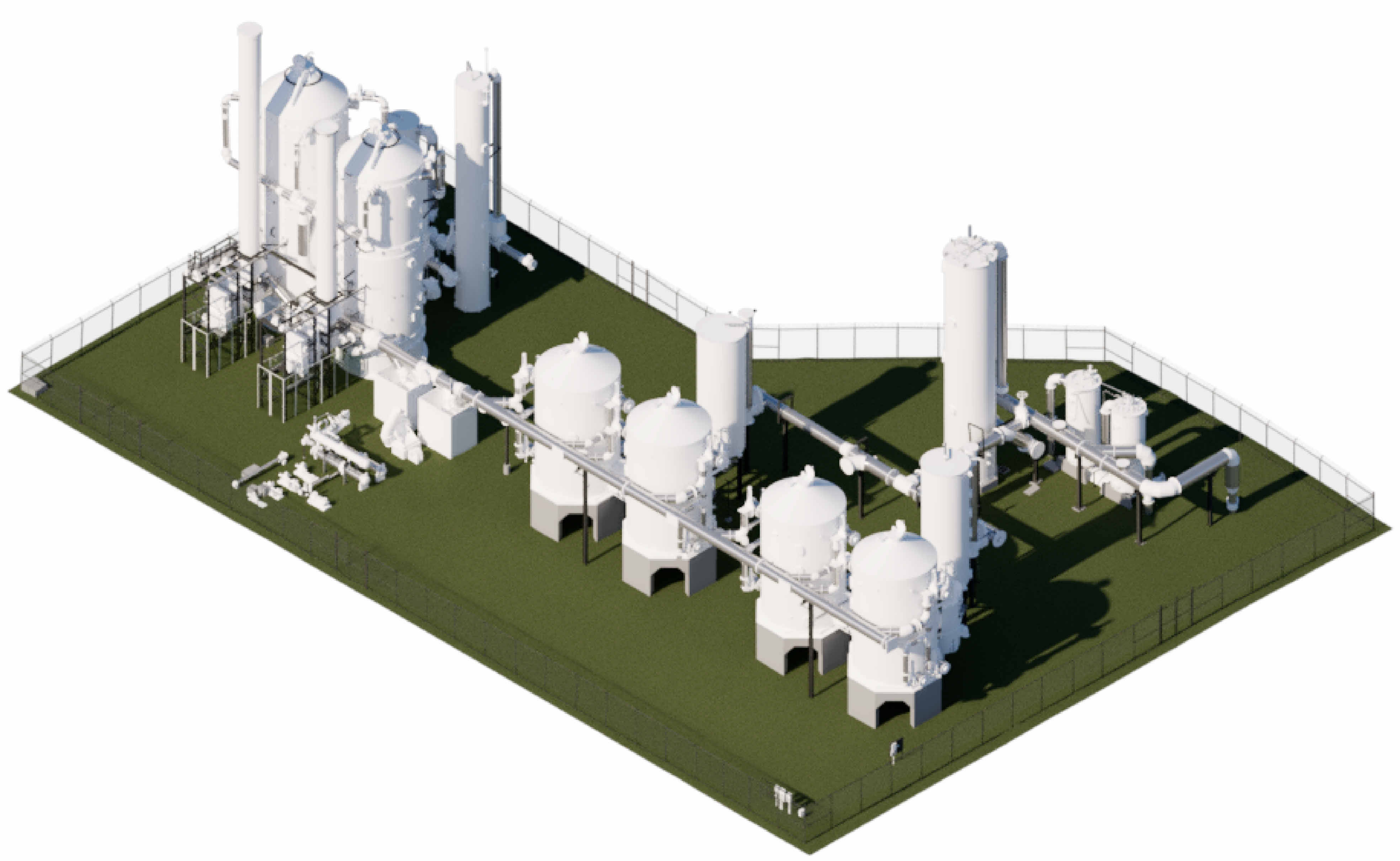
- ITEMS RENDERED IN RED ARE SELECTED FOR REMOVAL AND DISPOSAL (TYP.)
- CUT-OFF VERTICAL FRAMING AT GROUND LEVEL
  - SOIL DISTURBANCE IS EXCLUDED FROM THIS PROJECT.
- CAPPING OF UTILITY PIPING IS INCLUDED IN THE SCOPE OF THIS PROJECT.



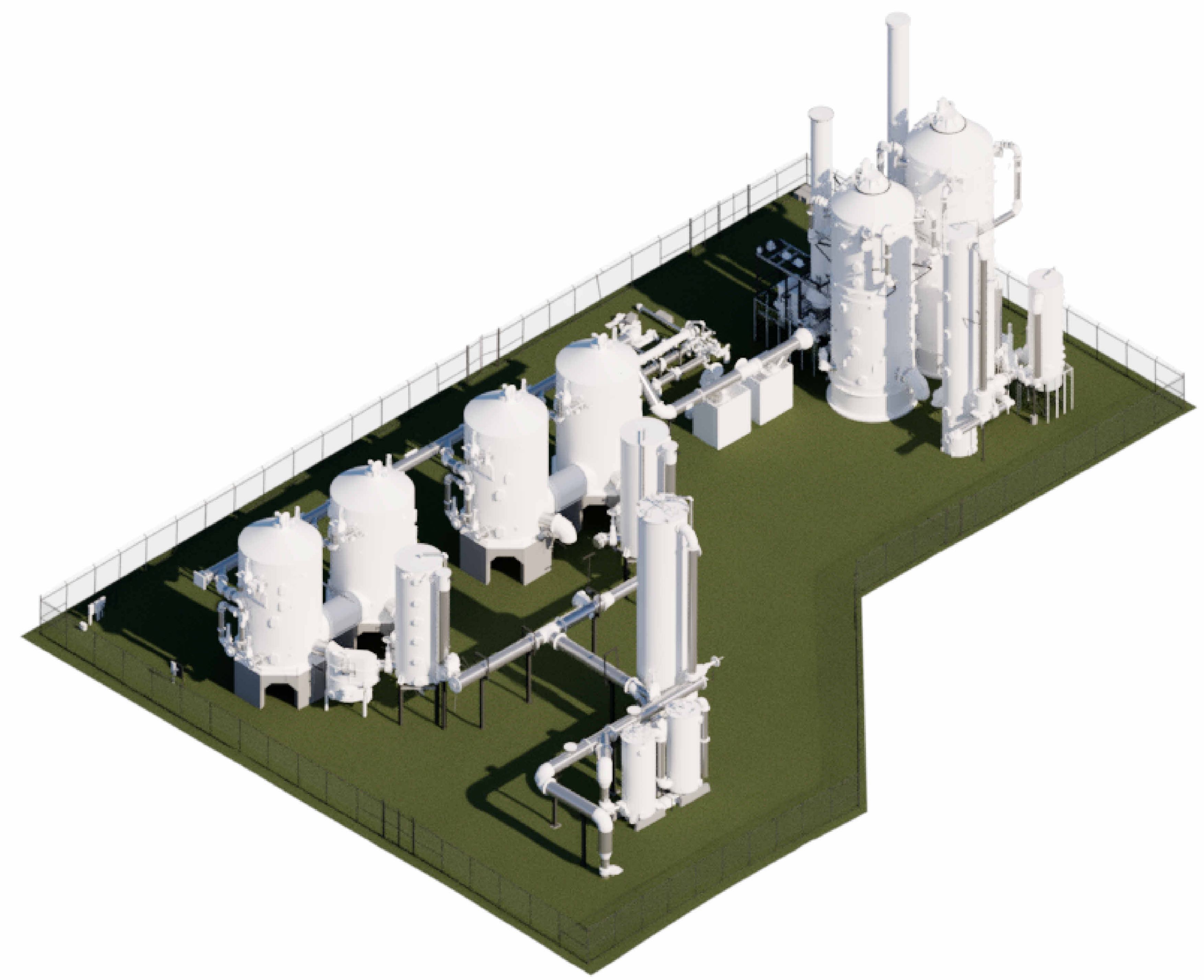
1 POST DECONSTRUCTION SW PERSPECTIVE
NTS



2 POST DECONSTRUCTION SE PERSPECTIVE
NTS



3 POST DECONSTRUCTION NE PERSPECTIVE
NTS



4 POST DECONSTRUCTION NW PERSPECTIVE
NTS

APPROVED FOR ADVERTISING:
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EMERGENCY DEMOLITION

POST DECONSTRUCTION PERSPECTIVE RENDERINGS

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D1.07

SCALE NTS (U.N.O.)

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GENERAL NOTES

- SCOPE INCLUDES REMOVAL OF CATWALKS, LADDERS, AND ASSOCIATED SUPPORT FRAMING. REVIEW IN-FIELD CONDITIONS WHERE PIPING SYSTEMS NOT SCHEDULED FOR REMOVAL MAY BE SUPPORTED BY CATWALK STRUCTURES.
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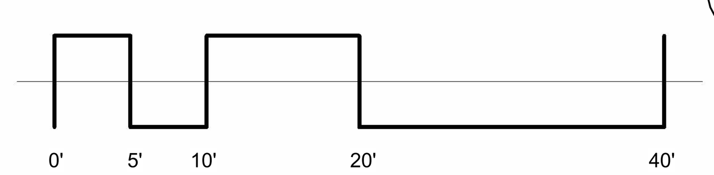
- REMOVE ALL STRUCTURAL SUPPORTS DOWN TO GRADE. NOTE: EXISTING SOILS CONTAIN HYDROCARBONS—DO NOT DISTURB NATIVE SOIL.

1 POST DECONSTRUCTION WEST ELEVATION
AS NOTED



APPROVED FOR ADVERTISING:
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Signature: ______ Director, Purchasing & Contracting

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POST DECONSTRUCTION WEST ELEVATION

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CONTRACT NO.			
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GENERAL NOTES

- SCOPE INCLUDES REMOVAL OF CATWALKS, LADDERS, AND ASSOCIATED SUPPORT FRAMING. REVIEW IN-FIELD CONDITIONS WHERE PIPING SYSTEMS NOT SCHEDULED FOR REMOVAL MAY BE SUPPORTED BY CATWALK STRUCTURES.
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1 POST DECONSTRUCTION NORTH ELEVATION
AS NOTED

0' 5' 10' 20' 40'

APPROVED FOR ADVERTISING:
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Date

Signature: ________
Director, Purchasing & Contracting

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POST DECONSTRUCTION NORTH ELEVATION

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GENERAL NOTES

- SCOPE INCLUDES REMOVAL OF CATWALKS, LADDERS, AND ASSOCIATED SUPPORT FRAMING. REVIEW IN-FIELD CONDITIONS WHERE PIPING SYSTEMS NOT SCHEDULED FOR REMOVAL MAY BE SUPPORTED BY CATWALK STRUCTURES.
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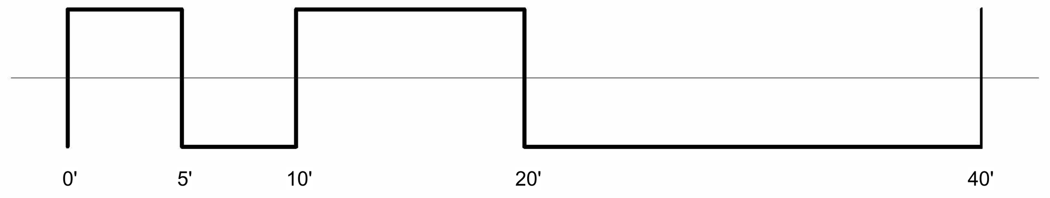
2 POST DECONSTRUCTION SOUTH ELEVATION
AS NOTED



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POST DECONSTRUCTION SOUTH ELEVATION

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CONTRACT NO.			
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GENERAL NOTES

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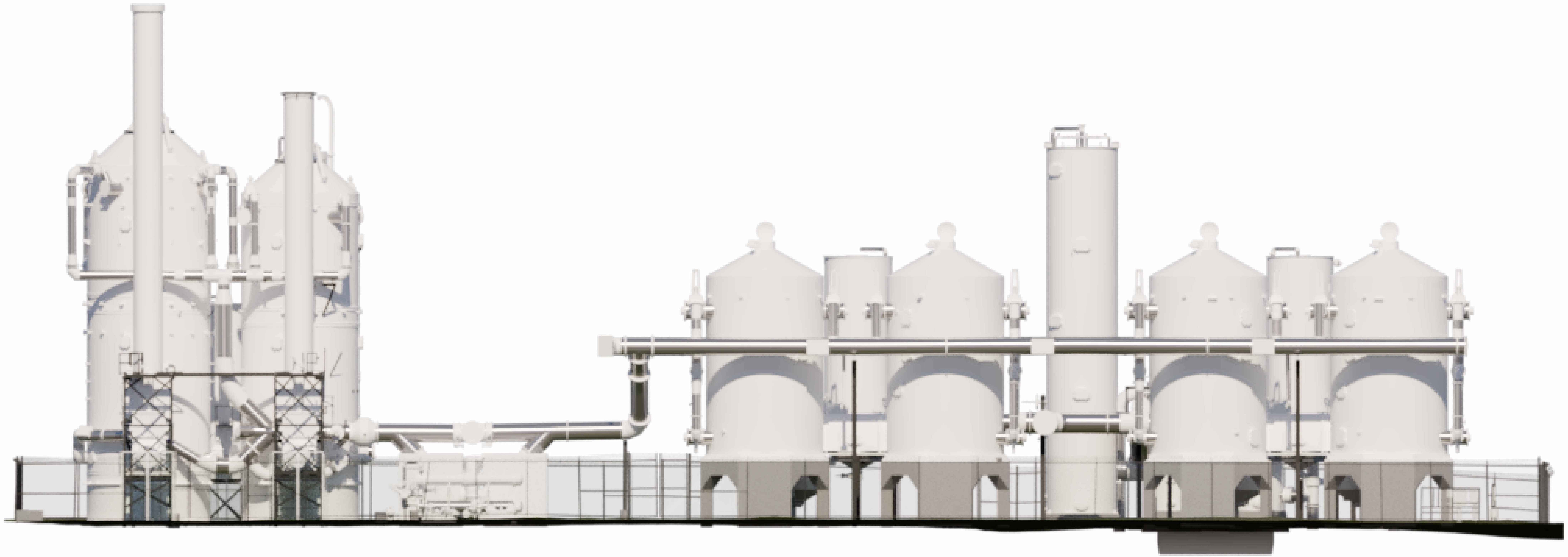
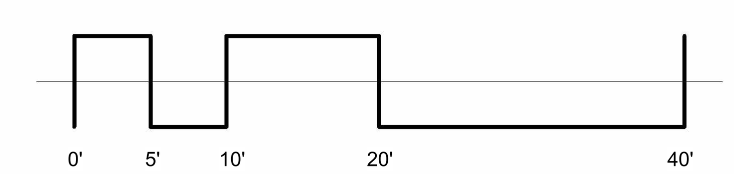


2 POST DECONSTRUCTION EAST ELEVATION
AS NOTED



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Signature: ______________________
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EMERGENCY DEMOLITION

POST DECONSTRUCTION EAST ELEVATION

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ORDINANCE NO.		D1.11	
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Guidance Engineering

205 NE Northlake Way
Suite 100
Seattle, WA 98105
+1 206.906.9090
GuidanceEngineering.com

December 17, 2025

Liza Anderson
Seattle City Attorney's Office
701 Fifth Avenue, Suite 2050
Seattle, WA 98104

Subject: Gas Works Park Project, GEAR Project No. 20250371

Dear Ms. Anderson,

In accordance with your request, we have examined human factors and biomechanics issues related to the *Gas Works Park Project.* As part of this task, we reviewed materials provided by you, which are listed in Attachment A, and scientific literature on human factors and biomechanics. In addition, as part of our analysis, on November 12, 2025, we inspected the Gas Works Park Structure located at 1901 N. Northlake Way in Seattle, Washington. Please accept this report of our findings to date.

I. Qualifications

Scott Reed, Ph.D.

Dr. Reed is currently a Senior Human Factors Scientist at Guidance Engineering and Applied Research. He has expertise in the fields of human factors and cognitive neuroscience, and applies this expertise to analyze the behavioral abilities and limitations of human performance. Prior to joining Guidance Engineering and Applied Research, Dr. Reed earned a Ph.D. in Cognitive Neuroscience from the University of Oregon and earned a M.A. and B.A. in Psychology from California State University, Chico. He has taught numerous undergraduate level courses in psychology, including courses in human performance, perception, memory, biological psychology, human learning, and research methods at the University of Oregon and at California State University, Chico. Dr. Reed has published several articles in peer-reviewed scientific journals and has presented his research at conferences and scientific meetings. A copy of his most current curriculum vitae is attached as Attachment B.

Bethany Suderman, Ph.D., P.E.

Dr. Suderman is a Senior Biomechanical Engineer at Guidance Engineering and Applied Research. She specializes in accident reconstruction and injury biomechanics. She investigates injury claims arising from motor vehicle accidents, slip/trip and falls, and recreational activities using biomechanical engineering techniques that apply the principles of engineering to the human body. Dr. Suderman has extensive experience with mechanical testing design and analysis. She has researched accidents and injury potential using anthropomorphic test devices ("crash test dummies"), computational models of the human body, national motor vehicle and injury surveillance databases and statistical analyses. Dr. Suderman holds a Bachelor of Science in Engineering with a biomedical concentration from LeTourneau University. She also has a Doctorate in Mechanical Engineering from Washington State University, where she specialized in biomechanics. Prior to joining Guidance Engineering, Dr. Suderman was a Postdoctoral Fellow at Washington State University where she conducted research in the field of biomechanical engineering related to 3D models of the cervical spine. A copy of her most current curriculum vitae is attached as Attachment C.

II. Introduction

Gas Works Park is located on the north shore of Lake Union, and was first opened to the public in 1976.[1] The park contains a former coal and gasification plant that operated from 1906 to 1956,[1] which is comprised of several towers, tanks, piping, supports, railings, ladders, and catwalks; see Figure 1. The main structures of the plant are located on the south side of the park (hereafter, referred collectively to as the *subject structure*), and are closed to the public via an approximately 11-foot metal-grating fence (with a locked access gate located on the east side of the structure) that extends around the perimeter of the structure, with numerous "NO TRESPASSING" signs posted on the perimeter fence. Despite these measures to prevent public access, since 2008, there have been at least 25 incidents of individuals trespassing within the perimeter fence, climbing the towers, and falling; of these incidents, three resulted in fatalities and 22 in severe injuries.[2]

Figure 1. A Google Earth aerial capture (July, 2024) depicting Gas Works Park and the former coal and gasification plant structures (enlargement).

Guidance Engineering and Applied Research (GEAR) was retained to conduct a human factors and biomechanical analysis to evaluate the efficacy of the extant measures to prevent unauthorized

[1] Exhibit C, Consent Decree, SPAR000790
[2] Gasworks Park Safety Project, updated August 14, 2025

public access of the subject structure, and the extant structural components that afford opportunities to access, ascend, and/or climb the structure. As part of this analysis, on November 12, 2025, GEAR conducted a site inspection at Gas Works Park to document these measures and structural components. Based on this inspection, materials associated with this project, and the scientific literature, a human factors and biomechanics analysis was conducted, including review of prior incidents (Section III), description of preventative measures to limit public access (Section IV), a social media analysis on access methods and prior climbing incidents (Section V), a climbing analysis of the existing structural components (Section VI), and a human factors analysis (Section VII) on the evaluation of preventative measures and factors that affect the likelihood of future fall-related incidents.

III. Incident History

As part of our analysis, GEAR reviewed prior reported incidents related to individuals trespassing within the perimeter fence and sustaining death or injury. According to the "Gasworks Park Safety Project," updated August 14, 2025, there have been at least 25 incidents of individuals falling from the park's towers, resulting in three fatalities and 22 in severe injuries. GEAR was provided a document ("Gasworks Fall Incidents") that included details on a subset of prior reported incidents (14 incidents) between October, 2008 and July, 2025; additional details on these prior incidents were obtained by GEAR through review of archived news articles.

Of the 14 prior reported incidents reviewed, all involved an individual falling from an elevated component of the structure; these include falls from the towers, refinery, catwalks, and otherwise unidentified components of the structure. All of the incidents occurred at night between the hours of approximately 10:00 PM to 5:30 AM when the park was closed. The average age of the involved individual was approximately 21.6 years old,[3] with males accounting for approximately 79 percent of prior incidents (11 out of 14). For most of the prior incidents, the peer status of the individual at the time of the incident (i.e., alone or with others) is unknown, with exception of four incidents that indicate the individual was with one or more friends. Similarly, while three incidents report that the involved individual was intoxicated, the intoxication status of the individuals in the remaining incidents is unknown. Three of the prior incidents resulted in fatalities, with the remaining incidents resulting in generally serious injuries (e.g., reported head injuries, multiple broken bones). For the three incidents that resulted in fatalities, two report that the individual fell approximately 50 feet from a tower, and one reports that the individual fell approximately 30 feet from a tower or fuel tank after scaling a fence topped with razor wire.

IV. Description of Signs and Fence Barricade

A. Description of Signage

At the time of GEAR's inspection, there were numerous signs posted on the metal grating perimeter fence that read "NO TRESPASSING;" see Figure 2. The signs were comprised of black-printed text on a white background, and were posted on the fence approximately 8-feet

[3] One prior incident involved a 40-year-old male. The age range of the remaining involved individuals were all between 15 and 26 years old.

above the ground. Three "NO TRESPASSING" signs were posted on the east fence, and three signs were posted on the south fence; see Figure 2. As depicted in Figure 2, several of these signs contained graffiti, decals, and/or stickers on the front surface of the sign that partially obscured legibility of the sign.

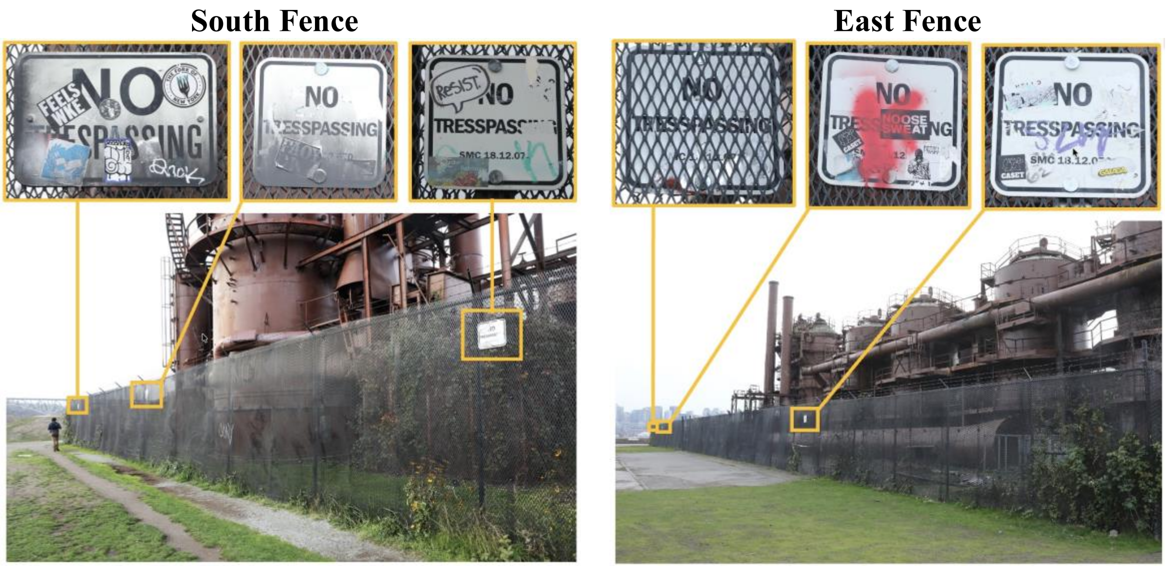

Figure 2. Photographs taken during GEAR's November 12, 2025, site inspection, depicting numerous "NO TRESPASSING" signs posted on the south (*left*) and east (*right*) sides of the perimeter fence.

In addition, at the time of GEAR's inspection, a portable A-frame sign was located in the interior of the fenced perimeter near the (locked) gate on the east side of the perimeter fence; see Figure 3. The sign, approximately 2 feet wide by 3 feet long, contains black-colored text on a white background that reads: "NO TRESPASSING," "IT IS ILLEGAL TO ENTER," "This property is CLOSED;" see Figure 3. Below this text, the sign reads, "Entry in violation of this warning may subject the violator to arrest and prosecution for criminal trespass," with indication of the applicable SMC and RCWs; see Figure 3. In addition, during GEAR's inspection, a second A-board sign with this same text was observed in a stored position beneath the structure; the sign contained a significant amount of graffiti which occluded and obscured the legibility of the text.

Figure 3. A photograph taken during GEAR's November 12, 2025, site inspection, depicting a portable A-frame "NO TRESPASSING," "IT IS ILLEGAL TO ENTER" sign.

Finally, there are several areas on the subject structure (e.g., piping, tanks) that contain written text indicating "DANGER," "KEEP OFF." For example, Figure 4 depicts piping on the east side of the structure with this admonition.

Figure 4. A photograph taken during GEAR's November 12, 2025, site inspection, depicting the text "DANGER," "KEEP OFF" on a section of piping on the east side of the subject structure.

B. Description of Fence Barricade

The Gas Works Park structure is enclosed around its perimeter by a metal grating fence, with three rows of barbed wire installed at the top of the fence; see Figure 5. Relative to the ground on the exterior sides of the fence, the metal-grated fence measures approximately 9 feet, 4 inches to 10 feet, 2 inches tall in height, with the barbed wire extending the height of the fence to approximately 10 feet, 4 inches to 11 feet, 2 inches. The interior of the fenced area is accessed (by authorized personnel) via a gate on the east side of the perimeter fence; the gate is locked and secured via a chain and padlock. Additional, non-functional gates (i.e., welded shut) are present in other areas around the perimeter fence.

Figure 5. A photograph taken during GEAR's November 12, 2025, site inspection, depicting a section of the metal-grated fencing and barbed wire that extends around the perimeter of the subject enclosure.

Observations by GEAR during the site inspection suggest there have been previous attempts to overcome the fencing and/or access the interior area within the perimeter fencing. For example, on the west side of the perimeter fencing in the former location of a gate (currently welded shut), an irregular-shaped section of metal grating had been removed from the lower portion of the grate, with an additional piece of metal grating welded over the missing section; see Figure 6. In addition, at the time of GEAR's inspection, a torn/ripped garment was present on the barbed wire on the east side of the perimeter fencing; see Figure 6. It was not possible to determine whether the presence and condition of the garment was the result of an individual climbing over the top of the fence or whether the garment was thrown and/or placed on top of the fence. Furthermore, as described above, the "NO TRESPASSING" signs around the fence perimeter contained graffiti, decals, and/or stickers, suggesting that individuals had obtained an elevated height—i.e., up to the approximate 8-foot height at which the signs were posted—to vandalize these signs. In addition, while there were no fixed objects or structures around the exterior of the perimeter in proximity to the fencing, there were portable, non-fixed objects in the park (e.g., that, if moved, could facilitate climbing and/or penetration of the fence). For example, at the time of GEAR's inspection, several trash bins were located adjacent to the fence on the northwest side of the perimeter. The trash bins were unsecured and measured approximately 3½ feet tall.

Figure 6. Photographs taken during GEAR's November 12, 2025, site inspection. *Left*) A photograph depicting a missing section of metal fencing on the west perimeter (with additional metal-grating welded over the missing section). *Right*) A partially torn/ripped garment on the barbed wire at the top of the fencing on the east perimeter.

V. Social Media Analysis

As part of GEAR's analysis, we reviewed information available to the public through social media websites regarding self-reported instances of individuals climbing the structure, and reported methods on how to penetrate and overcome the fencing and/or climb the structure. For example, there are several videos posted on YouTube that depict individuals accessing the interior of the fenced-off area and climbing the structure, including during daytime conditions. To illustrate, a video from September of 2021 titled "Climbing Gasworks Park"[4] depicts (via body worn cameras) individuals approaching the fence perimeter, traversing through the interior of the perimeter, and climbing the structure: two individuals are depicted climbing the structure up to the top, with additional drone video of their ascension; see Figure 7.

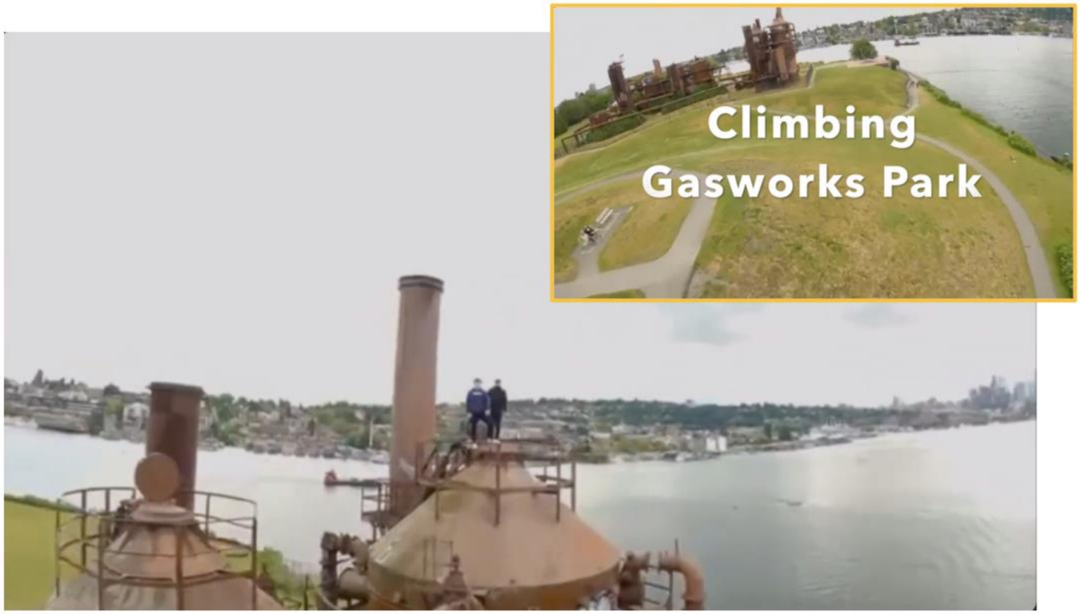

Figure 7. Still captures from the "Climbing Gasworks Park" video (see inset of title screen) posted on YouTube. The video was taken with body worn cameras and a drone camera, and depicts two individuals approaching the fencing perimeter, traversing through the interior of the perimeter, and climbing the structure, with the still capture above depicting their ascension towards the end of the video.

In addition, a video uploaded to YouTube in August of 2022 depicts a group of young men climbing the structure at night.[5] While the video does not show how the group penetrated the perimeter fence, it depicts the group's climb from ground level, and their ascension of numerous components of the structure (stairs, catwalks, etc.). In addition, review of social media posts revealed numerous self-reports of individuals climbing the structure. For instance, a Reddit post from two years ago titled "Guy climbed to the top of the Gas Works Park plant" includes a photograph of an individual on top of the structure; see Figure 8.[6] In the comments section of this post, there are several self-reported instances of individuals accessing the area within the perimeter fence and/or witnessing others do so, including:

- *"I forget exactly when, maybe 2016/2017 someone broke the lock on the gate and there were hundreds of people climbing it at once: I went in and climbed like 10 feet up and decided I didn't want tetanus or to watch someone plummet to their death…"*
- *"I've always seen people climb inside over the 35+ years being here"*

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[4] https://www.youtube.com/watch?v=n1OuJhnIIRc
[5] https://www.youtube.com/watch?v=yAqMMwpXhhY
[6] https://www.reddit.com/r/Seattle/comments/1c4cepm/guy_climbed_to_the_top_of_the_gas_works_park_plant/

- *"I've seen people in there all the time. Especially if you go at night. Although I've never seen anyone climb more than 1-2 levels up"*
- *"Ooooh looks like someone cut a hole in the fence this weekend and this guy decided to climb it."*
- *"Two summers ago the fence was all open and I climbed it along with dozens of others"*
- *"I've climbed this structure 3 times total, and two times successfully to the top… The two times I made it to the top I only went to the lower top levels cause of the route I took and didn't go as high as this guy, but I definitely felt the metal planking being super rickety as I walked on it carefully… it's a very dangerous thing to do, but for me it's fun and I'm exceedingly careful doing it."*
- *"Last year I… heard a bunch of kids or teenagers playing on top of the silos at night time… we both heard a loud thump. I walked by the fence side with my ex, where if faces the water towards the view and saw a body face down… I immediately climbed the fence on the eastern side and messed my hands up from the barb wire and immediately yelled for her friends when I didn't feel a pulse"*

Figure 8. A photograph uploaded to a 2-year-old Reddit post titled "Guy climbed to the top of the Gas Works Park plant," depicting an individual on top of one of the towers.

In addition, in a 3-year-old Reddit post titled "Woman dies falling off Gasworks Park structure in Seattle,"[7] a user comment states: "I've climbed on it and there are tons of holes in the catwalks. Don't go up there if you aren't physically capable of climbing things. You will die." In addition,

[7]https://www.reddit.com/r/SeattleWA/comments/xiysh7/woman_dies_falling_off_gasworks_park_structure_in.com

in a 4-month-old Reddit post titled "Teen boy dies after 50-foot fall off Gas Works Park structure during concert,"[8] user comments include:

- *"As someone who has also climbed that structure and fell 25 feet to a platform that broke my fall, this is very sad to read*." Regarding the referenced climb, an additional post from this user reports that it occurred in 2012, and that*: "It was about 2am and yea, I climbed to the top of the largest tower (after climbing over the barbed wire fence). Once I got to the top I started walking around the platform, and since it was dark I did not notice the missing grate and stepped right through to a ~25 foot fall to a platform, which prevented me from falling an additional 20 feet. Broke my femur and thumb"*
- *"This happened to my best friend years ago when we were climbing on gasworks… My buddy walked right through a missing grate on the second row catwalk if I remember right. I was climbing up above and he wanted to walk around to the other side and all I heard was a bang then him gasping for air after a few seconds from the ground… And after years of think back to the night, no fence could of stopped us, no signage"*

Additional comments on Reddit and TikTok related to accessing the area within the perimeter fence at Gas Works Park include:

- *"This was a while ago, if I remember there's a gate with a chain and you can pull on it to make a gap to slip through"*[9]
- *"Somebody went to a lot of trouble to break that lock on the west side of the fenced area; the long-shackle padlock was twisted like a pretzel two weeks ago and gone entirely last week"*[10]
- *"Seattle had already tried by putting the barbed wire fences up years ago, then someone cut a hole in the fence, and that became the main entryway"*[11]
- *"It's not like it was ever difficult to get through the fence"*[12]
- *"To bad at all times the homeless cut holes in the fence to sleep under the structure no matter what fence you put there it will be compromised due to people living there even if it is routinely "patrolled"*[13]

VI. Biomechanical Climbing Analysis

The purpose of the biomechanical analysis was to determine the height and size of handholds that an unassisted individual could jump, reach and grip for the purposes of climbing vertical structures and identify potential example handholds at Gas Works Park.

[8] https://www.reddit.com/r/Seattle/comments/1lzunl8/
[9] https://www.reddit.com/r/Seattle/comments/u47rb/comment/c4scae1/
[10] https://www.reddit.com/r/Seattle/comments/u47rb/comment/c4scae1/
[11] https://www.reddit.com/r/Seattle/comments/1c4cepm/comment/l0dnvb2/
[12] https://www.reddit.com/r/Seattle/comments/249b7o/comment/ch53mp6/
[13] https://www.tiktok.com/@komo4seattle/video/7527353635445951758?_r=1&_t=ZP-91JuMvLwZ71

Determine Height and Size of Handholds for Purposes of Climbing Vertical Structures

In order to climb a vertical structure an individual will need to reach and grasp a handhold. The following analysis determines the height that an individual can reach unassisted and also the depth of handhold that an individual can grasp.

For the purposes of this analysis, the tallest individuals in populations were considered as they have the potential to have the highest jump, reach and grip; this is what is considered to be the 95th to 99th Percentile. By examining the 95th to 99th Percentile individual, 95 to 99 percent of the population will have a lower jump, reach and grip height. Thus, providing an upper range of jump, reach and grip heights. As male populations are taller (overall), this analysis will focus on the 95th to 99th Percentile male. Vertical grip reach and jumping height were analyzed separately to determine the maximum overall jump, reach and grip height an unassisted individual could achieve.

<u>Vertical Grip Reach Height</u>

According to the scientific literature, "vertical grip reach" height is defined as the vertical distance between a surface that an individual is standing on and the center of a dowel that is being gripped in one hand; see Figure 9. In this measurement, the individual's shoulder, arm and hand are held out straight overhead.

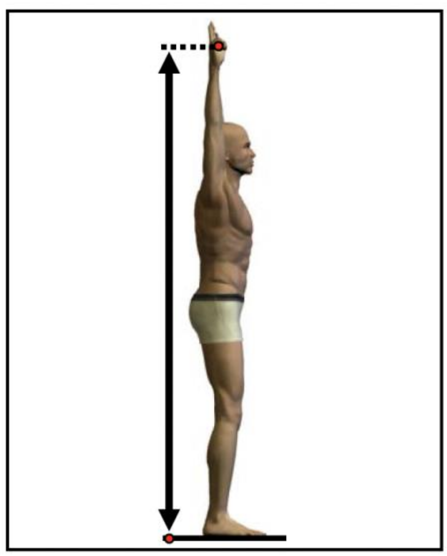

Figure 9. Vertical Grip Reach Height measurement taken from Gordon et al., (2014).

Anthropometrical studies in the scientific literature were queried to determine the 99th percentile height and vertical grip reach. The PeopleSize (Open Ergonomics, 2008) anthropometry dataset was also used to determine the vertical grip reach height for different population datasets. PeopleSize is an anthropometry dataset that contains data for up to 291 individual body measurements for nine nationalities and nine adult age groups. Vertical grip reach height was determined for all available nationalities for the 18-to-30-year age group to determine the 99th percentile height and vertical grip reach height. The tallest height and vertical grip reach height across the anthropometrical studies and PeopleSize for the 99th Percentile male was determined (Gordon et al., 2014). The largest 99th Percentile male height was approximately 78 inches and the largest 99th percentile male vertical grip reach was approximately 95 inches. Based on this analysis 99 percent of the general population would have a vertical grip reach less than 95 inches (approximately 8 feet).

<u>Jumping Height</u>

A similar analysis was performed for the jumping height of individuals. In these studies, participants were instructed to perform a countermovement vertical jump and to reach as high as possible. A countermovement jump allows individuals to swing their arms down as they squat and swing their arms up as they extend their legs and has been shown to produce a higher jump than a squat jump (Bobbert et al., 1996). The vertical jump height was recorded as the difference between the individuals' standing reach height and their jump reach height. For the 95th percentile male, the jumping height was approximately 30 inches (2½ feet) (Larkin et al., 2024; Morassutti et al., 2025).

A conservative estimate given the standing vertical reach grip height of approximately 8 feet and the vertical jump height of 2½ feet would be that 99 percent of the population would not be able to jump, reach and grip a structure that was greater than 11 feet in height.

<u>Handhold Grip Depth</u>

Handhold grip depths are typically protrusions from a flat vertical surface. Smaller grip-hold depths are considered to be less than 1-inch and larger climbing grip-hold depths are considered to be greater than 3 inches (Vigouroux et al., 2019; Fuss & Nigel, 2010). Studies have demonstrated that maximal power and mechanical work decrease with decreasing grip hold depth (Vigoroux et al., 2019). Based on this analysis, protruding structures from a vertical surface that have depths of 3 inches or greater and a level platform (flat on top) could be more easily grasped by an individual.

Other structures that are separated from a vertical surface, such as a horizontal pipe, or horizontal metal bar or bracket can be potential handholds. These structures allow the fingers to wrap around the superior surface and can improve the grip force (Mcdowell et al., 2012; Firrell et al., 1996). According to the scientific literature, grip strength tends to be greater for structures that are 1½ to 2 inches in diameter, than for smaller or larger diameter structures (Firrell et al., 1996; McDowell et al., 2012). However, smaller and larger diameter structures can still provide potential handholds for climbing opportunities.

Based on the above analysis, an individual could potentially grasp a handhold that was less than 11 feet above the ground and either had a protrusion from the surface that was 3 inches or greater in depth or a horizontal structure that was separated from the vertical surface (such as a cylindrical or rectangular bar).

Types of Structures at Gas Works Park

During the November 12, 2025, inspection, GEAR observed different types of structures at Gas Works Park. There were the main vertical towers and structures. There were also pedestrian appurtenances, such as, catwalks, ladders and railing (and the supporting structures for them); see Figure 10. There were also components such as piping and other protruding structures that were welded or bolted on to the vertical components and towers.

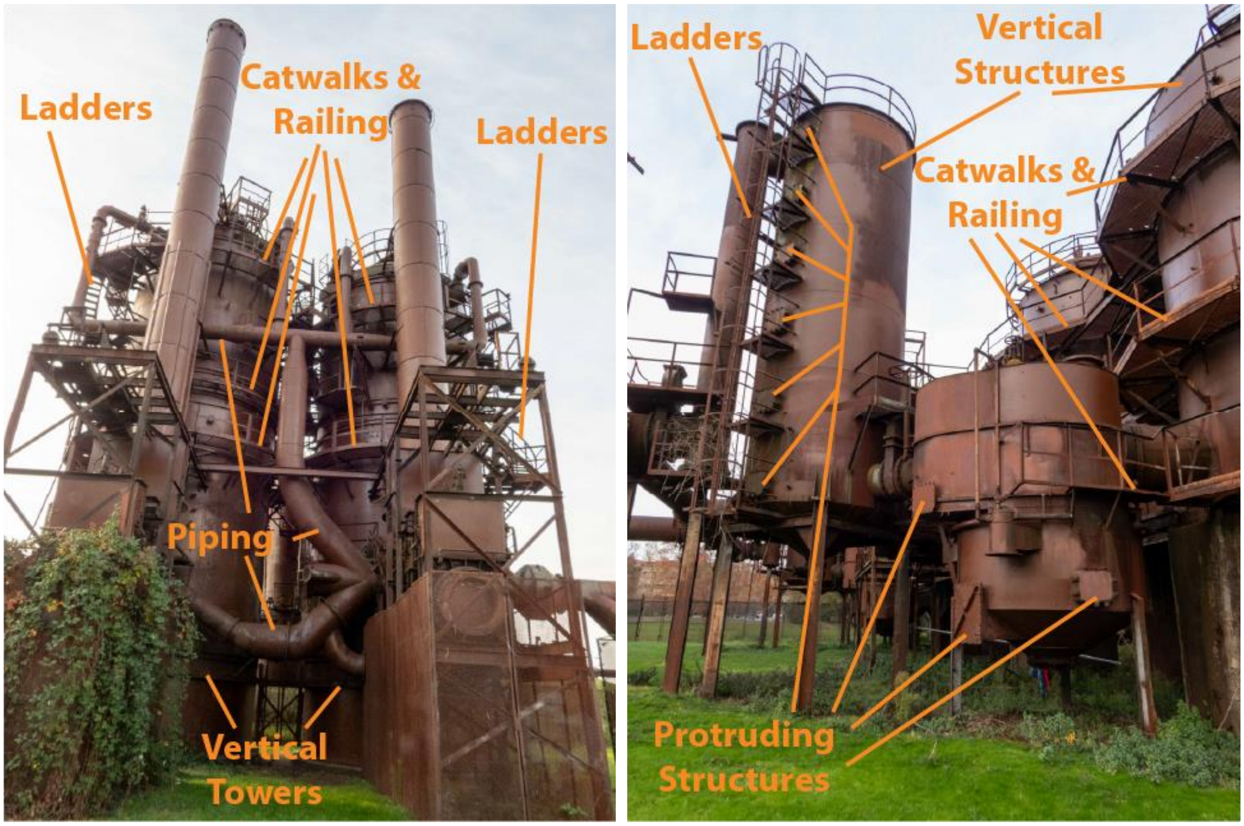

Figure 10. Photographs of the structures at Gas Works Park. There were the main vertical towers and structures. There were also pedestrian appurtenances such as catwalks, ladders and railing (and the supporting structures for them). There were also components such as piping and other protruding structures that were welded or bolted on to the vertical components and towers.

Structures at Gas Works with Potential Climbing Opportunities

During the November 12, 2025, inspection of Gas Works Park, examples of potential handholds (as described above) were observed and documented. These potential handholds could be used in climbing opportunities for an unassisted individual.

On the south towers there was a protruding ledge that was approximately 6 feet above a concrete slab that protruded approximately 8 inches from the vertical tower wall; see Figure 11, left. Above the protruding ledge was piping that was less than 11 feet in height from the protruding ledge below and further in height was a catwalk and railing. In another area, there was a protruding structure that was approximately 7 to 8 feet above the ground and protruded approximately 7 inches from the vertical wall; see Figure 11, right. This structure had bolts that provided additional areas for finger holds. Above the lower protruding structures there was piping and a catwalk and railing within 11 feet in height.

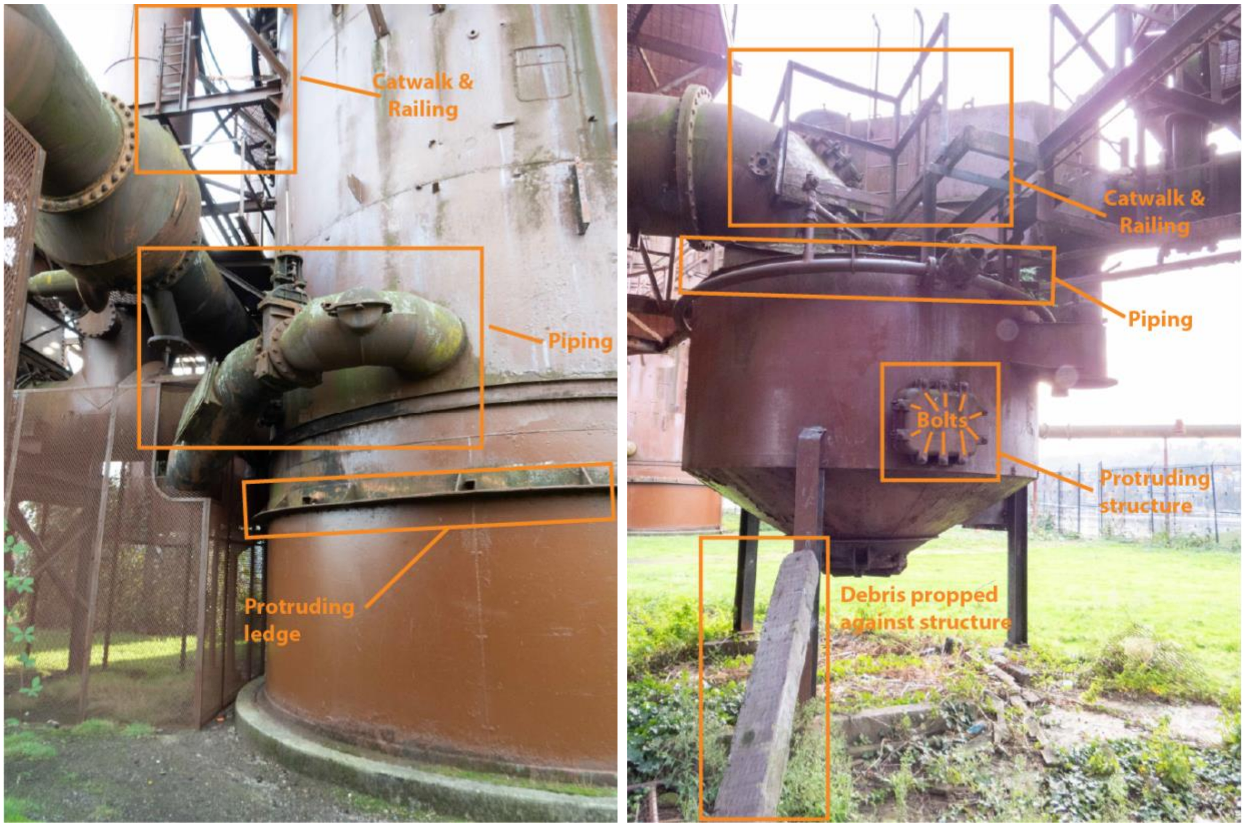

Figure 11. *Left*) A protruding ledge on a tower that was approximately 6 feet above a concrete slab that protruded approximately 8 inches from the vertical tower wall. Above the protruding ledge was piping that was less than 11 feet in height from the protruding ledge below and further in height was a catwalk and railing. *Right*) A protruding structure that was approximately 7 to 8 feet above the ground and protruded approximately 7 inches from the wall. This structure had bolts that provided additional areas for finger holds. Above the lower protruding structures there was additional piping and a catwalk and railing within 11 feet. At the time of the inspection, there was debris that was propped against the structure.

There was another instance of a horizontal metal bar that was approximately 9 feet in height that was narrow in diameter and provided a graspable surface that fingers could wrap around; see Figure 12. Below this horizontal bar there was a diagonal bar that could provide a foothold to assist in reaching the horizontal bar. Additionally, on the other side of the vertical structure there were horizontal ledges that could provide potential footholds. There were also additional further horizontal bars above the bar at 9 feet. In addition to the above examples, there were more instances of protruding structures that were under 11 feet and protruded more than 3 inches and other horizontal structures that provided potential climbing surfaces.

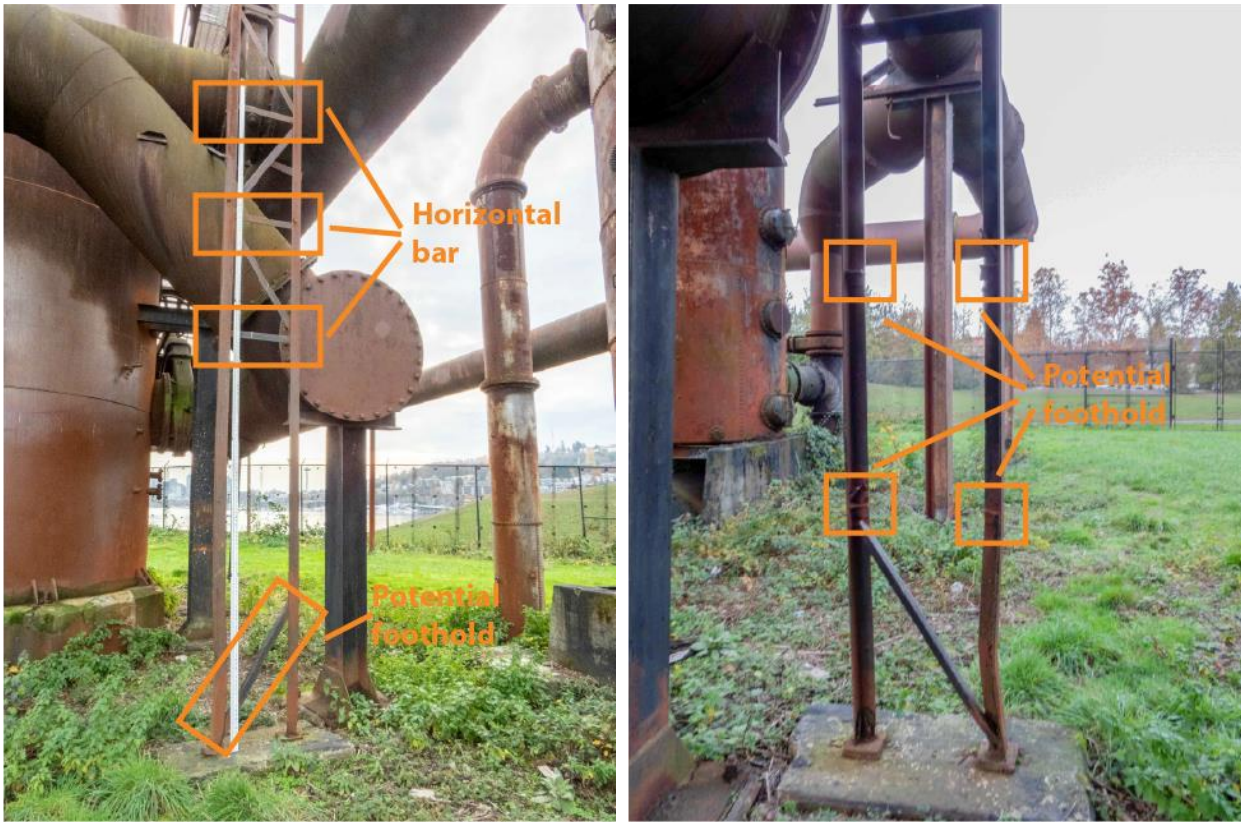

Figure 12. *Left*) Horizontal metal bars. The lowest horizontal bar was approximately 9 feet in height and narrow in diameter that provided a graspable surface that fingers could wrap around. Below this horizontal bar there was a diagonal bar that could provide a foothold to assist in reaching the horizontal bar. Right) The other side of the same structure. There were horizontal ledges that could provide potential footholds.

Assisted Climbing Opportunities

The analysis above is based on climbing opportunities for an unassisted individual, i.e., the biomechanical reaching and climbing capabilities of a person without assistance from another object or person. During GEAR's inspection of the Gas Works Park structures, we observed numerous pedestrian appurtenances and protruding structures located above 11 feet, including catwalks, ladders, piping, railing, and other components, that provide potential handholds for individuals to access with assisted means. There are numerous means available to assist individuals with obtaining heights, greater than 11 feet, including ladders, ropes, debris, and/or assistance from another individual. For example, during our inspection, we observed the presence of debris within the perimeter area of the structure—for example, see Figure 11, right—that can be used by individuals to access pedestrian appurtenances and protruding structures above 11 feet. Similarly, there are numerous consumer products available to the public (e.g., 48-ft. extension ladders[14]) that can assist individuals with accessing pedestrian appurtenances of the structure located above 11 feet. As a public park, there is nothing to prevent individuals from bringing these types of consumer products to the park.

[14] https://www.homedepot.com/p/Werner-48-ft-Aluminum-D-Rung-Extension-Ladder-with-300-lb-Load-Capacity-Type-IA-Duty-Rating-D548-2/203134250

VII. Human Factors Analysis

A human factors analysis was conducted on the efficacy of the extant signage and fence barricade in preventing public access to the interior of the fenced perimeter of the Gas Works Park structure. As part of this analysis, we reviewed scientific literature related to the effectiveness and compliance with posted warnings and safety information, and physical barricades. In addition, we reviewed scientific literature on factors that affect risk perception and risk-taking behaviors, and examined how these factors relate to prior fall incidents on the Gas Works Park structure, as well as the likelihood of future incidents on the structure.

A. Science of Warning and Barricade Effectiveness

The perimeter fencing around the Gas Works Park structure contains numerous signs that indicate "NO TRESPASSING;" see Figure 2. The signs are posted in locations on the fencing that make them highly visible to park users navigating the pedestrian paths and terrain around the structure. While graffiti on a portion of these signs partially obscures the text of the signs, most of the signs are legible and, in conjunction with their placement on a large, barricade fence, are appropriate and effective at communicating to park users that access to the interior of the fenced area is not permitted. Despite these attributes, the prior fall incidents on the Gas Works Park structure, as well as the referenced incidents from social media user comments, suggest that the extant signs are not effective at deterring access to the structure among individuals who are motivated to do so. Consistent with this, a large body of scientific literature on warning effectiveness and compliance has demonstrated that despite the visible presence of posted signs in the environment, human factors inherent to a person—including their goals, motivations, and intentions—are the primary determinant of whether an individual will comply with posted signs in their environment. Specifically, while the goal of presenting posted signs and warnings information is to alter human behavior and achieve a reduction in the number of injuries and/or unpermitted actions associated with an activity, scientific studies that have shown that the mere presence of a warning or safety-related message does not ensure that a person's behavior will be changed (e.g., Ayres et al., 1994; Arndt et al., 1998). Specifically, while it is a common assumption that people will comply with posted signage in their environment, numerous studies of real-world behavior have demonstrated people often fail to notice and comply with posted signage (e.g., Goldhaber & DeTurck, 1989). For example, observational studies of human behavior in real-world settings report low rates of compliance with posted signage and warnings (e.g., Khan et al., 2013; Mortimer, 2007; Goldhaber & DeTurck, 1989). The low rates of compliance with posted signage are not due to the physical characteristics of the sign or warning message, as scientific studies on warning effectiveness show that changes to the wording, content, or appearance of posted signs—including the inclusion of signal words (e.g., "DANGER" or "CAUTION") and enhancement of a sign's conspicuity—do not influence its effectiveness in increasing behavioral compliance or reducing accidents (e.g., McCarthy et al., 1987; Friedmann, 1988; Shaver & Braun, 2000; Otsubo, 1988; Huntley-Fenner et al., 2007; Frantz et al., 2005). Rather, low rates of compliance with posted signs have been attributed to human processing failures that are otherwise prerequisite for a posted sign or warning to be effective at modifying behavior. Specifically, there are several stages of human information processing that must occur for a posted sign and warning to be effective: a person must 1) look for and/or be motivated to seek out the information, 2) be attentive enough to notice and read the information, 3) correctly interpret the meaning of the warning, and be willing to change his or her behavior in response to the information, and 4) alter their behavior under their own volition. The scientific literature has found that a posted sign can fail to have its intended effect due to failures at each and any of these stages of processing (Ayres et al., 1994). For example, an individual may not be attentive enough to notice and/or read posted information in their environment (e.g., Strawbridge, 1986), or may choose not to comply with posted information even when noticed (e.g., Mortimer, 2007). Subsequently, a large body of scientific literature has found that human factors—such as a person's goals, motivations, and decision-making processes—are the primary determinants of whether a person will notice and comply with posted signage, independent of the presence, content, and characteristics of the posted signage itself.

Based on the scientific literature above, the extant "NO TRESPASSING" signs posted on the perimeter fence are not an effective deterrence for individuals who are motivated to penetrate the fence barricade and/or access the structure. Furthermore, based on the science of warning effectiveness, changes to the signs—e.g., modifications to the language, size, or location of the signs, and/or enhancement of their visibility through supplemental artificial lighting—are unlikely to increase their effectiveness and/or overcome the exorbitantly stronger influence that an individual's motivations have on warning compliance. For example, while it is possible that the likelihood that park users notice the sign(s) is negatively affected in nighttime conditions—e.g., given that the prior fall incidents have all occurred at night—the scientific literature on warning effectiveness does not support a proposition that supplemental artificial lighting (i.e., that illuminates the signs at night) will increase compliance with the posted signs. Consistent with this, Figures 7 and 8 depict individuals accessing the interior of the fenced area and climbing the structure in daytime conditions in which the signs are visible. For example, in the "Climbing Gasworks Park" video[15] posted to YouTube (see Figure 7), while the video does not show the specific point where the individuals gain access to the interior perimeter area, it does show their approach to the east fencing and their preparation of camera equipment near the west fencing, immediately prior to the video cutting to their traversal of the interior perimeter area, and in both of these areas the "NO TRESPASSING" signs appear to be visible; see Figure 13. In summary, while the extant signs posted on the perimeter fence of the Gas Works Park structure are reasonable, appropriate, and provide sufficient information to the public that access to the structure is not permitted, based on the human factors literature, these signs will not be an effective deterrence to individuals who fail to notice the signs and/or are motivated to penetrate the fence barricade and access the structure.

[15] https://www.youtube.com/watch?v=n1OuJhnIIRc

Figure 13. Still captures from the “Climbing Gasworks Park” YouTube video depicting the Gas Work Park structure (*top*), and individuals approaching the east fence (*bottom left*) and preparing their camera equipment near the west fence (*bottom right*). The orange arrow in each capture indicates what appears to be posted signs on the fence that is consistent in shape and appearance with the “NO TRESPASSING” signs.

Human factors research has revealed that humans possess both the physical capability and behavioral determination to overcome various types of physical barriers (e.g., platforms, fences, walls). For example, scientific studies have found that individuals who are behaviorally motivated or determined to engage in a given behavior or activity will readily overcome physical barriers, when capable, in order to achieve their intended goal (e.g., Mortimer, 2007). For example, Mortimer (2007) found that habitual behavior patterns, combined with the desire to avoid inconvenience, lead individuals to routinely climb barriers despite warning signage and inherent risks. Specifically, Mortimer (2007) conducted an observational study of commuter rail passengers climbing onto elevated platforms, as opposed to using the stairs at the other end of the platform. It was found that—despite the addition of warning signs—100 percent of the individuals who approached the platform climbed onto it, even those who looked at the warning sign. The propensity of individuals to overcome barriers is supported by research showing that standard perimeter fencing can be breached in as little as 4 seconds, even by moderately fit individuals. For example, the U.S. Army conducted evaluations of penetration times for chain-link fencing by subjecting fences to climbing attacks by fit young men, and these evaluations indicate that fences—including those with outriggers and barbed wire—can be penetrated via climbing relatively quickly (e.g., less than 8 seconds), with even faster penetration times when the individual is assisted by aids and/or other people (Smith & Brooks, 2012). This research demonstrates that even enhanced perimeter fencing provides minimal delay time against determined individuals.

The perimeter fence around the Gas Works Park structure is appropriate and effective in *limiting* public access to the structure—e.g., in part due to its relatively tall height and the presence of barbed wire which serve as both a physical barrier and a visual deterrent. However, for individuals who are motivated to access the interior of the perimeter area (and possess the physical capabilities), the fencing is inadequate in *preventing*, and deterring, individuals from accessing the Gas Works Park structure. Specifically, analysis of the prior fall incidents and social media posts indicate that the extant fencing can readily be penetrated by individuals who are motivated to do so (e.g., *"It's not like it was ever difficult to get through the fence…"*).[16] For example, penetration methods of the fencing referenced in social media posts include:

- Cutting through the fence, consistent with GEAR's observation of an area on the west fencing where the fencing had been cut through and patched.
    - *"looks like someone cut a hole in the fence this weekend"*[17]
    - *"the homeless cut holes in the fence to sleep under the structure no matter what fence you put there it will be compromised due to people living there even if it is routinely "patrolled"*[18]
- Slipping through the fence
    - *"there's a gate with a chain and you can pull on it to make a gap to slip through"*[19]
- Climbing over the fence
    - *"I immediately climbed the fence on the eastern side and messed my hands up from the barb wire"*[20]
- Breaking the lock on the access gate
    - *"someone broke the lock on the gate"*[21]
    - *"Somebody went to a lot of trouble to break that lock on the west side of the fenced area; the long-shackle padlock was twisted like a pretzel two weeks ago and gone entirely last week."*[22]

In addition, during GEAR's site inspection, a small hole was observed under the fencing on the west side of the perimeter. While the hole was too small for human access, its presence indicates another potential penetration method: digging a sufficient size hole beneath the fence to allow human access. The penetration methods summarized above can not only be used for individual access, but can also be used by individuals to bring objects and/or consumer products into perimeter area to facilitate assisted-based climbing affordances. Together, while the extant

[16] https://www.reddit.com/r/Seattle/comments/249b7o/comment/ch53mp6/
[17] https://www.reddit.com/r/Seattle/comments/1c4cepm/guy_climbed_to_the_top_of_the_gas_works_park_plant/
[18] https://www.tiktok.com/@komo4seattle/video/7527353635445951758?_r=1&_t=ZP-91JuMvLwZ71
[19] https://www.reddit.com/r/urbanexploration/comments/137gotv/comment/myofbk3/
[20] https://www.reddit.com/r/Seattle/comments/1c4cepm/guy_climbed_to_the_top_of_the_gas_works_park_plant/
[21] https://www.reddit.com/r/Seattle/comments/1c4cepm/guy_climbed_to_the_top_of_the_gas_works_park_plant/
[22] https://www.reddit.com/r/Seattle/comments/u47rb/comment/c4scae1/

perimeter fence is appropriate and effective as both a visual deterrence cue and a physical barrier for individuals who are motivated to comply with barriers, based on the scientific literature, prior incident history, and social media data, there are a variety of ways in which the subject perimeter fence can be penetrated, and thus it is not effective at preventing access to the structure for individuals who are motivated to penetrate the fence.

It is our understanding that the perimeter fence had been modified from a chain link fence to a metal-grating fence; while this modification is appropriate in reinforcing the effectiveness of the barrier (i.e., making it more difficult to climb), the analysis above demonstrates that the extant metal-grating fence can still be penetrated by individuals who are motivated to do so. For example, the extant hole cut through the metal grating fence (see Figure 6, left) demonstrates that the penetration methods identified above can still be effective for penetrating the fence. This does not implicate a deficiency in the perimeter fence, but rather the proclivity of individuals to overcome any barrier when motivated to do so.

B. Risk Perception and Risk-Taking Behaviors

Scientific studies have found that despite an individual's ability to perceive risks associated with a variety of situations, risk perception is not a strong determinant in accounting for an individual's actions or decisions when encountering a potential hazard. An explanation that better accounts for human decisions and actions in everyday situations is *affordance perception* (Ayres, 2000). In this view, actions are based upon whether an environment or circumstance will allow an action to be completed successfully—e.g., available means to penetrate the fence barrier, and available appurtenances to climb the Gas Works Park structure—in accordance with an individual's goals, rather than what may be optimal with regard to safety. Therefore, from an affordance perception perspective, an individual's goals have a greater influence on an individual's decision to comply with warnings and safety information than perceived risk (deTurck & Goldhaber, 1988; Friedmann, 1988). Thus, individuals can be expected to choose a behavior that is adequate for achieving their goals in lieu of behaviors that optimally reduce risk. In addition, there are several cognitive and developmental factors inherent to individuals that scientific studies have demonstrated to increase an individual's proclivity to engage in risky and sensation-seeking behaviors. For example, risk-taking behaviors are disproportionately common among adolescent and young adult males, particularly in the presence of other adolescent and young adult peers. For example, experimental and epidemiological studies show that young people take more risks when observed by or in the company of peers, even in the absence of explicit encouragement, an effect that has been attributed to increased sensitivity of reward-related brain circuits during social contexts (Gardner & Steinberg, 2005; Chein et al., 2011). In addition, meta-analytic findings indicate that males are, on average, more likely than females to engage in many types of risky behavior, and that peer presence, sensation-seeking, and gender composition of the group moderates that tendency (Byrnes et al., 1999; Smith et al., 2014). The effects of age, gender, and peer influence on risky decision-making and behaviors have been most commonly demonstrated in driving studies and accident statistics. For example, it is well-established in the epidemiological literature that young drivers (i.e., under the age of 25) are at an increased risk of traffic accidents, and are overrepresented in accident statistics (e.g., NHTSA, 2023). Furthermore, the presence of teenage peers—particularly male teenage peers—increases risky and unsafe driving behaviors, and young drivers with three or more passengers are three times more likely to be involved in a fatal accident compared to young drivers without any passengers (e.g., Simons-Morton et al., 2005; Chen et al., 2000). Together, the scientific literature illustrates that risky actions can arise from goal-oriented intentions of feasibility and potential reward, independent of the safety, risk, and/or permissibility of the action, and that these risky affordance-based behaviors are particularly salient in young males, with developmental and social factors (peers) significantly influencing these behaviors.

The incident data on prior falls from the Gas Works Park structure suggests that these risk factors contributed to many of the prior incidents. For example, the prior incident data indicates that the majority of incidents involved young adults (average age of 21.6 years old), with males accounting for approximately 79 percent of prior incidents. In addition, several of the prior fall incidents indicate the involved person was with one or more people at the time of the incident (with the peer status of other incidents unknown), which suggests that peer influence may be a factor in an individual's decision to penetrate the fence barrier and climb the Gas Works Park structure. Similarly, the prior incident data indicates that several of the involved individuals were intoxicated at the time of the incident, which can compound the proclivity for individuals to engage in risk-taking behaviors through its adverse effects on judgment, attention, inhibition, and decision-making. As a public park, individuals of all ages,[23] gender, and developmental stages are exposed to the presence of the Gas Works Park structure. As such, future visitors to the park will include individuals who possess the inherent risk factors above (young, male, presence of peers, intoxication). Therefore, as long as climbing affordances are present on the structure, these risk-taking factors will decrease compliance with signs and barricades, as well as safety considerations, and increase the likelihood that a future incident will occur.

VIII. Evaluation of Remedial Measures

Below we evaluate several hypothetical remedial measures to deter and/or limit climbing opportunities. GEAR is not providing a structural analysis regarding the removal of pedestrian appurtenances and protruding structures. Nor is GEAR providing recommendations for any of the remedial measures discussed below.

Modifications to the Signs and Barricades

Based on the analysis above, modifications to the signs and/or fence barricade are not likely to deter or prevent access to the structure among individuals who are motivated to do so. As summarized above, a large body of scientific literature demonstrates that posted signs and barricades will not reliably modify a person's behavior, and that human factors internal to the person—their goals, motivations, and intentions—are the primary determinants of compliance. As indicated through both the prior fall incidents and social media analysis, individuals will disregard posted signs and penetrate barriers when motivated to do so (e.g., "*no fence could of stopped us, no signage")*. These motivations can persist even with additional and/or modified signage and barricades. For example, modification to the height of the fence barrier (e.g., increasing the fence height) may not dissuade individuals when other penetration means (e.g.,

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[23] For example, "all ages" events are held at the park, such as the August, 2025 "Forest for the Trees 8 – A Free All *Ages Music and Art Event at the Park";* https://ra.co/events/2205943

cutting through the fence) are available. As such, for individuals who are motivated to access and/or climb the subject structure, the addition and/or modification of signs and barriers are unlikely to be effective at modifying their behavior and/or preventing access to the structure.

Supplemental Lighting and Video Surveillance

The prior incident data (n = 14) reviewed by GEAR indicates that these prior incidents have all occurred at night (i.e., between the hours of approximately 10:00 PM to 5:30 AM). As such, it is possible that these nighttime conditions negatively affected the visibility of the extant signs on the perimeter. However, the scientific literature and analysis above indicate that low rates of compliance with posted signs are invariant to the lighting conditions present in a given environment (e.g., the visibility of the sign), and that increasing the conspicuity of posted signs is not associated with increased rates of compliance (e.g., Huntley-Fenner et al., 2007). Thus, the human factors literature on warning compliance does not support the notion that enhancement of the visibility of the signs at night through supplemental artificial lighting will increase compliance. In addition, while supplemental artificial lighting directed onto the structure and/or towers may provide an effective visual deterrence cue for some individuals, it is not likely to prevent future incidents of individuals accessing and/or climbing the structure among those who are motivated to do so. For example, Figures 7 and 8 depict individuals accessing the interior of the fenced area and climbing the structure in daytime conditions, i.e., under lighting conditions in which their trespass and access of the structure would have been observable to others. This suggests that supplemental lighting on or around the structure to facilitate deterrence through potential public observation is not likely to be effective for individuals who are motivated to access and/or climb the structure. Consistent with this, the research summarized above indicates that a person's goals, motivations, and intentions have a significantly stronger influence on behavior than perceptions of risk. In addition, for individuals who are motivated to access and/or climb the structure, supplemental artificial lighting on the structure may have an adverse, unintended effect in facilitating climbing opportunities by illuminating the pedestrian appurtenances and protruding structures that afford climbing opportunities. As such, for individuals who are motivated to access and/or climb the subject structure, the addition of supplemental artificial lighting on the signs, fence barricade, and/or structure are unlikely to be an effective deterrence.

In addition, while the implementation of surveillance cameras can provide an additional deterrent to some individuals, video surveillance is unlikely to deter individuals who are motivated to access and/or climb the structure. First, research that has examined the effect of video surveillance on crime has found that video surveillance is not associated with a significant reduction in crime rates. For example, Cameron et al. (2008) examined the effects of video surveillance on crime in Los Angeles and found that "Neither cameras in Jordan Downs nor Hollywood Boulevard had any statistically significant effect in reducing the overall monthly crime rates within the target areas." Second, the scientific literature on warning effectiveness demonstrates that many individuals fail to notice posted signs and warnings in their environment, even when readily visible and detectable in their field of view. Similarly, surveillance cameras are not an ineffective deterrent when unnoticed by individuals, and/or when installed in locations that may not be readily visible to individuals. Finally, the YouTube videos cited above indicate that video exposure is not an effective deterrent, as these videos were posted on public social media sites despite potential consequence for the unpermitted activity (i.e., climbing the structure). In summary, the implementation of video surveillance is unlikely to deter individuals who are motivated to access and/or climb the structure.

Auditory Alarms

While auditory alarms can be effective at modifying human behavior, their effectiveness is contingent in part upon their audibility in a given environment (e.g., above background ambient noise levels). For example, ISO 7731:2003 (Ergonomics—Danger signals for public and work areas—Auditory danger signals) recommends that auditory danger signals in public and work areas be 15 decibels (dB) above background ambient noise levels in order to be clearly audible, with minimum and maximum recommended sound levels of 65 dB and 118 dB, respectively. Additional factors can affect the audibility of alarms, including the frequency of the alarm and the distance of the alarm source to the observer (Dolan & Rainey, 2005; van der Hoek-Snieders et al., 2020). However, even when an auditory alarm is audible, its effectiveness as a behavioral deterrent may be dependent on other factors. For example, while home alarm systems typically have outputs between 100 and 130 dBs and are widely used to help prevent burglary,[24] there are other factors inherent to the involved individuals (e.g., the incentive for committing a given action) that may decrease their effectiveness as a deterrent. For example, Nee and Meenaghan (2006) interviewed 50 experienced burglars and found that over half (30) of them said that alarms did not deter them, and only nine always avoided alarms; in addition, security cues were mentioned least frequently by the experienced burglars, with factors like layout cues and potential profitability mentioned more frequently. Additionally, Tilley et al. (2015) found that adding a home alarm generally resulted in no change in risk or a substantial increase in risk of burglary with entry, depending on the combination of other home security measures (e.g., window locks, deadlocks, lights); only one of eight security combinations resulted in a marginal benefit from alarms. In summary, while auditory alarms can be effective at modifying human behavior, their efficacy as a *behavioral deterrent* is dependent on human factors internal to a person, including the perceived incentives that may be obtained for disregarding the alarm.

Removal of Pedestrian Appurtenances

The Gas Works Park structure contains numerous pedestrian appurtenances, including the presence of catwalks and ladders in numerous locations on the structure. From a human factors perspective, the presence of these pedestrian appurtenances provide visual affordance cues that can affect individuals' motivations for accessing the structure. Specifically, as discussed above, the scientific literature on affordance perception indicates that actions are based upon whether an environmental feature or circumstance will allow an action to be completed successfully. The presence of pedestrian appurtenances on the structure can facilitate the perception of climbing affordances, both in terms of climbing accessibility (e.g., using the pedestrian appurtenances to obtain higher climbing heights) and as an affordance destination (e.g., a location for individuals to "hang out" after ascension of the structure). Furthermore, the design of these appurtenances for pedestrian access may lead individuals to assume they are a safe and appropriate locomotor surface, which may encourage individuals to seek out and/or look for climbing affordances (e.g.,

[24] https://www.andovercompanies.com/insight/how-home-security-systems-work

nearby protruding structures) that lead to these pedestrian appurtenances. The social media analysis further suggests that the condition of these pedestrian appurtenances could directly lead to a loss of balance and/or fall. For example, social media comments include "*I definitely felt the metal planking being super rickety as I walked on it carefully"* and *"Once I got to the top I started walking around the platform, and since it was dark I did not notice the missing grate and stepped right through to a ~25 foot fall to a platform."* This suggests that in addition to the pedestrian appurtenances providing a visual affordance cue, their extant condition may further make them unsafe for use by pedestrians. Notwithstanding these considerations, a remedial action that solely removes the pedestrian appurtenances but leaves other protruding structures in place may not prevent future climbing incidents on the structure. For instance, if pedestrian appurtenances are removed but protruding structures that afford assisted or unassisted climbing opportunities are left in place, these affordances may still result in individuals attempting to climb the structure (e.g., to the top of the towers) despite the lack of pedestrian appurtenances. In summary, while removing the pedestrian appurtenances will eliminate their presence as an affordance cue (and reduce physical climbing opportunities) which can be a deterrent to some individuals, it is unlikely to deter individuals who are motivated to access and/or climb the structure. In the section below, we evaluated a remedial measure(s) related to use of anti-climbing devices on the structures.

Anti-Climbing Devices

There are several commercially available "anti-climbing" devices on the market.[25] These include both aggressive "anti-climbing" devices, such as spiked collars[26] and non-aggressive "anti-climbing" devices, such as rollers.[27] These devices (depending on where they are installed on the Gas Works Park structures) could deter an unassisted individual and/or limit the use of available climbable affordances.

VIII. Summary of Conclusions

Based on the analyses presented above, we have reached the following opinions:

1. Based on the analysis above, 99 percent of the general population would have a vertical grip reach height of less than 8 feet, and would not be able to jump, reach and grip a structure that was greater than 11 feet in height.
2. At Gas Works Park there were protruding structures and horizontal bars on the structures that were potential handholds that could be used in climbing opportunities for an unassisted individual.
3. While the signs posted on the perimeter fence of the Gas Works Park structure are reasonable and appropriate at alerting the public that access to the structure is prohibited, these signs—in addition to inclusion of supplemental signage and/or visibility

[25] GEAR has not completed an analysis of these devices and is not providing an opinion or recommendation of the use.
[26] https://greenfrogsystems.com/product/anti-climbing-spike-collar/
[27] https://www.skyhighladders.com/climb-prevention-rollers

enhancements—are not an effective deterrence for individuals who are motivated to penetrate the fence barricade and/or access the structure.

4. While the perimeter fence around the Gas Works Park structure is appropriate and efficacious in limiting public access to the structure, the fence is not an effective barricade for individuals who are motivated to penetrate the fence.

5. As a public park, future visitors to Gas Works Park will include individuals who possess inherent risk factors to disregard signs and barricades, and/or engage in risk-taking behaviors; due to the presence of climbing affordances on the structure, these factors will increase the likelihood that a future climbing incident will occur.

6. While remedial measures—i.e., modifications to the signs and perimeter fence around the structure, installation of supplemental lighting, video surveillance, and auditory alarms, and/or removal of pedestrian appurtenances—can increase the likelihood that the public is deterred from attempting to access and/or climb the structure, these measures are unlikely to deter and/or prevent all individuals who are motivated to access and/or climb the structure from doing so.

The opinions in this report, based upon the materials reviewed, the scientific literature, the site inspection and the education, experience, and knowledge of the authors, are presented with a reasonable degree of scientific certainty. These opinions are based on the assessment of work accomplished to date, and we reserve the right to change any opinions expressed upon production of additional information and materials.

Sincerely,

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Attachment A: List of Materials Provided

- Exhibit C, Consent Decree
- Landmark Preservation Board Update, 10/09/2025
- Landmark Preservation Board Denial of Certificate of Approval, 10/22/2025
- Gas Works Park Selective Deconstruction (COMP ALT 10/14/2025)
- Gas Works Park Safety Project, 07/23/2025, updated 10/14/2025
- Gas Works Park Fall Incidents Spreadsheet
- 1901 N Northlake Way 2015-2025 Spreadsheet
- 2101 N Northlake Way 2015-2025 Spreadsheet

Attachment B: CV of Scott Reed, Ph.D.

Scott A. Reed, Ph.D.

Senior Human Factors Scientist

Dr. Reed is a Senior Human Factors Scientist at Guidance Engineering and Applied Research. Dr. Reed has expertise in visual perception, attention, pedestrian gait and falls, lighting and visibility, perception reaction time, and warning compliance. He uses his expertise to investigate and analyze the human factors issues in transportation accidents (automobiles, motorcycles, bicycle, etc.), occupational accidents, and pedestrian slip/trip/fall accidents. Dr. Reed has published and conducted research on how perceptual judgments, visual gaze, and response time are affected by the visual context in a scene. He has also investigated human performance factors related to visual search, sensory adaptation, and multiple-object tracking.

Prior to joining Guidance Engineering and Applied Research, Dr. Reed completed his Ph.D. at the University of Oregon, where he studied visual perception and cognitive neuroscience. His dissertation examined how visual perception, attention, and cognitive processes contribute to capabilities and limitations in human performance. Dr. Reed has been an instructor at multiple universities and has taught courses in perception, human performance, memory, biological psychology, human learning, research methods, and general psychology. Dr. Reed is also a certified English XL Tribometrist and uses his training to measure and evaluate the slip resistance of walking surfaces.

Academic Credentials

Ph.D., Cognitive Neuroscience, University of Oregon, 2014

M.A., Psychological Science, California State University, Chico, 2005

B.A., Psychology, California State University, Chico, 2002

Academic Appointments

Instructor, Department of Psychology, University of Oregon, Eugene, OR, 2014-2015

Graduate Teaching Fellow, University of Oregon, Eugene, OR, 2008-2014

Lecturer, Department of Psychology, California State University, Chico, CA, 2005-2008

Licenses and Certifications

Certified English XL Tribometrist (CXLT)

Publications

Crump, C., Cades, D., Lester, B., Reed, S.A., Barakat, B., Milan, L., Young, D. (2016). Differing perceptions of Advanced Driver Assistance Systems (ADAS). *Proceedings, Human Factors and Ergonomics Society, 60(1)*, 861-865.

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Conference Presentations and Published Abstracts

Peterson, J., Kenny, R., Reed, S.A., & Dassonville, P. (2014). A two-factor structure within the systemizing trait of autism differentially predicts susceptibility to lateral and collinear flanker effects. *Vision Sciences Society Annual Meeting,* St. Pete's Beach, FL.

Reed, S.A., Farley, M., & Dassonville, P. (2014). Delineating the mechanisms of the rod-and-frame illusion. Vision Sciences Society Annual Meeting, St. Pete's Beach, FL.

Reed, S.A., & Dassonville, P. (2013). Embedded figures performance is modulated by an 'analytical tendencies' factor within the systemizing trait of autism. *Vision Sciences Society Annual Meeting*, Naples, FL.

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Lester, B., Reed, S.A., & Dassonville, P. (2012). Surround suppression is modulated by an "insistence on sameness" factor within the systemizing trait of autism. *Vision Sciences Society Annual Meeting*, Naples, FL.

Reed, S.A., McCollough, A., & Vogel, E. (2011). Neural measures of object tracking are modulated by sensitivity to motion information. *Cognitive Science Association for Interactive Learning Annual Meeting*, Hood River, OR.

Dassonville, P., & Reed, S.A. (2011). Leftward prism adaptation increases sensitivity to local cues in healthy individuals. *Vision Sciences Society Annual Meeting,* Naples, FL.

Reed, S.A., & Dassonville, P. (2011). Using prism adaptation to understand visual processing in hemispatial neglect. *University of Oregon Graduate Student Research Forum*, Eugene, OR.

Reed, S.A., & Dassonville, P. (2010). Configural and feature-based processing of human faces and their relation to autistic tendencies. *Vision Sciences Society Annual Meeting*, Naples, FL.

Reed, S.A. (2008). The detection of deception in neutral and emotionally-masked facial expressions. *Western Psychological Association Annual Conference*, Los Angeles, CA.

Academic Talks

Reed, S.A. (2015). Seeing the world differently: Cognitive traits and perceptual biases. Autism Interest Group, Eugene, OR.

Reed, S.A. (2011). Autism, systemizing, and the illusion of the extreme male brain. Autism Interest Group, Eugene, OR.

Reed, S.A. (2010). Learning and memory. Humphrey Fellowship Program, Eugene, OR.

Reed, S.A. (2009). The psychology of memory. Humphrey Fellowship Program, Eugene, OR.

Peer Reviewer

Journal of Science and Medicine in Sport

Attachment C: CV of Bethany Suderman, Ph.D., P.E.

BETHANY L SUDERMAN, PHD, PE

Senior Biomechanical Engineer

Dr. Bethany Suderman is a Senior Biomechanical Engineer at Guidance Engineering and specializes in accident reconstruction and injury biomechanics. Dr. Suderman has investigated injury claims arising from motor vehicle accidents, slip/trip and falls, and recreational activities. By applying the principles of engineering to the human body, she determines the forces and motions experienced during an event and analyzes whether they are consistent with an alleged injury. Dr. Suderman also compares these forces and motions to injury tolerance levels and those produced during other activities to provide context for the forces and motions. She has investigated and evaluated injury claims involving personal protective equipment in workplace and recreational environments. Dr. Suderman also has experience using injuries as evidence to determine how a particular event occurred.

Dr. Suderman has conducted studies using anthropomorphic test devices (ATDs "crash test dummies") and computational human models to determine forces and motions acting on the head and neck in accidents involving falling objects and falls to the ground. She has also assessed the energy attenuating potential of personal protective headgear. Dr. Suderman has worked with national motor vehicle and injury surveillance databases to determine the types of injuries people sustain in motor vehicle, recreational, and workplace accidents. Dr. Suderman has conducted water sports research studying the relationship between boat kinematics and towable inflatable kinematics. She also investigated the forces and motions acting on the inflatable rider. Dr. Suderman has a critical understanding of kinematic and dynamic analyses and mechanics of biomaterials, which she uses to determine forces and motions acting on the human body.

Prior to joining Guidance Engineering, Dr. Suderman was a Postdoctoral Fellow at Washington State University where she conducted research in the field of biomechanical engineering. She developed musculoskeletal models of the cervical spine from magnetic resonance images (MRI) of human subjects to simulate human movement and determine muscle strains and forces, joint kinematics, and compressive forces on intervertebral discs. Dr. Suderman also conducted human subject studies where she measured neck strength and muscle activity of volunteers in different head and neck postures associated with whiplash.

Academic Credentials

Ph.D., Mechanical Engineering, Washington State University, 2012
B.S., Engineering, Biomedical Concentration, LeTourneau University, 2008

Engineering Licenses and Certifications

Registered Professional Mechanical Engineer, Washington, #55736

Certified *XL* Tribometrist, CXLT, for floor slip resistance measurements

Publications

McFarland DC, Suderman BL, Cruise DR, Stepan LL, Scher IS. Head-first impacts during bubble soccer: examining head and neck injury potential. [Sports Eng. 28(1) (2025) 3-15]. *Sports Eng*. 2025. doi: https://doi.org/10.1007/s12283-024-00484-2

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Suderman B, Vasavada A. Moving muscle points provide accurate curved muscle paths in a model of the cervical spine. *Journal of Biomechanics,* 2012. 45, 400-404.

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Published Abstracts and Conference Proceedings

Suderman, B, Sklar, A, Stepan, L, Scher, I. Water Ski Binding Release Characteristics In Forward Lean. *ISEA 2020 The Engineering of Sport 13*, June 22-26, 2020.

Suderman B, Scher I. Upper Extremity Forces During Tubing. 42nd Annual Meeting of the American Society of Biomechanics; Mayo Civic Center, Rochester, MN, August 8-11, 2018.

Scher I, Suderman B, Stepan L, Shealy J. Helmet Effectiveness: Do Helmets Reduce the Likelihood of Severe Head Injury? Abstract presented at the Biennial Meeting of the International Society for Skiing Safety, San Vito di Cadore, Italy, March 2015.

Suderman B, Harley E, Stepan L, Shealy J, Scher, I. Chairlift unloading success: Effects of age and equipment type on likelihood of falling; 20th Congress of the International Society for Skiing Safety; San Carlos de Bariloche, Argentina, August 4 – 10, 2013.

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Suderman B, Vasavada A. MRI-derived moment arms of neck muscles during sagittal plane motion. *17th Biennial Meeting of the Canadian Society of Biomechanics*; Simon Frasier University, Burnaby, BC, Canada, June 6 – 9, 2012.

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Suderman B, Vasavada A. Moving muscle points provide accurate curved muscle paths in a model of the cervical spine. *35th Annual Meeting of the American Society of Biomechanics*, Long Beach, CA, August 10 – 13, 2011.

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Suderman B, Vasavada A. Comparison of moment arm methods for curved muscle paths in a cervical spine model. *Northwest Biomechanics Symposium 2010* University of Washington, Seattle, WA, May 25 – 26, 2010.

Suderman B, Krishnamoorthy B, Vasavada A. Effect of curved muscle paths on neck biomechanics. *Northwest Biomechanics Symposium 2009*. Washington State University, Pullman, WA, June 5 – 6, 2009.

Professional Affiliations

- ASTM International (member)
    - F27.80 Water Sports Equipment subcommittee chair
- American Society of Mechanical Engineers (member)
- Society of Automotive Engineers (member)

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Structural Review of Gas Works Park Selective Deconstruction

December 17, 2025

The City of Seattle requested that Seattle Structural review the existing Gas Works Park "Selective Deconstruction" plans prepared by OA Architects. The city is interested in making the facility less hazardous for trespassers.

Specifically, Seattle Structural was asked to comment on:

1. General observations of the structural integrity of the structures and appurtenances.
2. Comment on the effect that further removal of catwalks, ladders and other appurtenances, as outlined in the 2025 Selective Deconstruction drawings, would have on the stability of the structures.
3. Alternatives to the proposed selective deconstruction.
4. Structural Engineering aspects of previous and proposed modifications.

In addition to a site visit, the following documents were provided by the City of Seattle and reviewed by Seattle Structural in preparation of this report:

Mayes testing, "Condition Survey, Gas Generator – Gas Works Park", 6/25/2002

PSM Consulting Engineers, "Gas Works Park – Selective Safety Demolition", 6/30/2016

PSM Consulting Engineers, "Gas Works Park – Safety Evaluation Site Walk", 3/23/2017

PSM Consulting Engineers, "Gas Works Park – Safety Demolition", 4/7/2017

PSM Consulting Engineers, "Gas Works Park – Safety Implementation", 10/2018

OAI Architecture + Planning, "Gas Works Park – Emergency Selective Deconstruction", 8/7/2025

Eight high-quality color photos.

General Observations of the structural integrity of the structures and appurtenances

The physical elements of the Gas Works Park towers fall into two categories: 1. *Main structural elements*: tanks, piping and large pumps and other equipment, and 2. *Catwalks, ladders and appurtenances* that may be fully supported by the main structural elements, or may have independent columns and braces that support multiple levels of catwalks. Category 2 items are shown in red and yellow in the August 27, 2025 Selective Demolition drawing set. In some cases, catwalk framing columns or bracings support portions of the main structural elements (typically piping).

I am not aware of any possibility that the existing ladders and catwalks would be utilized except by trespassers or those attempting to rescue trespassers. These ladders and catwalks do not comply with the requirements for public access as defined within the Seattle Building Code; nor do they appear to comply with the requirements of OSHA regulations that govern industrial access. These ladders and catwalks were built for industrial use to an unknown standard. Restoration or improvement of ladders and catwalks are not options that should be considered.

According to the Mayes 2002 report, although the catwalk steel was at that time in generally good condition, although many connections between stair treads and stringers had completely failed. Large portions of the ladders and catwalks had loose or removed portions of gratings. Where connections of catwalks, ladders, stair treads and appurtenances (which includes pipes, small equipment and supports) are severely corroded or have failed, they are likely to give way under the weight of a trespasser or rescuer. Snow and wind loads could also fail the connections and cause parts to fall.

The Mayes 2002 report noted some buckling of the tank shells at catwalk brace connection points. Removal of catwalks at locations of buckling would likely improve the stability of the towers by removing the source of the stresses from the appurtenances. The Mayes report noted wall thickness of the tanks at the catwalk supports, with a minimum od 0.23” and a maximum of 0.494” as measured with ultrasound testing. While the outside surface of the tanks is visible, the inside is not. Nor is it accessible for repair or maintenance. The interior of the tanks will continue to corrode and will eventually fail.

Live load capacity of the catwalks, ladders and appurtenances is unknown. Deterioration of the structure over 80 years has certainly reduced capacity. This structure is in close proximity to Lake Union. While not a saltwater environment, it is a higher moisture environment which can accelerate corrosion. Structures are typically designed for a useful life of 50 years. We understand that the structure has not been meaningfully maintained since the City of Seattle acquired the Park in 1962, over 60 years ago.

Site observations showed deterioration of piping to the point that spontaneous failure may occur; this condition likely exists throughout the facility. These were major pipe sections which carried substantial loads. Where pipes and their supports are severely corroded, snow and wind loads could also contribute to failure.

Park personnel have mentioned that pieces of metal that have come loose and fallen are often observed on the ground. These pieces are removed so that mowing can occur and to reduce possibility of injury to workers. Falling pieces could cause serious injury or death if workers or trespassers are present when they fall. Climbing activity could increase risk of falling components. The Mayes report is 23 years old and additional deterioration has occurred to the catwalks and connections. Pieces will continue to fall without maintenance, removal or reconstruction.

In my opinion, the catwalks, ladders and appurtenances, which have small-dimensioned elements, and small welded and bolted connections, may eventually fail completely, even with efforts to apply paint and repairs. This structure is in a high moisture environment with increased risk of corrosion. Wind and snow loads may exceed the reduced load bearing capacity of the aged structure. The 2025 Selective Deconstruction plans seem to properly address the fragility of the catwalks and ladders through removal.

Comment on the effect that further removal of catwalks, ladders and other appurtenances, as outlined in the 2025 Selective Deconstruction drawings, would have on the stability of the structures

Catwalks, ladders and appurtenances can in general be removed, as outlined in the 2025 Selective Deconstruction plan, without jeopardizing the stability of the main structural elements. In those cases where catwalk framing elements support main structural elements, these should be examined on a case-by-case basis, with the removal of unsupported main elements, or the addition of new supports so that these elements can be maintained.

In general, it would be much easier to maintain the large tank-like elements of Gas Works Park, if the catwalks, ladders and appurtenances are removed.

Alternatives to the proposed Selective Deconstruction

We discussed what actions would be required to allow safe access. It would require a completely new catwalk system supported independent of the existing structure. This is not practical for cost reasons.

The complete demolition of portions of the plant, including some or all of the towers, could be considered as an alternative.

Structural Engineering aspects of previous and proposed modifications

As Structural Engineers, we have committed our professional practice to the protection of the public. Although building codes are often referenced to guide us, we also rely on basic engineering principles, especially when evaluating older existing facilities, to help frame our decisions and recommendations. It is well established that the Gas Works Park tower catwalks, ladders and appurtenances are unsafe. They are incomplete with failing connections. From the ground the remaining catwalks may appear intact to a trespasser. When accessed, the trespasser may fail to realize that areas of grating are missing, or that the entire catwalk assembly is at risk of failure.

Prior efforts to remove access as a means of stopping trespassers have not eliminated climbing. The scope of the removal shown in the August 7, 2025 Selective Deconstruction drawings are a good next step, provided that both the red- and yellow-marked catwalks, ladders and appurtenances are removed.

To make it clear that the tanks should not be climbed, we recommend complete removal of all catwalks and ladders, in addition to the removal of appurtenances that could aid climbing. This will remove the impression that safety can be achieved by reaching any remaining catwalks.

I declare that the foregoing is true and correct under the laws of Washington under a more probable than not basis, and is made in my capacity as a professional engineer.

Respectfully submitted,

Howard Burton, S.E. (WA), President
Seattle Structural PS Inc.
HBurton@SeattleStructural.com

HSB/
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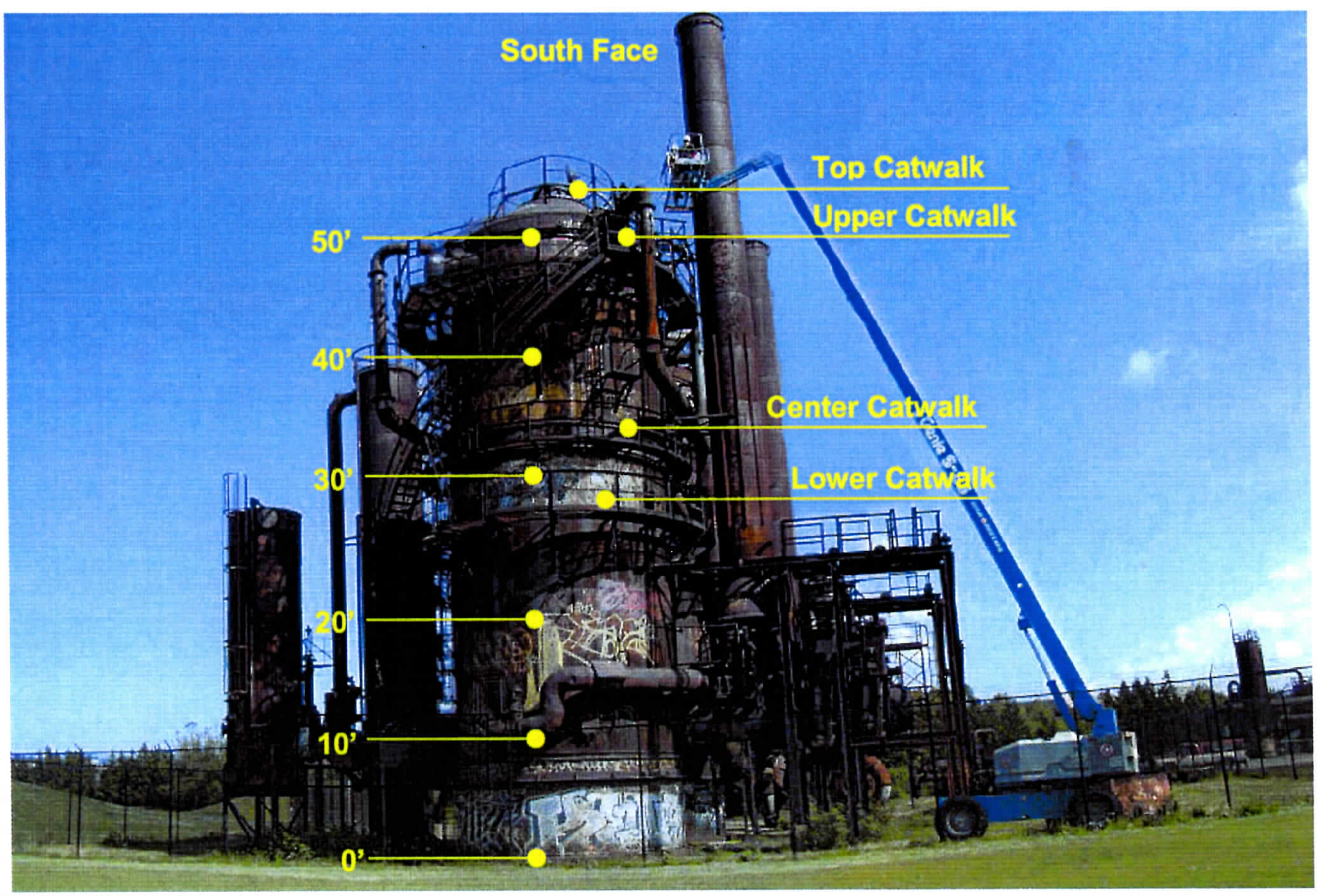
June 24, 2002

Ms. Patricia Fels
PTF Architects
30002 Issaquah-Fall City Road
Fall City, WA 98024

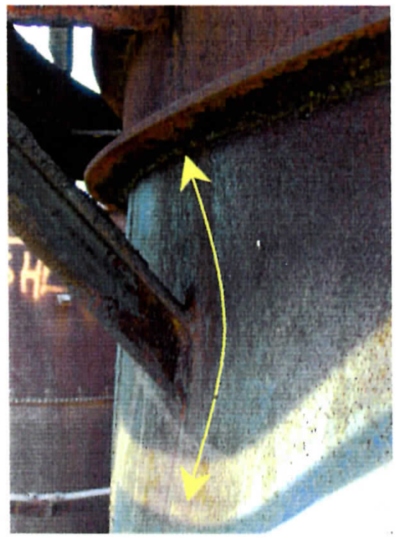
Re: Condition Survey
Gas Generator
Gas Works Park
MTE Project No. S1062

Dear Ms. Fels,

On May 30th and June 1st 2002, Mayes Testing Engineers performed a survey of the southern tank at Gas Works Park. This survey was performed in accordance with our Proposal No. 21081 dated April 9, 2001. An external visual survey was performed on the catwalks, stairs, vessel shell, and attachments. Ultrasonic testing was also performed on the south and west face elevations in two-foot increments (where accessible) to determine tank shell wall thickness. Samples of shell material were taken for chemical analysis from the vessel's west face at three-foot and fifty-foot elevations.

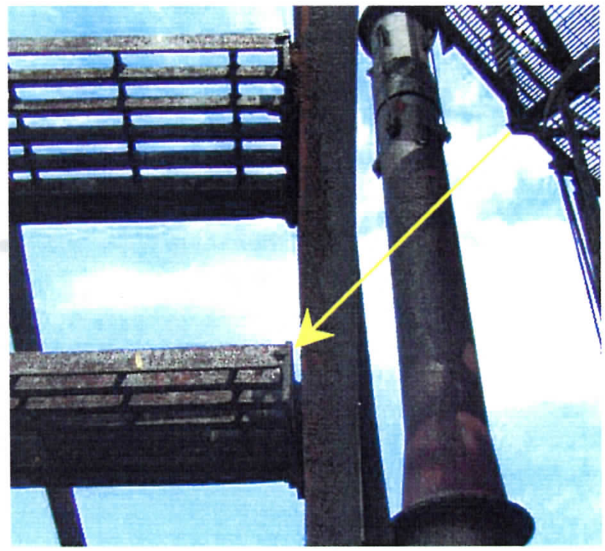


A. Investigation of the south vessel found the following conditions:

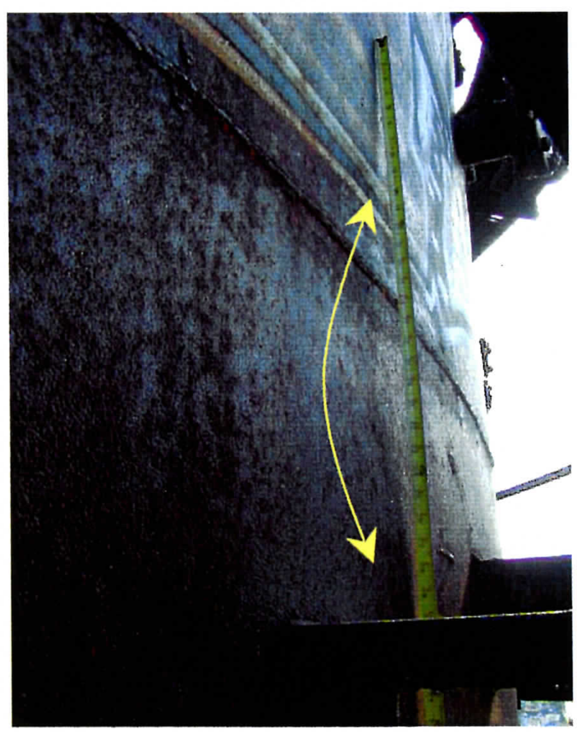


1. Supporting Level 2 catwalk, shell depressions at the catwalk knee braces along the south side.

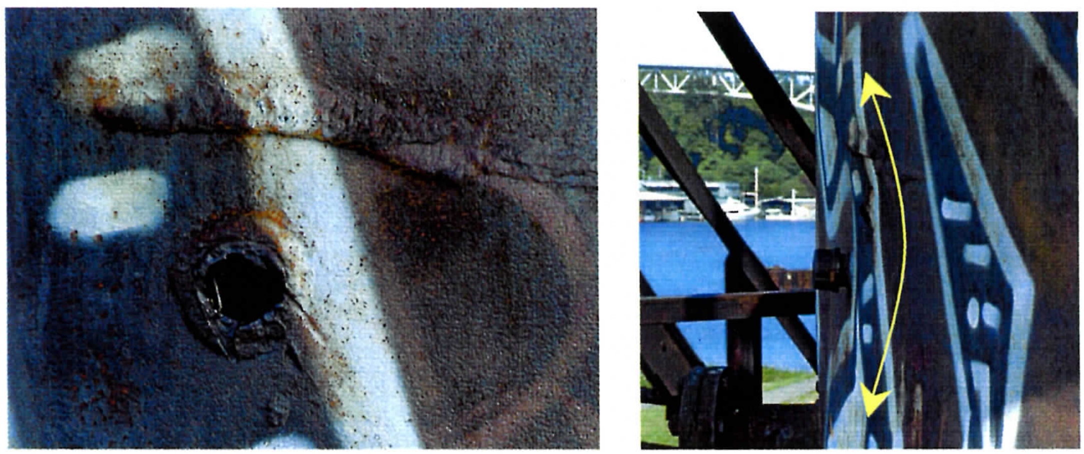
2. Typical stair support brace system.



3. South stairway from catwalk levels 2 to 3 has missing stair steps. Bolts have failed at various treads due to corrosion-separating some stringer channels from grating steps. Catwalk grating has numerous panels missing and is heavily corroded. None of the stair or catwalk grates appear to be in a safe or usable condition.



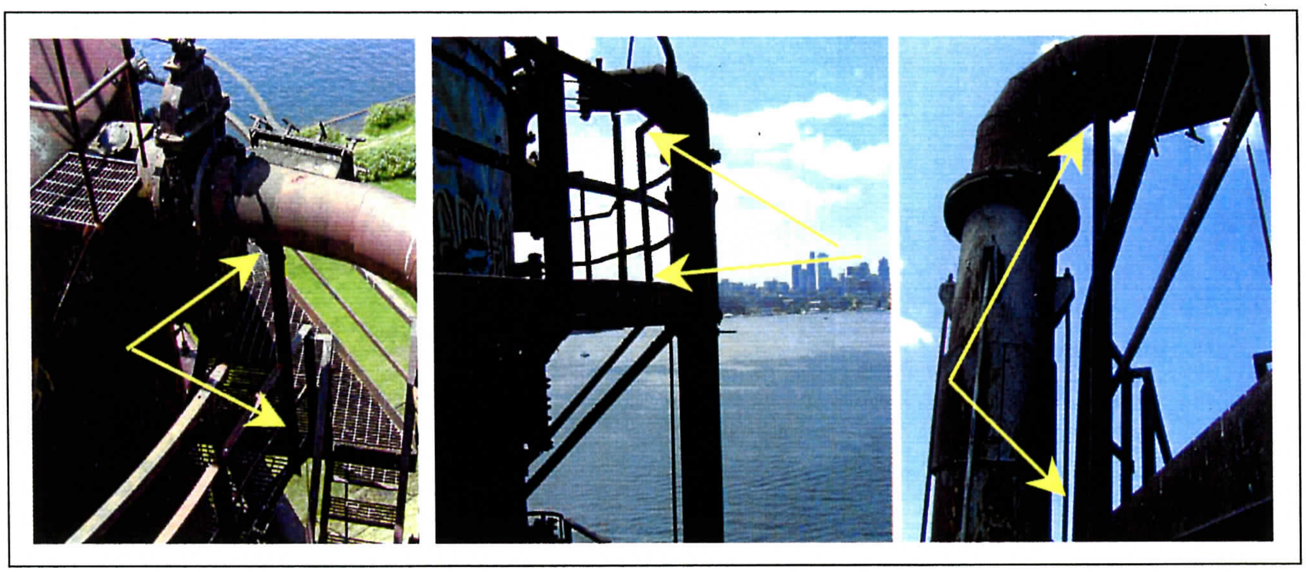
4. Deformations and buckles in shell walls at the south elevation of catwalk Level 1. Depressions and buckles are 1" nominally out of plane.



5. A repair weld was made to a tear/crack in the shell at catwalk Level 2. The shell also has a depression at this nozzle location.

6. Welds of catwalk support systems appear to be in fair condition with no apparent in service failures.

7. The conical roof section at top of vessel has holes corroded completely through its wall at manway fit-up connection joint. Thickness readings taken here ranged from 0.370", 0.360", and 0.160".



8. Vessel's upper piping is largely supported by upper catwalk framing. In one case, corrosion has left a 10' section of piping almost entirely resting on stanchion angle being carried by catwalk.

B. Measurement taken on catwalks, stairs, and attachments revealed the following:

Top Catwalk (top of tank)			
Member	**Size**	**Weld Size**	**Comments**
Perimeter rail	3"x4"x1/4"	N/A	
Horiz member	3"x3"x1/4"	¼" fillets	Welds all around
Diagonal brace	3"x3"x1/4"	¼" fillets	Welds all around

Upper Catwalk			
Member	**Size**	**Weld Size**	**Comments**
Perimeter rail	6"x3"x3/8"	N/A	
Horiz member	C 5"x2"x1/4"	¼" fillets	Channel member welds all around
Diagonal Brace	3"x3"x1/4"	¼" fillets	Welds all around

Welding of upper level catwalk diagonal braces has 9" total length of weld around faying surfaces. At the lower end, the diagonal brace is welded to an angle foot-piece 3"x4"x 3/8" 6" long. The connection angle is welded all around with 3/8" fillets, the brace is welded with ¼" fillets all around.

There are a few pipes that have their supports welded to the upper catwalk. The vertical support members are 3" x 3" x ¼" angles with (3") to (8") of ¼" fillet weld.

Center Catwalk			
Member	**Size**	**Weld Size**	**Comments**
Perimeter rail	4" x 3" x ¼"	N/A	
Horiz member	3" x 3" x ¼"	¼" fillets	(6") weld to collar channel.
Diagonal Brace	2 ½" x 2 ½" x ¼"	¼" fillets	Top weld (6") long. Bottom weld all around.

Lower Catwalk			
Member	**Size**	**Weld Size**	**Comments**
Perimeter rail	6" x 3 ½ " x 3/8"	N/A	
Horiz member	3" x 4"x 5/16"	¼" fillets	(6") weld to collar channel.
Diagonal Brace	4" x 3"x 5/16"	¼" fillets	Top weld (12") long. Bottom weld all around.

Stair Support Braces			
Member	**Size**	**Weld Size**	**Comments**
Stair Stringer	6" x 2" x ¼"	¼" fillets	Stair stringers are channel attached to the catwalk landing with welds (4") long.
Horiz member	4" x 4" x 3/8"	¼" fillets	(6") weld to 4" x 4" x 3/8" angle attachment.
Diagonal Brace	(2) 3" x 3" x ¼"	¼" fillets	Diagonal braces are double angles with top welds (8") long. Bottom welds all around to a 4"x 4" x 3/8" attachment angle.

There are collar support rings around the vessel at various Levels. The bottom ring is an 8" x 8" x 3/4" angle. The other rings are channels with dimensions of 6" x 2" x 7/16".

C. Chemical Testing:

Drill shavings were removed from two locations. Location #1 is from west side near access hole 3' high. Location #2 is from west side at 50' elevation.

Element	Test Results #1	Test Results #2
Carbon, C, %	0.268	0.245
Manganese, Mn, %	0.44	0.40
Sulfur, S, %	0.013	0.031
Silicon, Si, %	<0.001	0.009
Nickel, Ni, %	0.030	0.020
Chromium, Cr,%	0.09	0.01
Phosphorus, P, %	0.019	0.016
Copper, Cu, %	0.064	0.04
Molybdenum, Mo, %	0.05	0.04
Vanadium, V, %	<0.01	<0.01
Carbon Equivalent, C.E. %	0.35	0.31

The chemical analysis shows that shell base metal is comparable to ASTM A-36 steel with good weldability.

D. Ultrasonic thickness readings were taken of the shell with the following results:

1. Readings taken at Level #1 catwalk south elevation found nominal thickness of 0.350" with high reading of 0.407" and low reading of 0.250". This low reading appears to be due to internal pitting.

2. Readings were taken of the shell at catwalk support braces with the following results

Level	High	Low	Nominal
Level 2	.360	.250	.350
Level 3	.419	.360	.370

D. Ultrasonic thickness readings were taken of the shell with the following results cont.:

3. Readings from the vessel shell are as detailed in the table below.

Elevation	South	West
10'	N/A	0.49
12'	0.455	0.494
14'	0.491	0.478
16'	0.341	0.314
18'	0.37	0.23
20'	0.36	0.314
22'	0.38	0.32
24'	0.376	0.375
26'	0.409	0.372
28'	0.353	0.375
30'	N/A	N/A
32'	N/A	N/A
34'	0.385	0.389
36'	0.353	0.39
38'	0.357	0.359
40'	0.387	0.398
42'	0.407	0.375
44'	0.396	0.381
46'	0.389	0.383
48'	0.406	0.379
50'	0.417	0.392
52'	0.445	0.378
54'	N/A	0.387

D. Summary of Results:

The tank shows variable wall thicknesses ranging from 0.250 to 0.500 inches. There are areas of internal pitting and one area at the roof section where the steel has completely corroded through.

The catwalk support steel appears to be in good condition. The stair treads to channel connections are highly corroded and in many locations have completed failed.

Piping and duct work on the outside of the tank is often directly supported by catwalks which has compromised these structures. At several locations attachments have been made to the tank without adequate reinforcement causing deformation and deflection of the tank wall in the vicinity of the attachment.

Existing welding appears to be of acceptable quality. Only one crack was observed. The tank shell appears to be low carbon steel with good weldability and chemical properties similar to ASTM A-36 steel.

Respectfully Submitted,

MAYES TESTING ENGINEERS, INC.

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