

Tips for Managing Successful Irrigation Projects

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Introduction

- Background
- Topic is key to long term irrigation system viability, water conservation
- Can only scratch surface but provide framework to pursue further
- Owner perspective, diverse audience, apply to your experience
- Brief feedback

It starts with a story...

“Fine, We’re Not Going to Do Anything, It’s Not Our Fault!”

The Story

New contractor installed irrigation system as part of a large capital project.

The system didn't work, numerous fatal flaws, too costly and time consuming to repair with respect to workload and resource constraints.

So as proclaimed, we did nothing. Irrigation ran down the street or not at all, plants withered and the landscape suffered. It wasn't long before angry customers complained about the ruinous state of the new landscape around a brand new building and management told us we'd better get things under control ASAP! With "yeah buts..." falling on deaf ears, we started corrective work.

After a few weeks, another set of angry stakeholders started to complain about the decline of existing systems, and so started a 5 year juggling act between maintenance, minor in-house construction, and corrective work of new contractor installed capital construction, and not just for this system. There were more...

[Anyone ever have a similar experience? Who was at fault? Goal of presentation is to help avoid such circumstances.]

Top 5 Take-Aways

Unresolved design and construction issues can result in higher ongoing lifecycle maintenance costs, reduced system life, and opportunity cost to other work including maintenance of existing systems and self performed construction. [e.g. rocks in system]

Quality designs and construction are essential to achieving successful landscape/irrigation projects *including* lifecycle maintenance. [if not maintained, it's a failed project]

A viable owner landscape/irrigation program and qualified end user/service provider participation in design and construction are essential to achieving successful projects.

Getting things under control can be a lengthy, incremental process. Develop a plan, prioritize, chip away, track progress, make adjustments, think long term. [worse before better]

Success translates to more efficient/effective programs, improved water conservation, landscape health, and an easier, less stressful, more rewarding work life. [ROI, synergy]

Become a design & construction process partner

- **Get support to participate** [from superiors, stakeholders]
- **Act as if...** [just show up]
- **Leverage mistakes** [Identify problems, solutions, apply to standards and best practices]
- **Demonstrate value of participation** [e.g. calculate metrics for cost of corrective work, wasted water from leaking valves]
- **Gather business intel** [not always transparent, read published info, ear to ground, e.g. utility locates; avoid wasted work]
- **Team sport** [respect stakeholder roles, goals and constraints]
- **Be responsive** [be dependable, step up to challenges, sustainably meet beyond half way]
- **Develop and align design standards with program needs** [identify your needs and best practices]
- **Use design standards to efficiently communicate program needs** [architects, contractors, staff]

Specifications

- **Design Criteria**

Example: Irrigation piping flow velocity shall not exceed 5 fps.

- **Products, Materials and Equipment**

Example: Swing assemblies for quick coupler valves shall be Dura 1-A4-1-11-18 w/ DL-010 quick lock, or approved substitution.

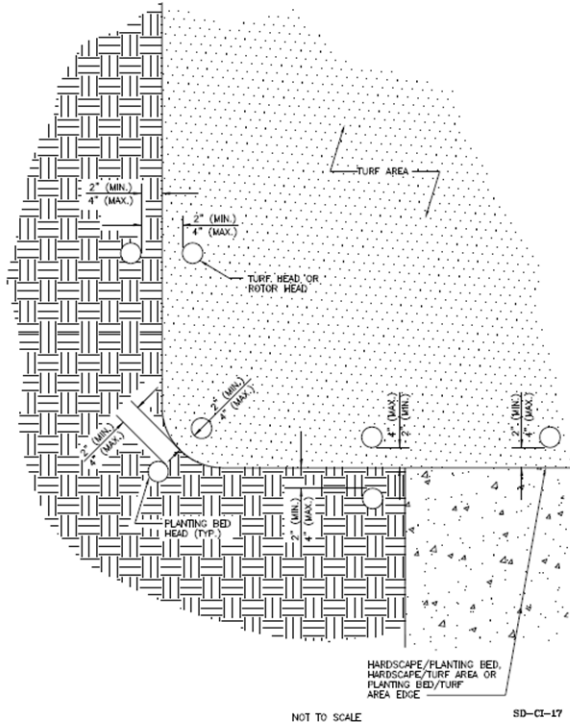
- **Installation, Fabrication and Construction**

Example: No bending of PVC pipe; use fittings for directional changes.

[products list: proven performance, inventory management, compatibility, criteria based requirements, open & sole source, acceptable equal]

Details

- Develop sketches of each assembly [a picture is worth a thousand words]
- See UW Facilities Services Design Guidelines (FSDG) at <http://www.washington.edu/facilities/engr/fs-design>
- Leverage manufacturer open source CAD details
- Examples
 - Sprinkler Set-Back & Location
 - Sprinkler Assembly & Installation



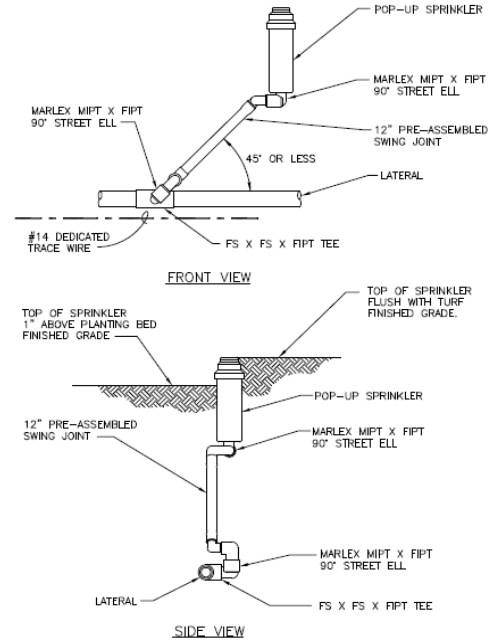
NOT TO SCALE SD-CI-17

Pop-Up Head Set Back and Location

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FRONT VIEW

SIDE VIEW

POP-UP SPRINKLER AND PRE-ASSEMBLED SWING JOINT CONNECTION ASSEMBLY

NOT TO SCALE

SD-CI-16

Pop-Up Sprinkler Assembly and Installation

2K - 016

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Design

- **Phases** [EIS, Programming, SD, DD, CD; large cap GCCM 1 yr+ vs. much less for criteria based design-build, light commercial, residential]
- **Review and comment each sub-phase** [formal review comments/responses, over the shoulder, informal]
- **Collaborative design software, building information modelling (BIM)**
- **Apply owner design standards**
- **Conduct an existing conditions assessment**
- **Provide as-built drawings, other records** [importance of record keeping]
- **Provide design strategies, balance w/ innovation** [e.g. extra capacity existing system; master plan]
- **Research and develop custom solutions** [e.g. sidewalk street tree DRiWATER]

Example of custom solution



Deliverables

- **Specifications**
 - Section 32 84 00 Planting Irrigation
- **Landscape “L” sheets**
 - Demo/Early Works Irrigation
 - Interim Irrigation
 - Future State Irrigation
 - Notes, Schedules, Details

[multiple sheets are important for clarify scope of work during each distinct phase vs. small, simple projects w/ everything on a single sheet]

Challenges & things to watch out for

- Disruption of service for assets to remain inside/outside of work limit
- Protection of existing assets to remain
- Restoration of disrupted areas outside work limit [staging, site access, utility connections]
- Restore or replace in-kind [e.g. restore an established, moderate use, full sun lawn w/ obsolete or no irrigation?]
- Discrepancies [between drawings including schedules, call outs and notes, with details, specs, related work, Section 01 56 00]
- Potential lifecycle maintenance issues [green roofs/walls, maintenance access, fall protection; UWMCE]
- Check design, calculations [coverage, radii, pressure, hydraulics, pipe sizing, valve sizing, water window]
- Compatibility of water delivery media, zoning, microclimate variables

Microclimate Variables

- Exposure
- Slope
- Soil texture, soil structure
- Infiltration rate, drainage
- Reflective heat
- Radiant heat
- Seasonal sun/shade path
- Multiple canopy/competition
- Plant water requirements, hydrozones
- Native or naturalized plants in non-native or unsuitable conditions
- Rain shadows [winter-rated irrigation zones, especially on-structure extensive green roofs w/ shallow soil/ballast]

Tips

- Ensure design is aligned with owner maintenance capacity
- Include an owner maintenance plan as part of the deliverables
- Ensure design is aligned with owner standards and design strategy
- Visualize design and construction to anticipate and avoid issues
- Include 'For Reference Only' as-built drawings in plans [reduces RFIs]
- Encourage landscape architect to coordinate related work
- Ensure related work is cross referenced [civil, electrical, mechanical-plumbing]



Landscape protection

or lack of...

“Wadya mean, this is a roofing job, there’s no landscape scope!”

there is now...

Related Work

MEP

Interior POC assembly

Interior controller



Construction

- **Pre-Construction Meeting** [big picture, overall scope, protocols, submittals]
- **Pre-Installation Meeting** [each work package; **with** sub foreman, LA, GC; review plans, schedule, protocols, benchmarks, expectations]
- **Mock ups** [in situ, review/approve all initial assemblies before proceeding to minimize rework; may take steps, i.e. open trench, backfill]
- **Inspections**
 - Scheduled, dedicated weekly progress meetings, benchmarks, performance testing, i.e. pressure test+, coverage test+
 - Unscheduled, informal
 - Proper attire & equipment; identify & record issues – list, markup plans, flags, paint, photos w/ ref shots
- **Field Reports**
- **Tracking** [collaboration software, progress meetings/minutes, GC corrective work log]
- **Punchlist, backpunch** [make goal to not have a punchlist by doing things right first time, and/or real-time/proactive corrective work]
- **Substantial Completion** [requires completed punch/backpunch but work often still in progress*; start of maintenance/warranty periods]
- **Close Out** [owner training, lessons learned, O&M manual/videography, 11x17 color coded laminate, bootleg redlines]
- **Maintenance Period, Warranty** [maintenance agreement, plant replacement strategy, transition to owner, management protocols]

Challenges & things to watch out for

- “Its just landscaping;” not a priority of the project or general contractor
- Timing of landscape/irrigation [acute schedule/budget pressure, project fatigue, change in personnel, other issues]
- Up to date documents & information [check dates, revisions, conformed drawings, RFI, ASI, SK, COR, COP, CO]
- Lack of clear responsibility for subgrade prep
- Out of sequence work
- Lack of coordination for complex, multi-trades work [green roofs, green walls, water harvesting]
- Restoration outside of work limit
- Not keeping updated as-built drawings
- Non responsive parties

Tips

- Be an advocate; identify and support your advocates
- Inspections – do **not** wait until testing or punchlist! [frequent, especially at first, but do not crowd]
- Be assertive, take on difficult issues
- Pick & choose battles, learn to negotiate [e.g. mainline/wiring vs. sprinklers/nozzles]
- Simplify complex solutions [summary/layperson language w/ detail for LA, sub; engage, don't alienate, no captain smarty pants]
- Ensure actionable direction and schedule for corrective work is getting from GC to sub
- Believe it when you see it, track w/ perseverance [agreement/handshake is only a first step]
- Be helpful, fair, professional; develop trust; show appreciation, acknowledge good work
- Cross educate, empathy [all parties, mutual interest, repeat business, as landlord explain why doing it right is important]
- Accept some imperfection [e.g. uncoordinated signage; unresolved, disputed, NIC items – positive is that you have a to-do list]
- Revisit sites 1, 2 & 5 years later [talk to maintenance personnel, extension of lessons learned]

Inspections

Example of photo documentation to identify and resolve an issue



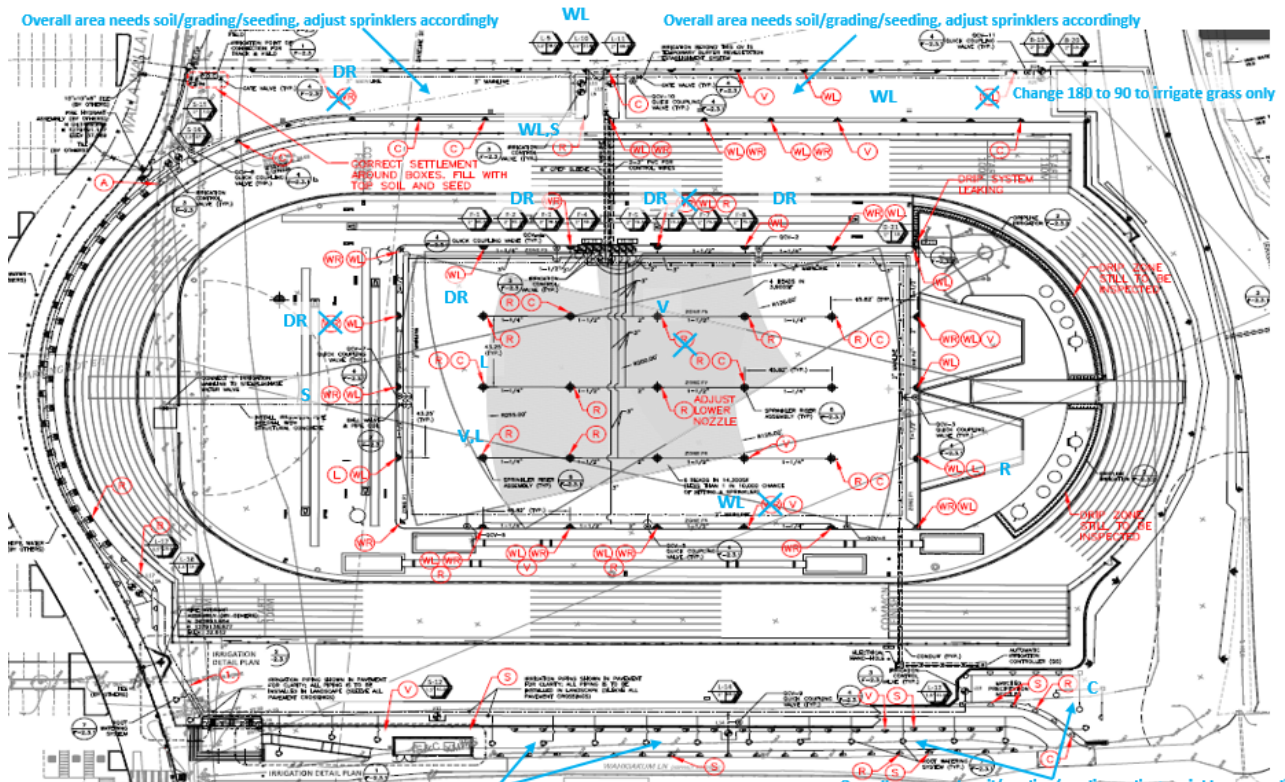
Photo 1. 40 psi after adjustments to Zone 9 (most west zone in south lawn panel) on 10/11/12



Photo 2. PVC pipe shavings in riser stem of sprinkler in Zone 9.



Photo 3. More PVC pipe shavings pulled out of riser by tip of marking flag.



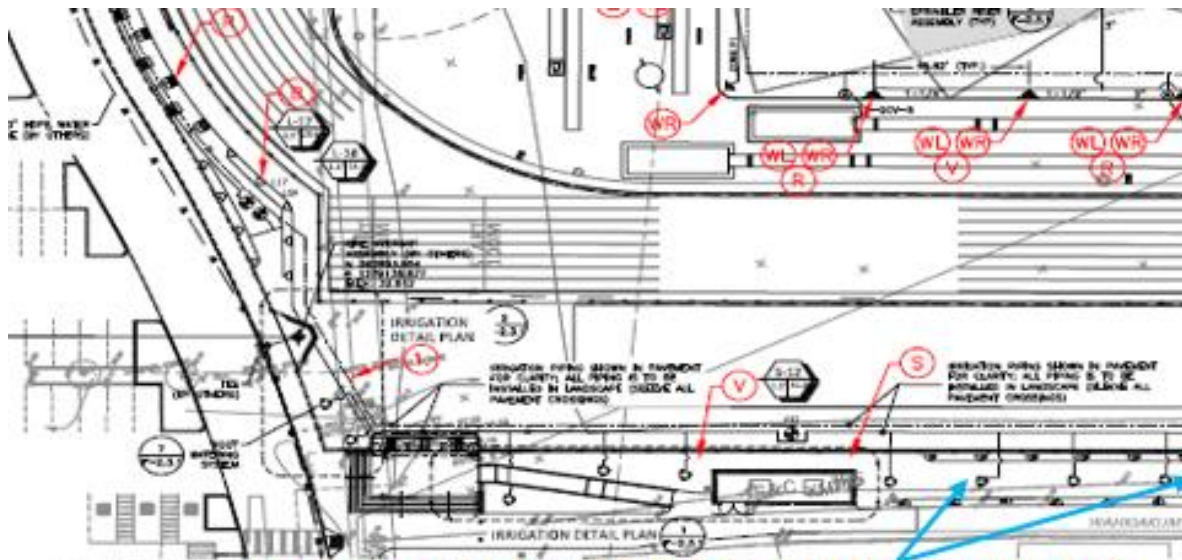
Example of a punchlist markup to identify and resolve issues

LEGEND Overall area needs soil/grading/seeding, adjust sprinklers accordingly

- | | |
|----------------------------------|--|
| (A) ALIGN WITH EDGE OF LAWN AREA | (R) RAISE |
| (B) BROKEN HEAD | (S) SHIFT HEAD LOCATION TO/OFF OF EDGE OF LAWN OR PAVEMENT |
| (C) CORRECT SETTLEMENT | (V) ADJUST TO VERTICAL |
| (L) LOOSEN NOZZLE SCREW | (WL) WIDEN RIGHT |
| (N) REPLACE NOZZLE | (WL) WIDEN LEFT |
| | (DL) DECREASE LEFT |
| | (DR) DECREASE RIGHT |

GENERAL NOTES:

1. NOTE SLEEVE DEPTH ON AS-BUILT.
 2. BRAIN DAMS TO PROVIDE DESIRED ZONE SEQUENCING FOR ALL PERIMETER IRRIGATION ZONES.
- Install adhesive labels showing zone numbers & spare terminations on all wiring in controller and install permanent tags in all valve boxes
- Change out Itron meter GPM register to CF register per specs



LEGEND Overall area needs soil/grading/seeding, adjust sprinklers accordingly

- | | |
|----------------------------------|--|
| (A) ALIGN WITH EDGE OF LAWN AREA | (R) RAISE |
| (B) BROKEN HEAD | (S) SHIFT HEAD LOCATION TO/OFF OF EDGE OF LAWN OR PAVEMENT |
| (C) CORRECT SETTLEMENT | (V) ADJUST TO VERTICAL |
| (L) LOOSEN NOZZLE SCREW | (WR) WIDEN RIGHT |
| (N) REPLACE NOZZLE | (WL) WIDEN LEFT |
| | DL DECREASE LEFT |
| | DR DECREASE RIGHT |

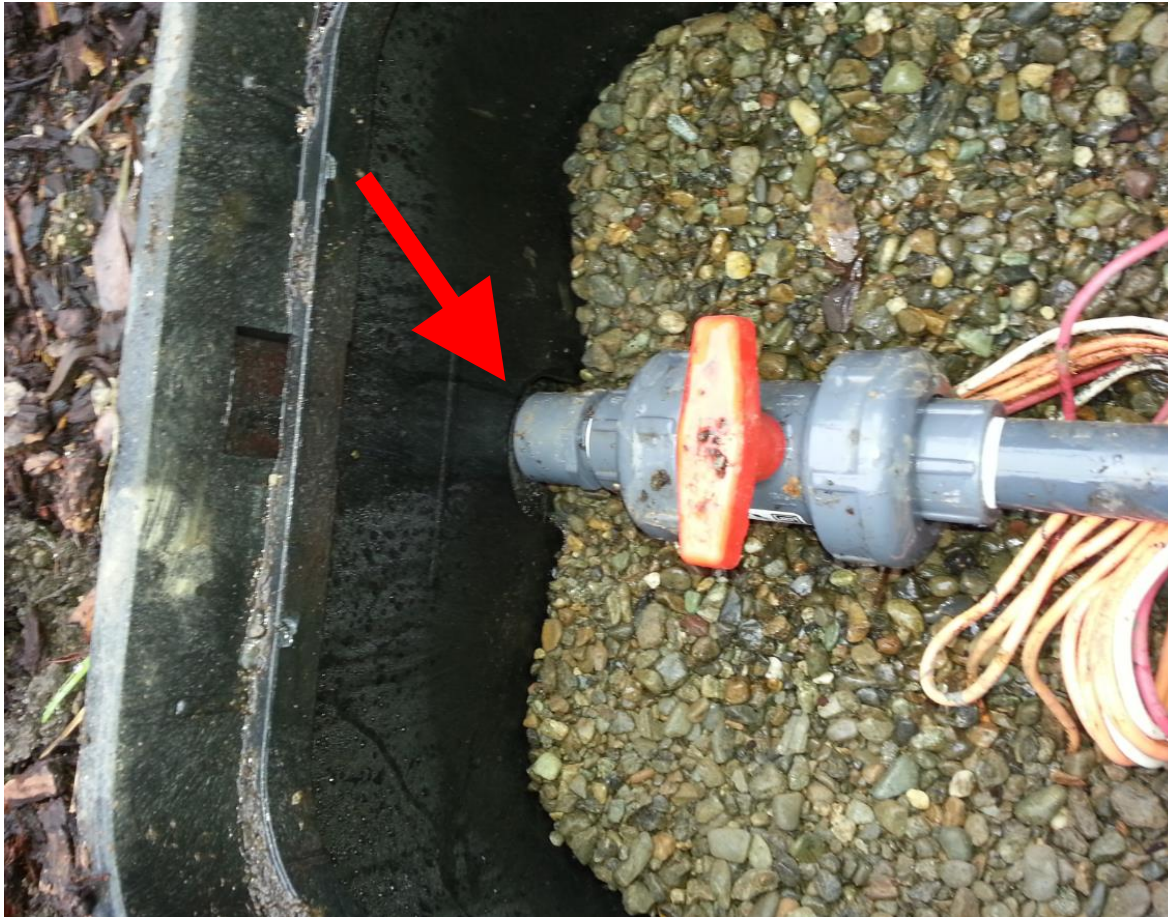
Enlargement of area at lower left

Also see example of marking flag with legend notation

Redundancy is good



...what's
wrong?

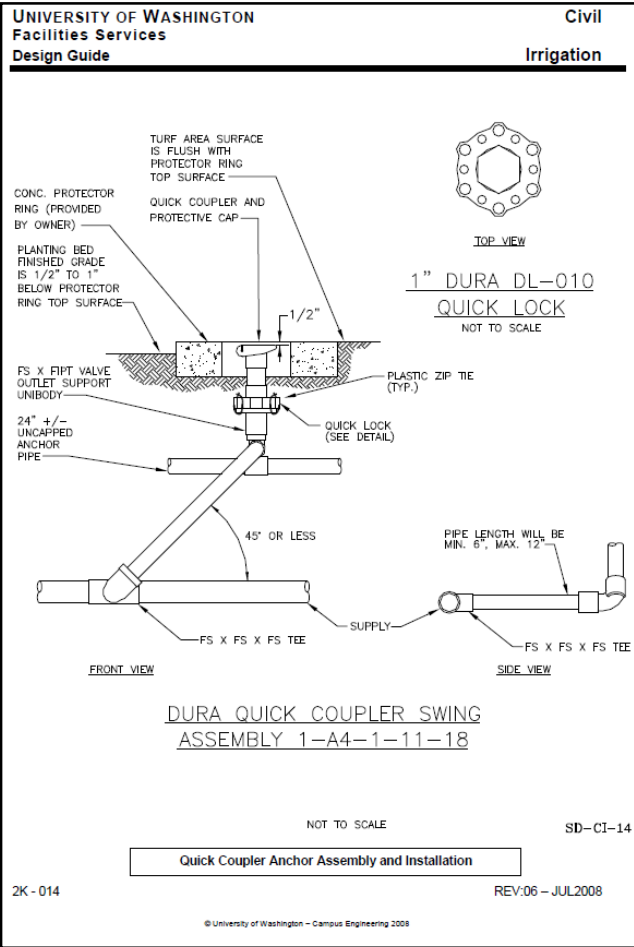


No clearance
between valve box
and mainline piping

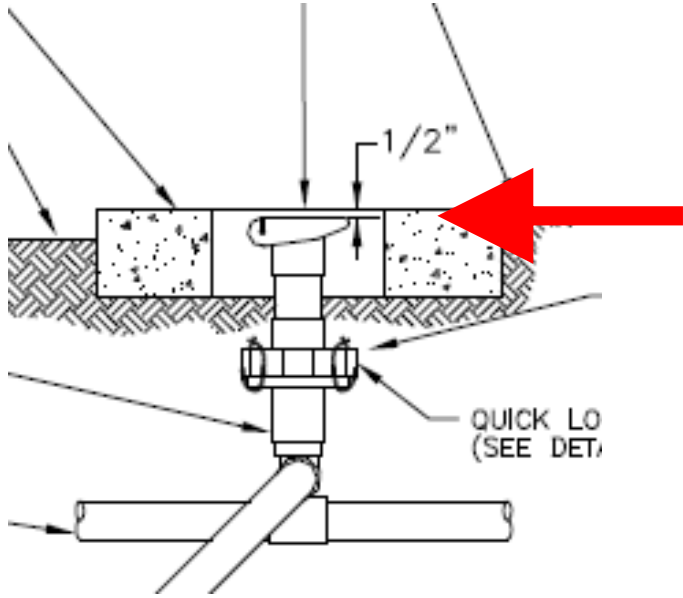


...what's
wrong?

Quick coupler valve (QCV)
cap is above the plane of the
protective concrete ring,
should be below as ring is
intended to protect QCV
from load of lawn
maintenance equipment



Use standard details to help clarify and resolve the issue



Questions???

Thank you!