*Construction Contract Document Review Training

Drinking Water Program

County of Santa Cruz

May 2018

Overview

What will be discussed:

Part 1

- Purpose of construction documents
- Major components of construction documents
  - Specifications
  - Construction Drawings (11X17 or 24X36)

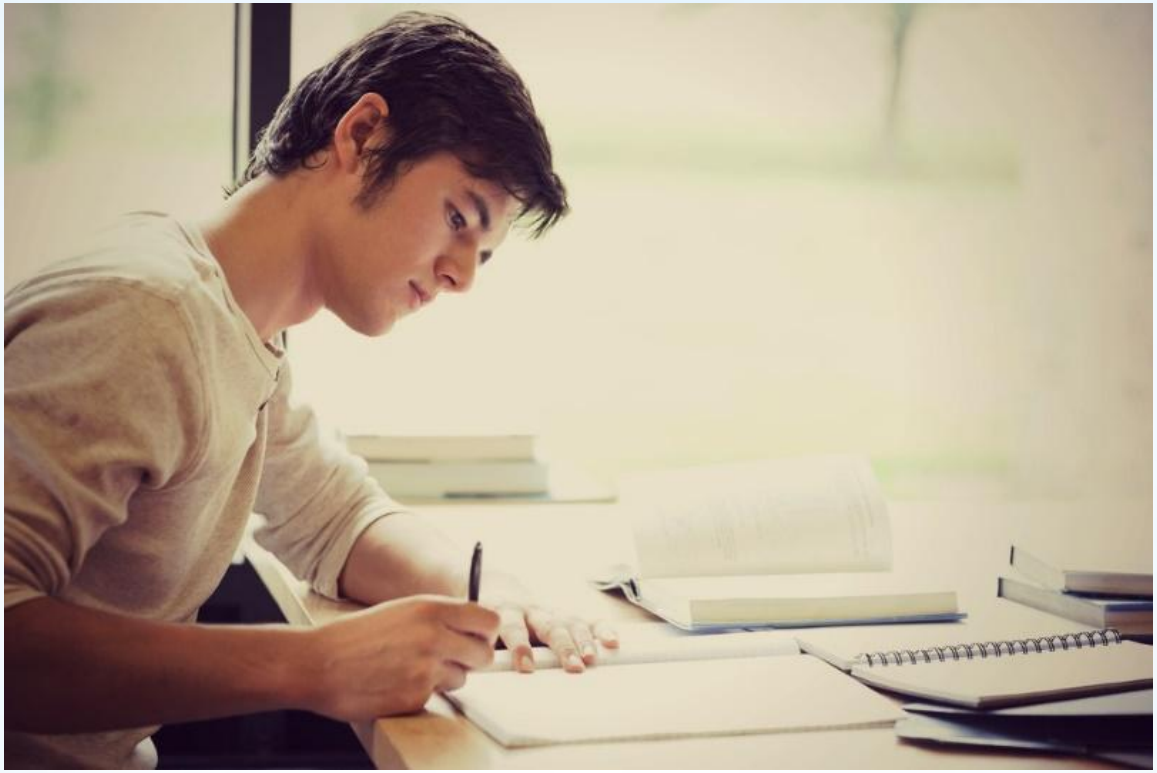
Part 2

- What to look for during technical review

Part 3

- Pipeline Separation Overview

Plans and Specs?!?! What should I do?



It’s going to be OK

Local Review (non-Housing):

*Intro

- Become familiar w/ the Building/Planning application process: http://www.sccoplanning.com/PlanningHome/BuildingSafety/ApplicantInformation.aspx

- Planning: submit plans if Pre-Approval is needed for a :
  - Coastal,
  - Development,
  - Technical Review, or
  - Variance

- Building: Submit plans if:
  - Simply need a Building Permit

Local Review - (non-Housing, cont.):

- Please specify that your project is for a
  - Small Water System
  - Have APN/s handy
  - Consult Building Counter Staff if anything is in question (fees, etc.)

State DDW/DFA Review:

* For Funding Purposes: SRF, Private Lenders, USDA…
* Coordination with DDW for a Detailed Review
* Design Responsibility on the Engineer and Water System, not on the permitting authority

Your Review is an Opportunity:

* To Learn
  * Every plan set and project is different
  * Feel free to ask questions
  * Use what you learn now on future projects
  * Observe the process

Your Review is an Opportunity:

* Be Proactive

* Make the project better

  * Protection of public health
  * Another set of eyes – add value
  * Anticipate and inform WS of permit requirements
    * Save time / money / quality

Technical Review:

- Be patient. Give yourself:
  - Workspace to spread-out documents and notes
  - Time to review the documents thoroughly / absorb the details
  - Notepad to write down notes
  - Feel free to tab / make notes on the drawings
  - Use the search function on electronic specifications

  - Compare with preliminary engineering reports

Technical Review:

- We are our greatest resources:
  - Speak with Colleagues, Operators, Board, & Staff
  - Discuss with other Staff / Water Systems regarding similar project experience
  - Other Special Committees

*Overview

Purpose:

- To clearly define the scope and locations of the project and associated components
- To inform the Contractor of the details / requirements of executing the project
- To provide a clear basis for competitively bidding

Specification Submittals

Submittals in the Contract Documents: (Contractor to owner)

- Shop drawings and support calculations
- Product catalog cut/spec. sheets
- Material or equipment samples / test reports
- Schedule(s)

Check in with systems as the project gets underway to coordinate any challenges before they are built

Construction Drawings

Purpose of Plans AKA Drawings:

- Illustrate the existing site constraints/conditions
- Show the location, elevation, size, and quantity of proposed project components
  - Buildable within existing site constraints
  - Accessible for maintenance
  - Separation of potable/non-potable

Construction Drawings

Disciplines:

- Civil
- Mechanical
- Structural
- Architectural
- Electrical
- Landscaping
- Program and Instrumentation Diagrams (P&ID)

Contains:

- Plan view
- Sections
- Details
- Construction notes

Technical Specifications

- Two types of product specifications:
  - Method specification describes equipment and procedures (nuts and bolts)
  - Performance specification dictates only the desired end result or product
- Specifications are often standard documents developed and employed for decades from one project to the next
- Specifications may also be produced by vendors looking to sell their products and provided at no charge to engineers and owners (caution for sole sourcing)
- Often contain referenced industry standards:
  - UL, ASTM,, AASHTO, ACI, NSF 61, AWWA
    (American Society for Testing and Materials, American Association of State Highway and Transportation Officials, American Concrete Institute, National Science Foundation, American Water Works Association)
  - NSF PRODUCT SEARCH
    http://info.nsf.org/Certified/PwsComponents/index.asp?standard=061

Additional Review Considerations

What to consider:

- Does the project solve the problem:
  - Water quality standard (<80% MCL?)
  - Compliance orders / Sanitary Survey deficiencies
  - Future concerns / Other permit / Monitoring requirements
  - Focus on the moving parts that touch water (pumps, pipes, valves, coatings, treatment equipment, well drilling, tanks)

Construction Drawings

Conducting Technical Review:

- Verify Spacing
- Elevations
  - Hydraulic profile (pressure, freeboard, water elevations, overflow, inverts, etc.)
  - Pump settings
  - Crossings
- Appurtenances are called out on plan, details, or specifications
- Matching dimensions elevations and distances from sheet to sheet
- Sizes type pressure class and material
- Listing specific vendor or equal:

Construction Drawings

Technical Review:

- General layout
  - How do things flow/connect
  - Cross connection control
- Project phasing
- Drawing specification and equipment lists
- Verify design criteria matches Preliminary Engineering Report
- Cost estimate matches drawings

Construction Drawings

Technical Review :

* Waterworks Standards:

  https://govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=I437FD430D4BA11DE8879F88E8B0DAAAE

  https://www.waterboards.ca.gov/drinking_water/programs/districts/docs/waterworks_standards_memo.pdf

* Pipeline separation (10 foot separation – minimize impact of a failed line):

  https://govt.westlaw.com/calregs/Document/I44AB06EE25824967983BC048F42C87C0

* Vessel sizes and layout
* Treatment capacity and order of treatment processes
* Requirements/location for chemical injection, analyzers, and other monitoring equipment
* Pump flow rate, head and power requirements
* Security (fences, prevent unauthorized access)
* Site Drainage
* HVAC (heating, ventilation, air-conditioning, electrical)
* Vehicle and personal accessibility for maintenance
* Waste handling (backwash, onsite storage, hauling sized appropriately)

Construction Drawings

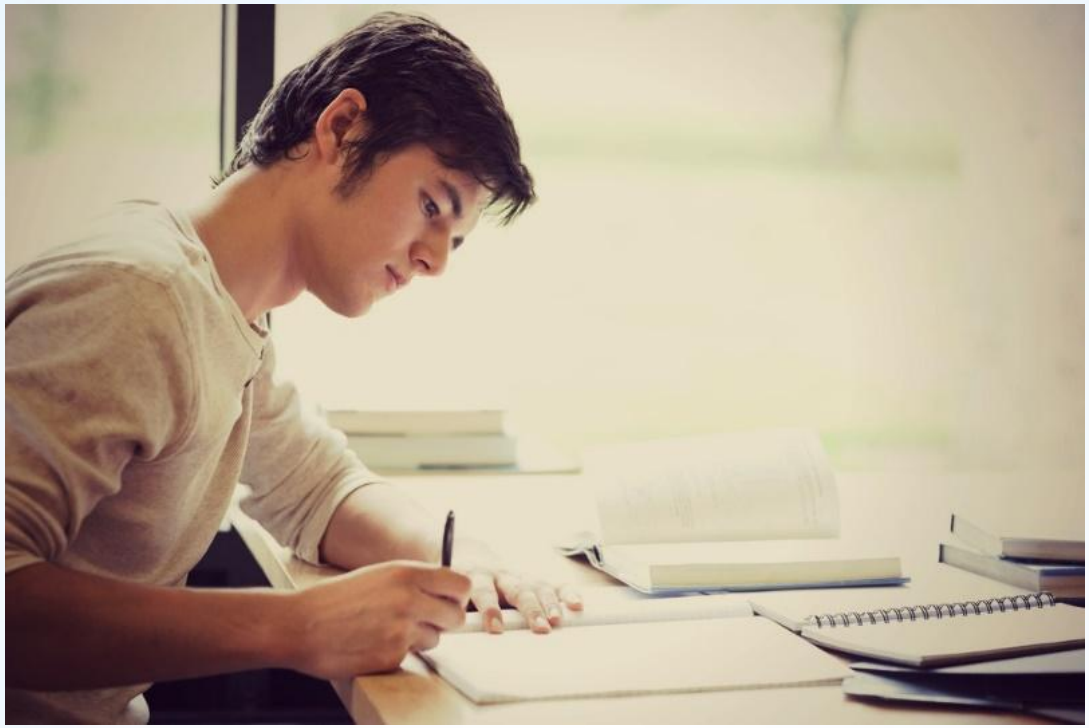
Technical Review – Waterworks Standards:

- Article 1. Definitions
- Article 1.5. Waivers and Alternatives (Does it provide adequate protection of public health)
- Article 2. Permit Requirements (is a permit amendment needed?)
- Article 3. Water Sources (New wells)
- Article 4. Materials and Installation of Water Mains and Appurtenances
- Article 5. Disinfection Requirements
- Article 6. Distribution Reservoirs
- Article 7. Additives (NSF 60 chemicals /61 products)
- Article 8. Distribution System Operation (Min. pressure, plans)

Recap

Your Review is an Opportunity:

- Anticipate and inform WS of permit requirements
  - Save time / money / quality
  - Consider holding a DESIGN REVIEW MEETING with the water system and engineer after you have reviewed the project documents
  - Hold the WS accountable for producing a quality design
  - Discuss permitting and flesh out other hidden issues
  - A site visits may also be helpful



*Your Review is an Opportunity Don't Be Intimidated!

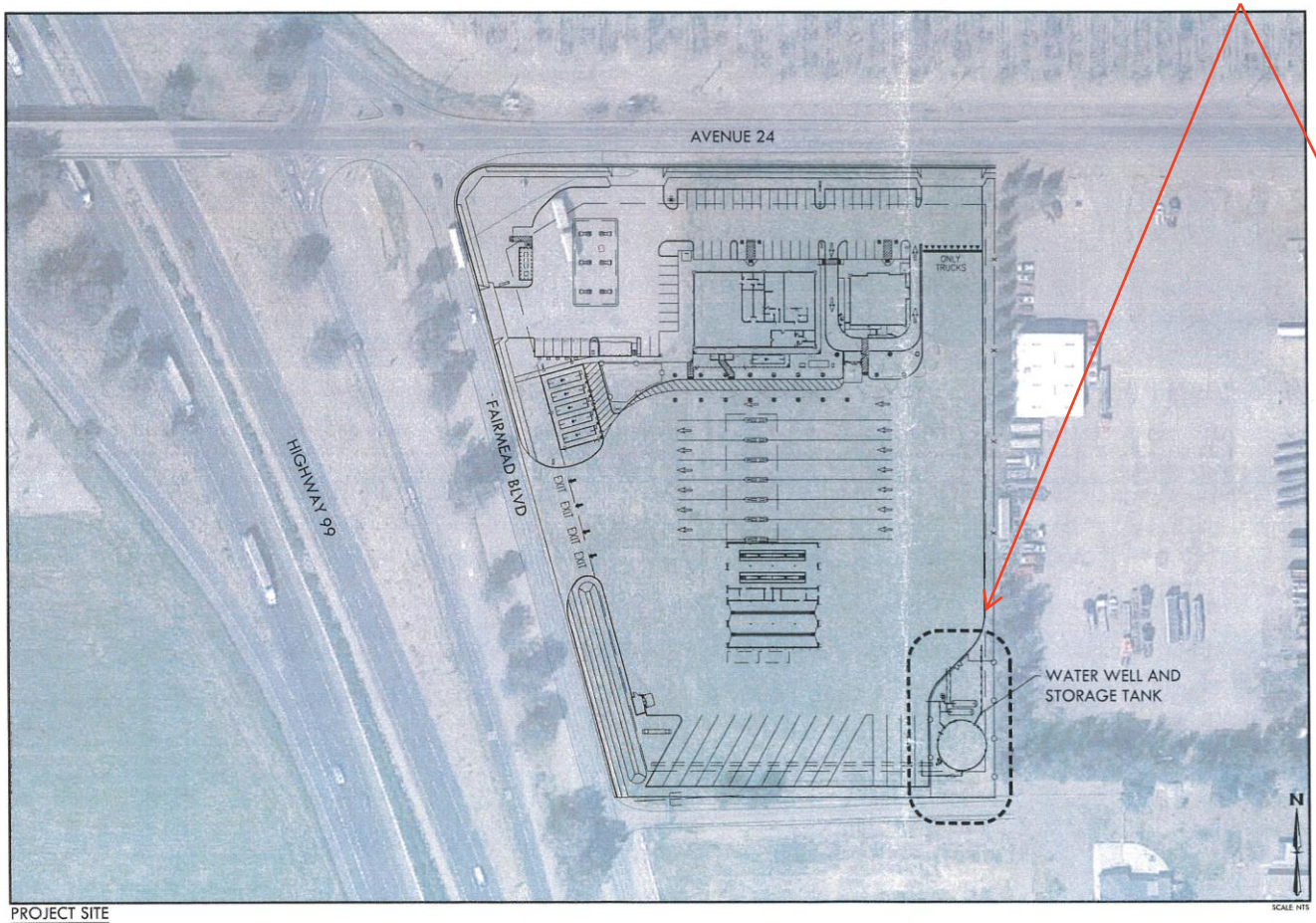
WHAT:

VALLEY GATEWAY TRAVEL CENTER
WATER WELL AND STORAGE TANK

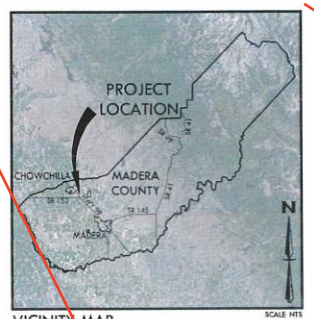
CHOWCHILLA, CALIFORNIA

WHERE:

WHO:



PROJECT SITE



VICINITY MAP

LOCATION MAP

SHEET INDEX

SHEET	DRAWING	NAME
1	G-01	COVER SHEET
2	G-02	ABBREVIATIONS AND GENERAL NOTES
3	C-01	SITE PLAN
4	C-02	SECTIONS AND DETAILS
5	C-03	SECTIONS AND DETAILS
6	C-04	DETAILS
7	C-05	STORAGE TANK DETAILS
8	C-06	STORAGE TANK DETAILS
9	C-07	SINGLE LINE DIAGRAM

WHEN:

APPROVED BY:

MADERA COUNTY ENVIRONMENTAL HEALTH DEPARTMENT DATE

REGISTERED PROFESSIONAL ENGINEER JENNIFER R. PRATT No. C71466 Exp. 12-31-17 CIVIL STATE OF CALIFORNIA

CALL BEFORE YOU DIG USA 800-227-2600

BLACKWATER CONSULTING ENGINEERS, INC. 605 STANDIFORD AVE., SUITE N, MODESTO, CA 95350 PH: 209.322.1817

REV	DATE	DESCRIPTION	APP

COVER SHEET

VALLEY GATEWAY TRAVEL CENTER WATER SYSTEM

DESIGNED BY	JRP
DRAWN BY	KCW
CHECKED BY	JRP
JOB NO.	16124
DATE	FEBRUARY, 2018
DRAWING	G-01
SHEET NO.	1 OF 9

GENERAL NOTES:

PERFORMANCE REQUIREMENTS

WELL PUMP

1. THE WELL PUMPING COMPONENTS BEING FURNISHED SHALL BE CAPABLE OF PROVIDING THE FOLLOWING FLOW & PRESSURE DEMANDS TO THE EQUIPMENT LISTED BELOW:
   a. HYDROPNEUMATIC TANK
      PEAK DEMAND: 165 GPM
      REQ. PRESSURE: 40-60 PSIG
   b. FIRE STORAGE TANK
      MIN. FLOW: 438 GPM
      MIN. PRESSURE: 10 PSIG
2. TDH PERFORMANCE REQUIREMENTS FOR WELL PUMPING COMPONENTS SHALL BE DETERMINED BASED ON WELL TEST RESULTS.
3. MATERIALS FOR A WELL PUMP AND MOTOR THAT SATISFIES THE SPECIFIED PERFORMANCE CRITERIA AND THE RESULTS OF THE PUMP TEST. THE SUBMITTAL MATERIAL SHALL INCLUDE SUCH INFORMATION AS ELECTRICAL REQUIREMENTS, PHYSICAL DIMENSIONS, PUMP CURVE AND SHUTOFF HEAD.

HYDROPNEUMATIC TANK

1. THE HYDROPNEUMATIC TANK COMPONENTS BEING FURNISHED SHALL BE CAPABLE OF MEETING THE FOLLOWING PERFORMANCE REQUIREMENTS:

CAPACITY:	3000 GALLONS
OPERATING PRESSURE:	40 PSIG - 60 PSIG
MAX. OPERATING PRESSURE:	85 PSIG

2. PRESSURE TANK SHALL BE AN ASME FULL ACCEPTANCE TANK. TANK SHALL BE NSF/ANSI 61 STANDARD.

FIRE STORAGE TANK

1. THE FIRE STORAGE TANK COMPONENTS BEING FURNISHED SHALL BE CAPABLE OF MEETING THE FOLLOWING PERFORMANCE REQUIREMENTS:

CAPACITY:	210,000 GALLONS USEABLE VOLUME
MATERIAL	FACTORY COATED BOLTED STEEL

2. THE STORAGE TANK SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICAN WATER WORKS ASSOCIATION (AWWA) D103-09 AND INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

FIRE PUMP

1. THE FIRE PUMP COMPONENTS BEING FURNISHED SHALL BE CAPABLE OF MEETING THE FOLLOWING PERFORMANCE REQUIREMENTS:

DEMAND:	1,750 GPM
REQUIRED PRESSURE:	40 PSI

2. THE FIRE PUMP SHALL CONFORM TO THE REQUIREMENTS OF THE CALIFORNIA FIRE CODE (CDC) AND NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 20.

SPECIFICATIONS:

FIRE STORAGE TANK

1. ALL PHASES OF THE WORK SHALL CONFORM TO THE MINIMUM STANDARDS PF THE 2012 EDITION OF THE INTERNATIONAL BUILDING CODE, UNIFORM PLUMBING, UNIFORM MECHANICAL & 2011 EDITION OF THE NATIONAL ELECTRICAL CODE PER CURRENT JURISDICTION REQUIREMENTS.
2. THE CONTRACT DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. UNLESS OTHERWISE INDICATED, THEY DO NOT SPECIFY METHODS OF CONSTRUCTION, THE CONTRACTOR SHALL TAKE ALL NECESSARY STEPS AND PRECAUTIONS TO MAINTAIN THE STABILITY OF THE STRUCTURE AND PROTECT WORKMEN AND OTHER PERSONS DURING CONSTRUCTION. SPECIFIC ITEMS TO BE CONSIDERED SHALL INCLUDE, BUT NOT BE LIMITED TO, THE ADEQUACY OF ALL FORMS, SCAFFOLDING, AND SHORING FOR CONSTRUCTION EQUIPMENT, SHORING OF RETAINING WALLS AND TEMPORARY LATERAL BRACING OF THE STRUCTURE.
3. ASTM SPECIFICATIONS AND IBC STANDARDS REFERENCED IN THESE DRAWINGS SHALL BE OF THE LATEST EDITION.

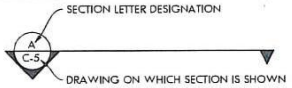
ABREVIATIONS and LEGEND:

ABBREVIATIONS

AB	AGGREGATE BASE	NTS	NOT TO SCALE
ALT	ALTERNATE	OC	ON CENTER
AVE	AVENUE	OHE	OVERHEAD ELECTRIC
BFP	BACK FLOW PREVENTER	PG&E	PACIFIC GAS AND ELECTRIC
BTWN	BETWEEN	PL	PROPERTY LINE
CIP	CAST IN PLACE	PT	POINT
CMP	CORRUGATED METAL PIPE	R	RADIUS
CONC OR CC	CONCRETE	RCP	REINFORCED CONCRETE PIPE
DIA	DIAMETER	R.D.	RELETIVE DENSITY
DIP	DUCTILE IRON PIPE	RD	ROAD
EX	EXISTING	REINF	REINFORCED
FDN	FOUNDATION	REQ'D	REQUIRED
FF	FINISH FLOOR	RT	RIGHT
FG	FINISH GRADE	S	SLOPE / SOUTH
FH	FIRE HYDRANT	SHT	SHEET
GR	GRATE	SIM	SIMILAR
HORIZ	HORIZONTAL	SS	SANITARY SEWER
HT	HEIGHT	SST	STAINLESS STEEL
ID	INSIDE DIAMETER	ST	STREET
INV	INVERT	STD	STANDARD
IRR	IRRIGATION	STL	STEEL
LF	LINEAL FEET OR LINEAR FEET	TEMP	TEMPORARY
LT	LEFT	TG	TOP OF GRATE
MAX	MAXIMUM	THRU	THROUGH
MFR	MANUFACTURER	TYP	TYPICAL
MGD	MILLION GALLONS PER DAY	UON	UNLESS OTHERWISE NOTED
MIN	MINIMUM	VERT	VERTICAL
N	NORTH / NEW	W	WATER / WEST
NIC	NOT INCLUDED	WM	WATER METER

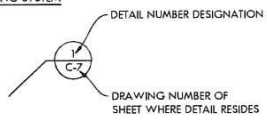
SECTION AND DETAIL NUMBERING SYSTEM

SECTION CUT ON PLAN



SECTION SHOWN

DETAIL NUMBERING SYSTEM

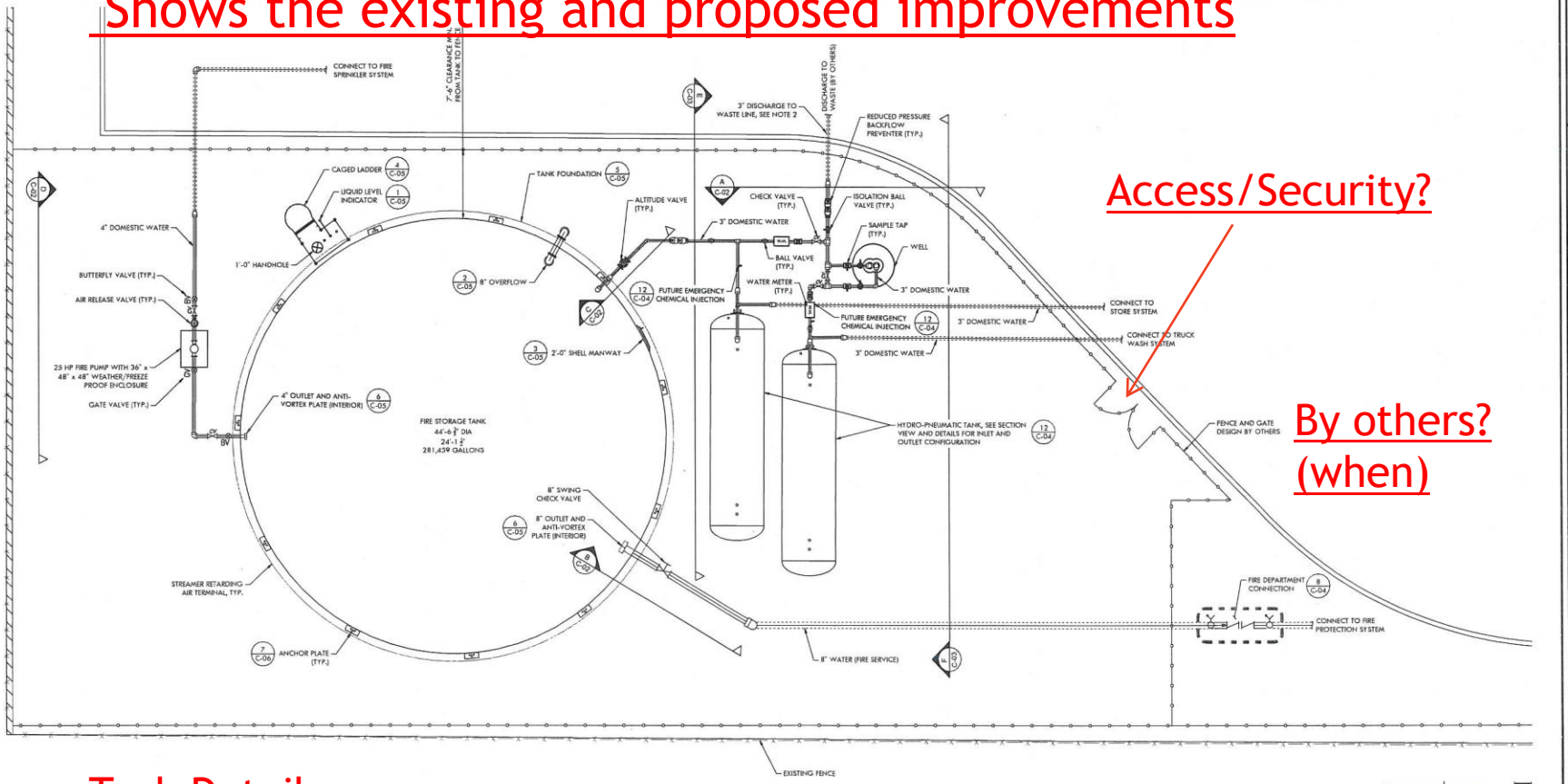


NOTES

1. "VAR" IN THE DRAWING DESIGNATION AREA INDICATES DETAIL APPLIES TO MORE THAN ONE DRAWING.
2. " - " IN THE DRAWING AREA INDICATES THAT SECTION OR DETAIL IS SHOWN ON THE SAME DRAWING THAT IT IS CUT FROM OR REFERRED TO.

SITE PLAN:

Shows the existing and proposed improvements



Access/Security?

By others? (when)

Tank Details:
Inlets and outlets
Vents
How is it filled
Drainage

What is existing?

What is non-potable?
Separation/backflow/airgap?

NOTES

NOTES:
1. SEE SHEET C-02 FOR ADDITIONAL EQUIPMENT CALLOUTS.
2. DISCHARGE TO WASTE LINE SHALL INCLUDE A 3" ISOLATION BALL VALVE AND 3" BACKFLOW PREVENTER.
3. UNDERGROUND LOCATION OF DISCHARGE TO WASTE LINE BY OTHERS. A MINIMUM 50 FOOT DISTANCE FROM THE WELL HEAD TO THE WASTE DISCHARGE LOCATION IS REQUIRED.
4. FIRE STORAGE TANK LEVEL INDICATOR, SHELL MANWAY AND LADDER SHALL BE PROVIDED BY THE TANK MANUFACTURER AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS. SUPERIOR TANK OR APPROVED EQUAL.
5. CONTRACTOR SHALL CONSTRUCT FENCE, WALL, GATE, MOW STRIP, AND/OR ACCESS PANEL. SEE ARCHITECTURAL PLANS FOR MATERIAL, COLOR, DETAILS AND SPECIFICATIONS.
6. AIR TERMINALS FOR LIGHTNING PROTECTION SYSTEM SHOWN FOR REFERENCE ONLY. SEE LIGHTNING PROTECTION SYSTEM NOTES ON SHEET G-02. ADDITIONAL SYSTEM EQUIPMENT NOT SHOWN FOR CLARITY.
7. ELECTRICAL SYSTEMS PROVIDED BY OTHERS.
8. FIRE PUMP AND FIRE DEPARTMENT CONNECTION SHALL BE APPROVED BY THE MADERA COUNTY FIRE MARSHAL.
9. FIRE STORAGE TANK SHALL BE SECURED TO FOUNDATION IN ACCORDANCE WITH MANUFACTURER'S STRUCTURAL CALCULATIONS.

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REV	DATE	DESCRIPTION	APP
1	11/10/17	N/A	AJH

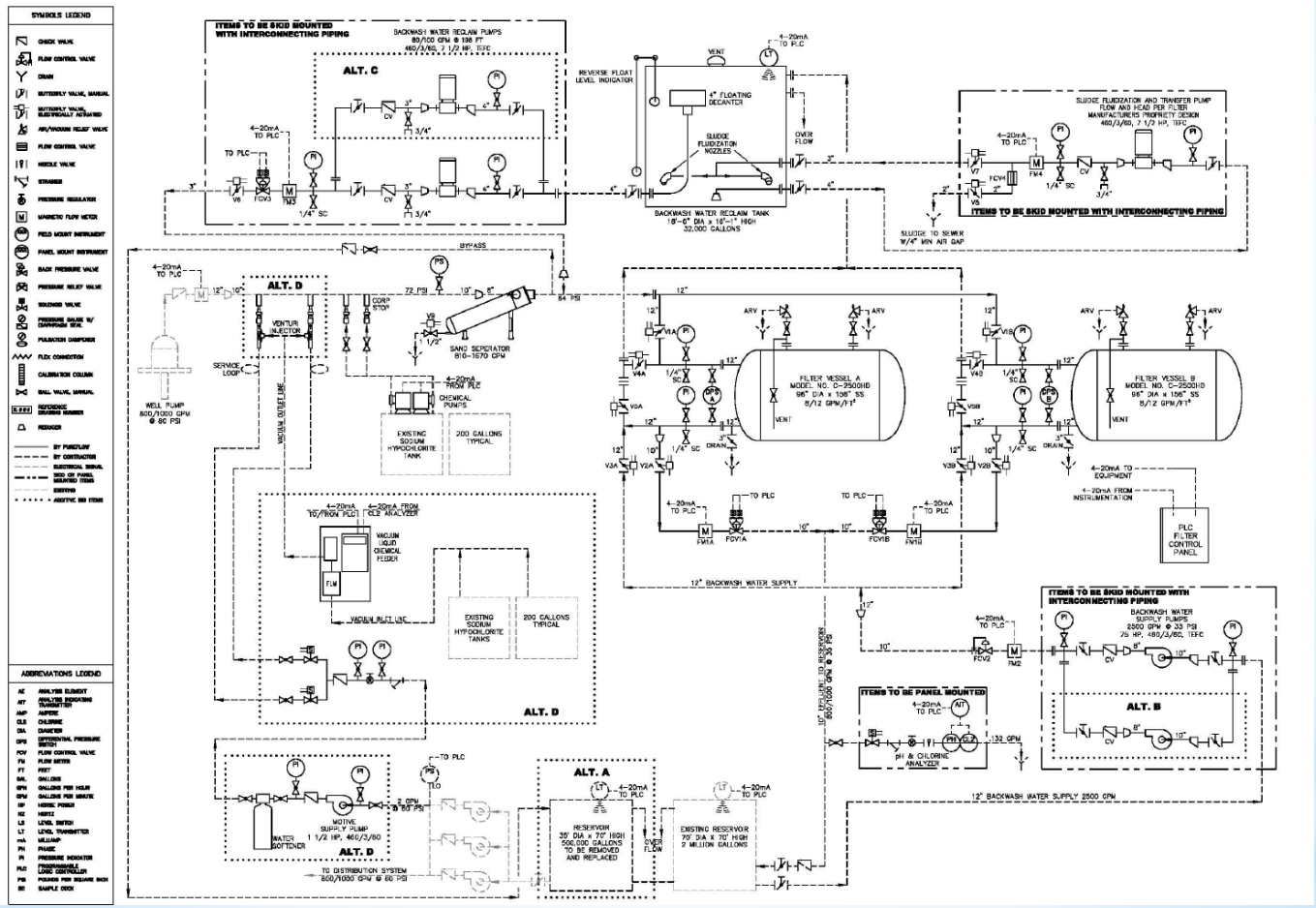
SITE PLAN

VALLEY GATEWAY TRAVEL CENTER WATER SYSTEM

DESIGNED BY	JRP
DRAWN BY	KCW
CHECKED BY	JRP
JOB NO.	16124
DATE	FEBRUARY, 2018
DRAWING	C-01
SHEET NO.	3 OF 9

Review Considerations:

* The Program and Instrumentation Diagram (P&ID) shows that all the important mechanical and electrical controls and monitoring devices are accounted for and connected for proper operation



*Program & Instrumentation Diagram

SEQUENCING and CONTROL LOGIC

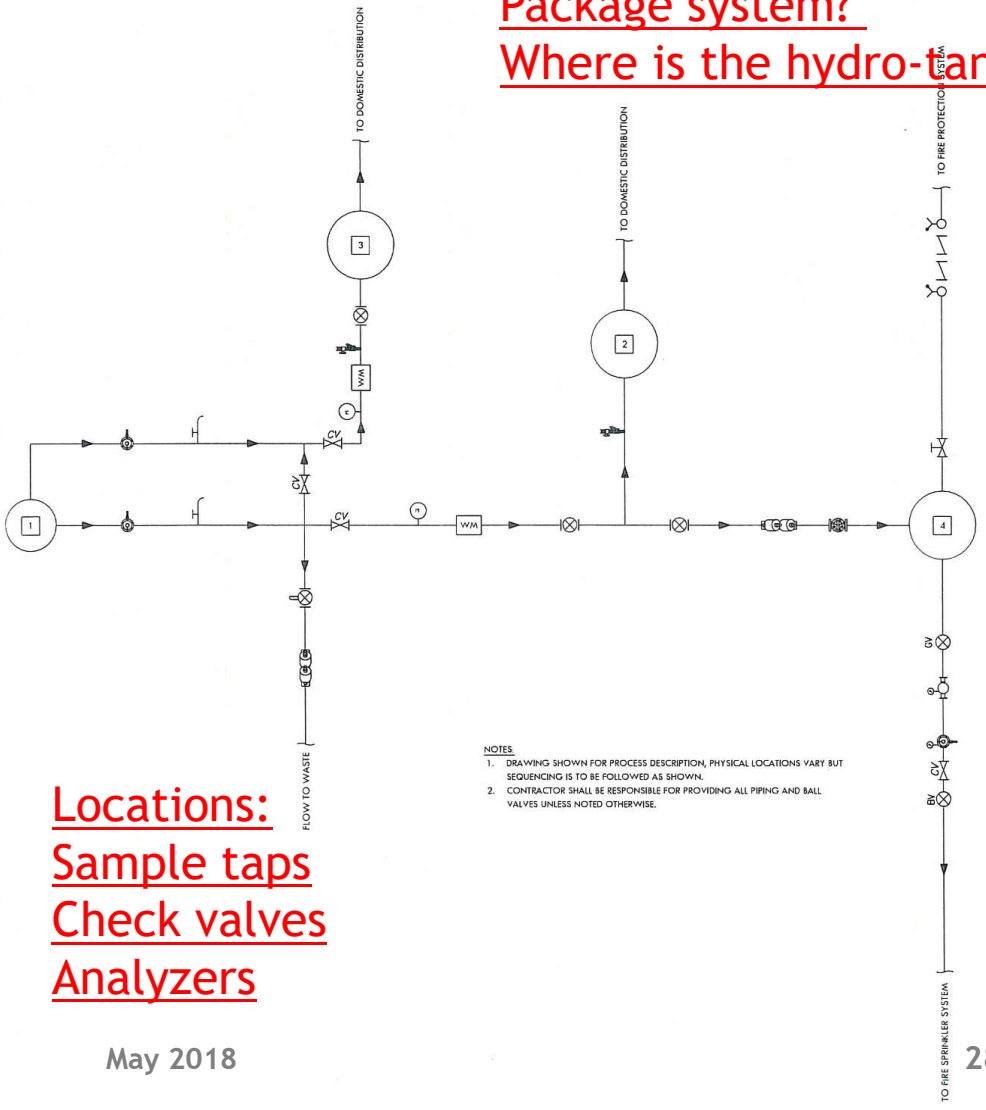
SETPOINTS pressure, level, flow?

WELL PUMP CONTROLS AND OPERATIONS	
CONDITION (AT HYDROPNUEMATIC TANK)	OPERATION
PRESSURE < 30 PSI	ALARM
PRESSURE < 40 PSI	WELL PUMP ON
PRESSURE < 60 PSI	WELL PUMP OFF
PRESSURE < 65 PSI	HIGH HEAD SHUT OFF-ALARM

WELL PUMP CONTROLS AND OPERATIONS	
CONDITION (AT FIRE TANK)	OPERATION (REQUIRES MANUAL ISOLATION)
LL LOW	(MANUAL) PUMP ON
LL HIGH	PUMP OFF
LL OVERFLOW	ALARM
LL LOW - LOW	ALARM

WELL PUMP CONTROLS OVERIDE	
CONDITION	OPERATION
AUTOMATIC	(WELL PUMP OPERATIONS)
OFF	MANUAL
MANUAL ON	MANUAL

Package system?
Where is the hydro-tank air compressor?



LEGEND

SYMBOL	DEFINITION
	ALTITUDE VALVE
	BACKFLOW PREVENTER
	CHEMICAL INJECTION TAP
	PRESSURE GAUGE
	PRESSURE INDICATOR
CV	CHECK VALVE
	SWING CHECK VALVE
	SAMPLE TAP
	AIR RELEASE VALVE
WM	WATER METER
	BALL VALVE
	ISOLATION BALL VALVE
GV	GATE VALVE
BV	BUTTERFLY VALVE
	FIRE DEPARTMENT CONNECTION
	FIRE PUMP

What is existing?

Locations:
Sample taps
Check valves
Analyzers

What is nonpotable?
Separation/backflow/airgap?

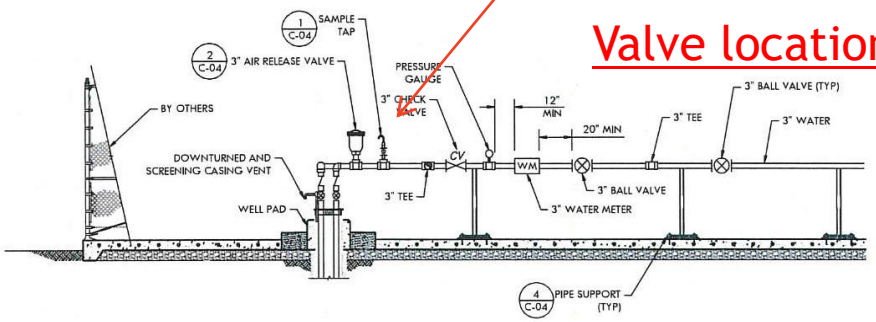
PIPING SECTIONS

Above grade vs below grade

Sample Taps

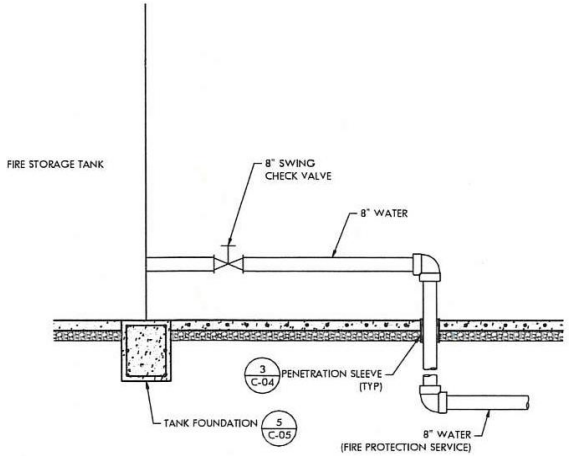
Screens

Valve locations



A WELL SITE SECTION

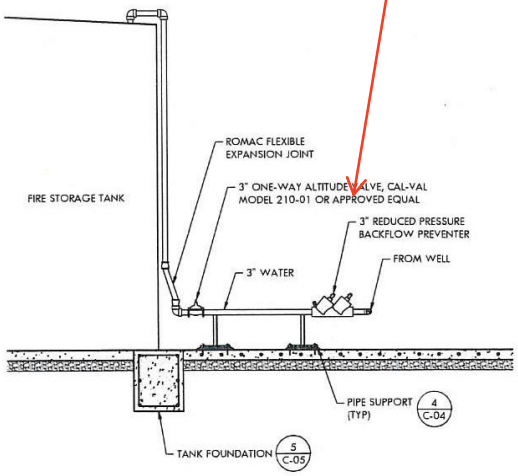
SCALE: 1"=4'-0"



B FIRE SERVICE SECTION

SCALE: 1"=4'-0"

Airgap? Check valve?

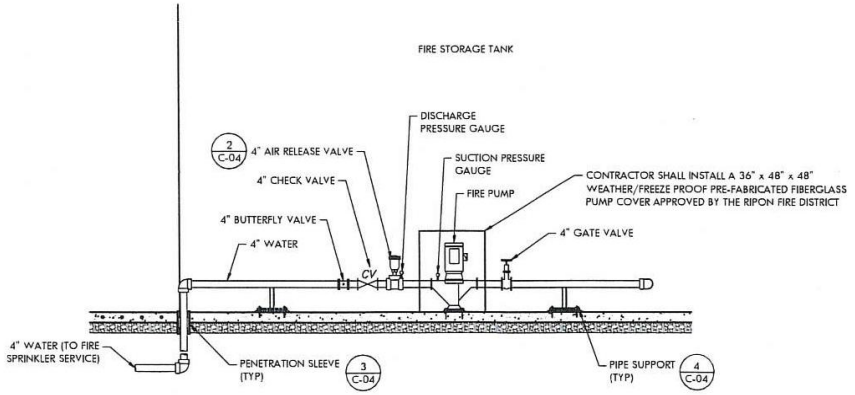


C WELL SITE SECTION

SCALE: 1"=4'-0"

Protection from elements ?

Security / Tampering?

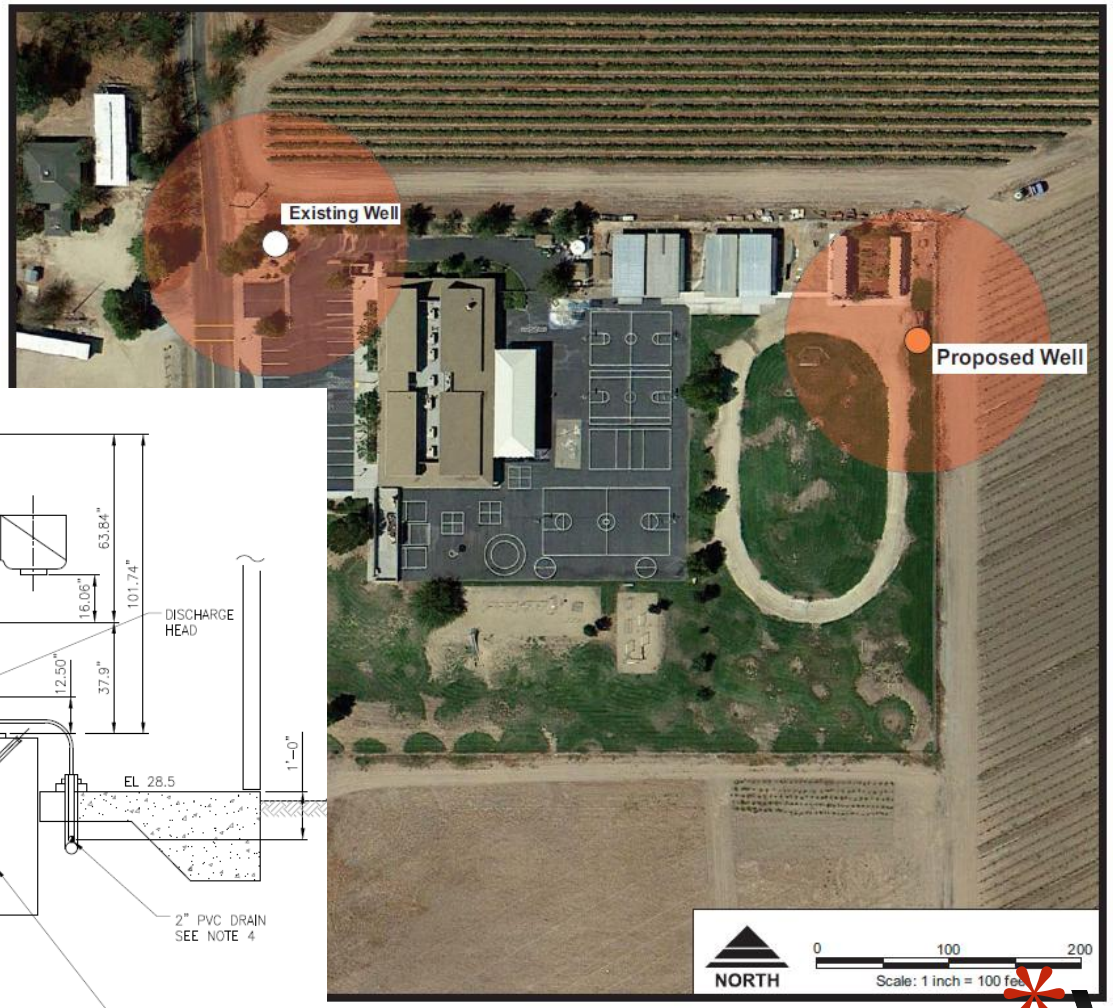


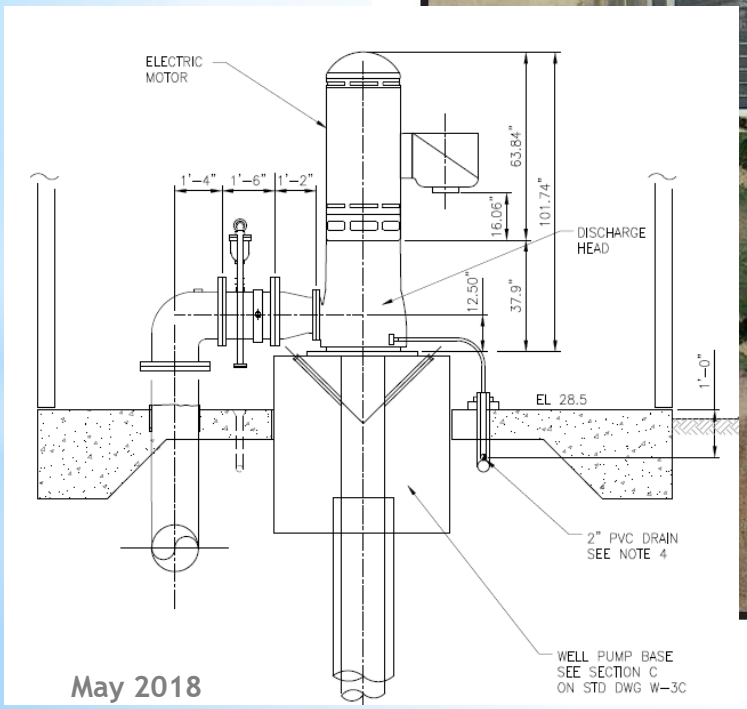
D WELL SITE SECTION

SCALE: 1"=4'-0"

Review Considerations:

* Well sized to serve the demands of the project (Isn't sized / doesn't extend into unserved / future growth areas)

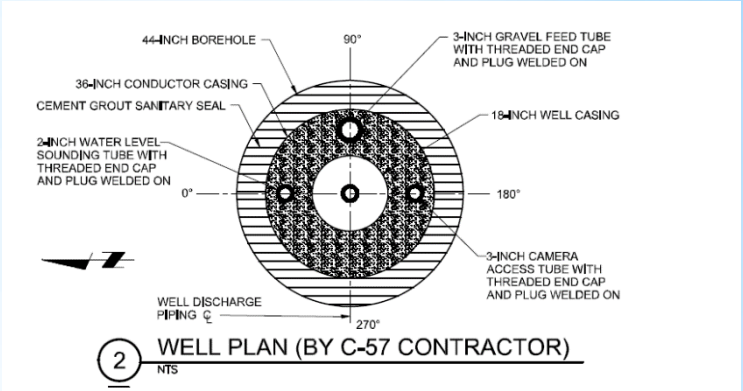


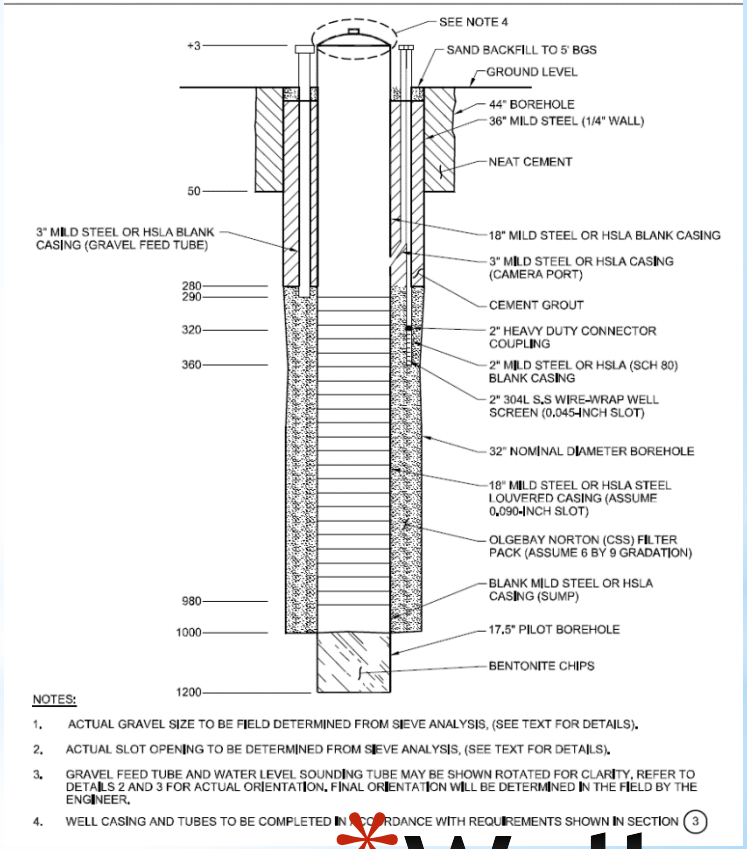


*Wells

Review Considerations:

* Well is located away from non-potable hazards (**Drinking Water Source Assessment and Protection - "TurboSWAP"**):
  * http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/DWSAPGuidance.shtml
* Well is designed in accordance with Department of Water Resources Well Standards:
  * http://www.water.ca.gov/groundwater/wells/standards.cfm
* Two construction/bidding phases:
  * Drilling, testing, and development
  * Well pump equipping





*Wells

WELL DETAILS

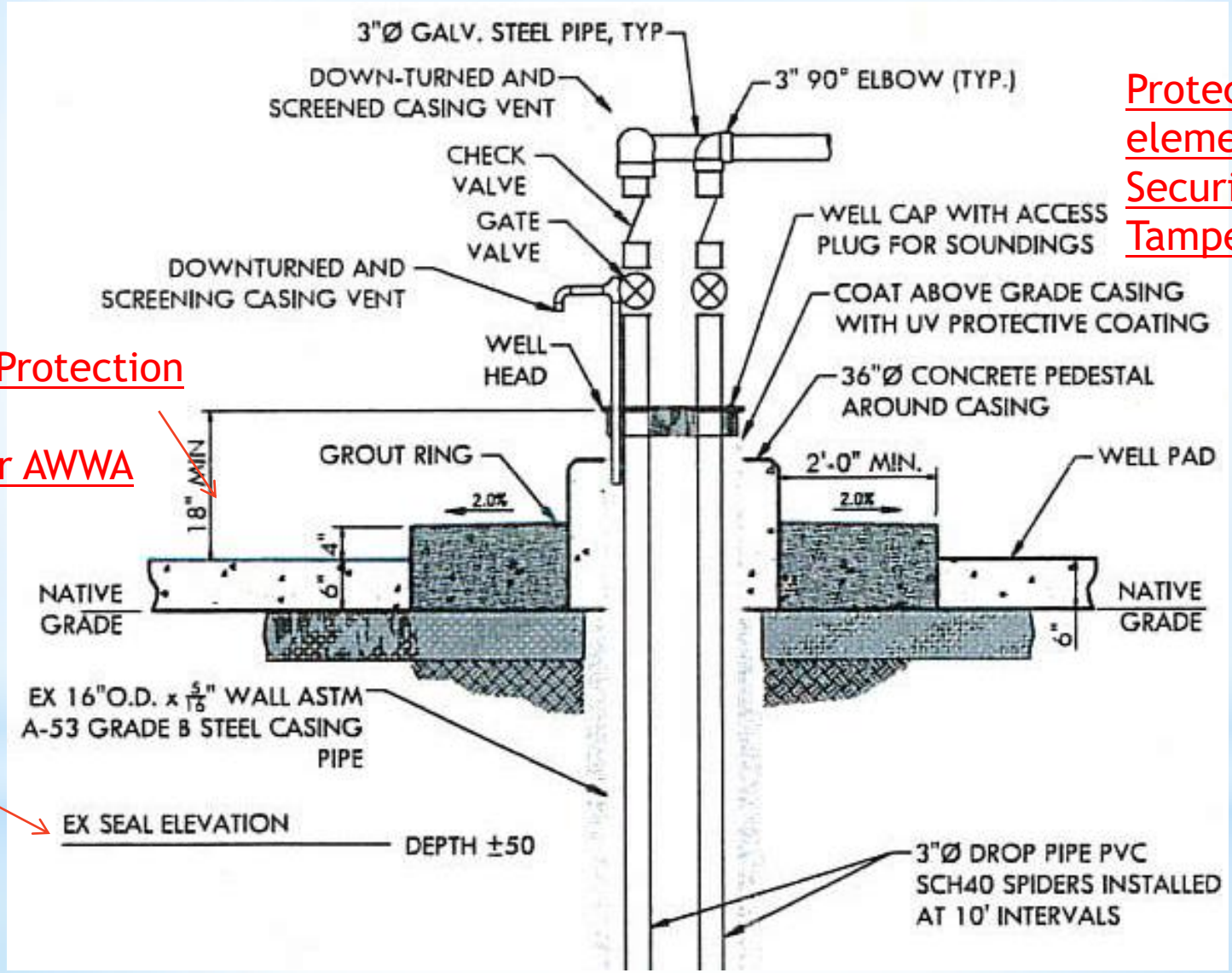
Above grade vs below grade

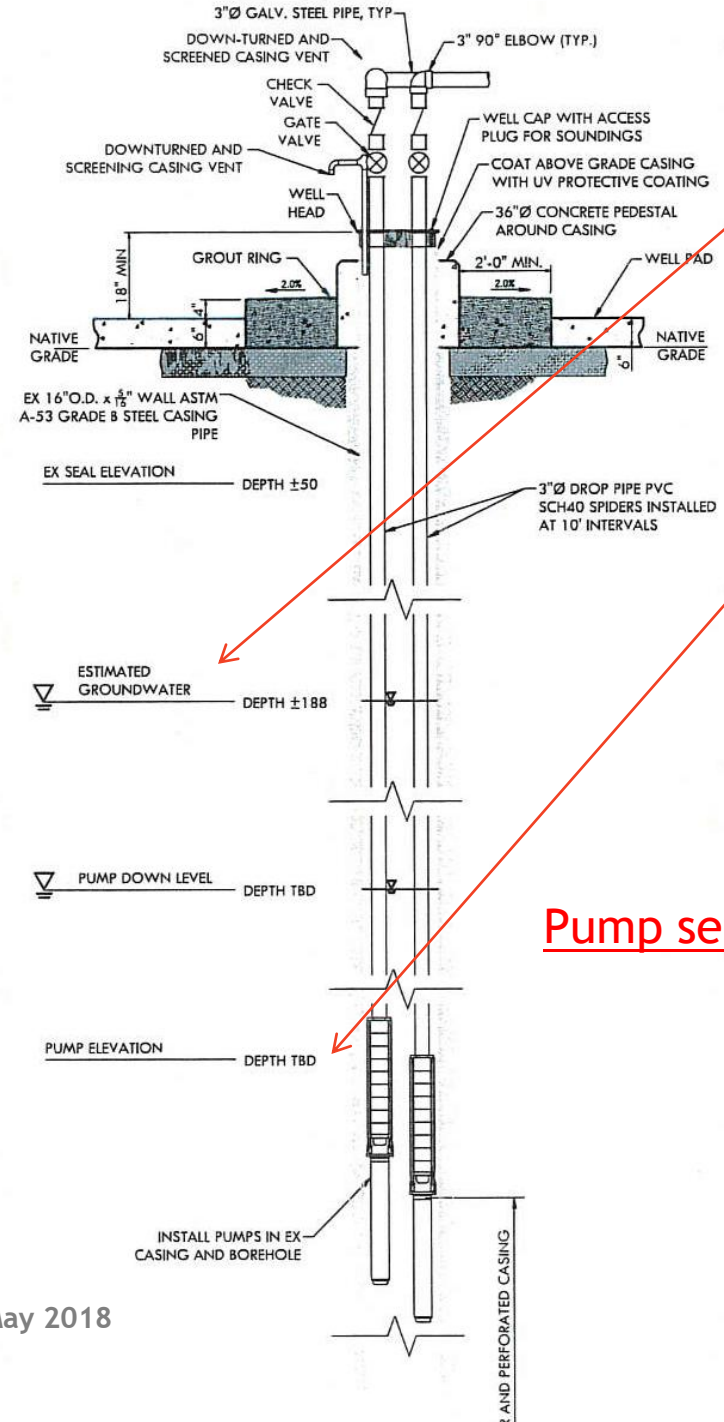
Protection from elements ?
Security / Tampering?

Storm Protection

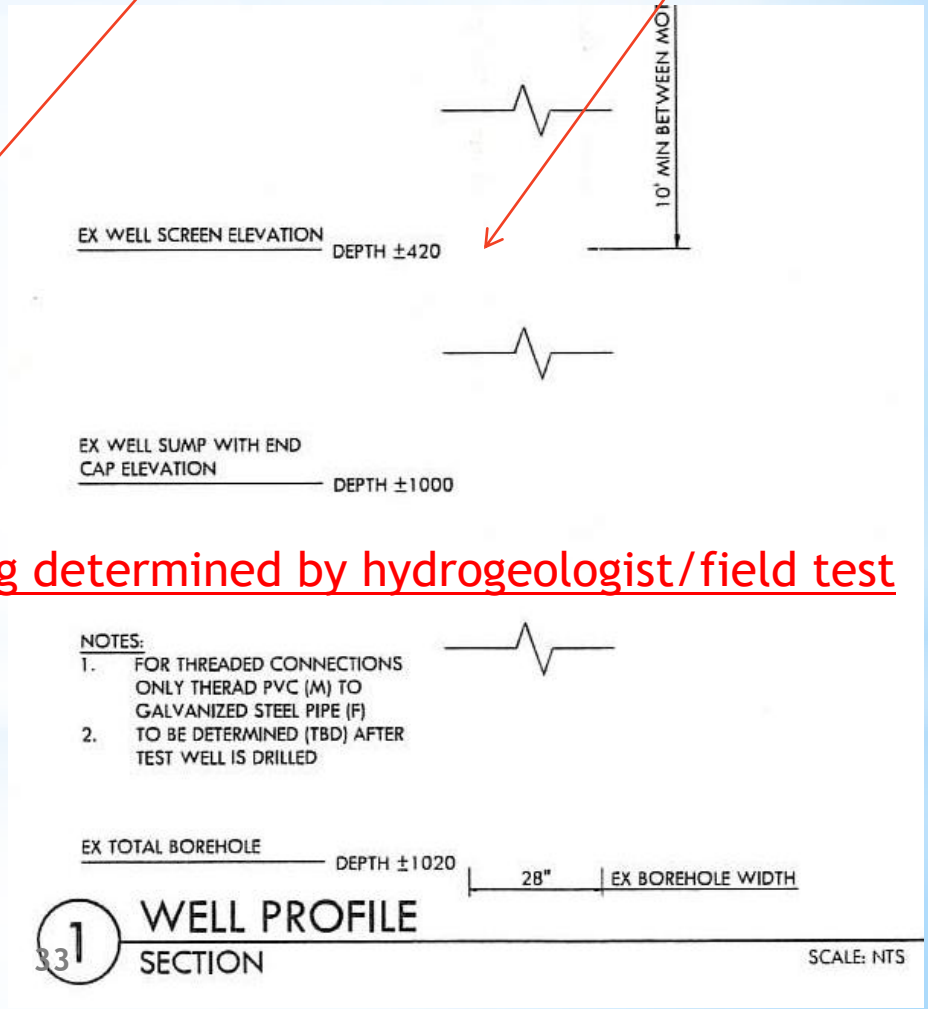
24” per AWWA

50 ft seal





Water elevations, screen locations, and pump settings



Pump setting determined by hydrogeologist/field test

Review Considerations:

- Written specifications are a critically detailed part of the well drilling contract.
- Hydrogeology Casing / Screen:
  - Overall depth and diameter of borehole and casing
  - Casing and screen material chosen based corrosive nature soil and groundwater
    - Mild steel , low carbon steel, stainless steel, PVC
    - Thickness
  - Location of screen intervals based on drilling log / water quality sampling
  - Depth of pump intake determined by hydro-geologist

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Review Considerations:

* Appurtenances:
  * Buildings
  * Pump sized for efficiency at flow-rate and total head
  * Air-release valves with insect screens
  * Isolation / Check valves
  * Sample tap on pump side of check valve
  * Sounding tube
  * Vent tube

* Ground interface:
  * Pump pedestal min 24” above finished grade/100yr flood level (per AWWA)
  * Filter-pack material designed by hydro-geologist
  * Sanitary seal based on min 50 feet or deeper based on SWAP
  * Access and easement for protection/ maintenance

* Installation and testing details:
  * Step tests
  * Well development
  * Flow testing and disinfection
  * Water quality and depth specific sampling
  * Video Survey
  * Alignment survey

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*Wells

Review Considerations:

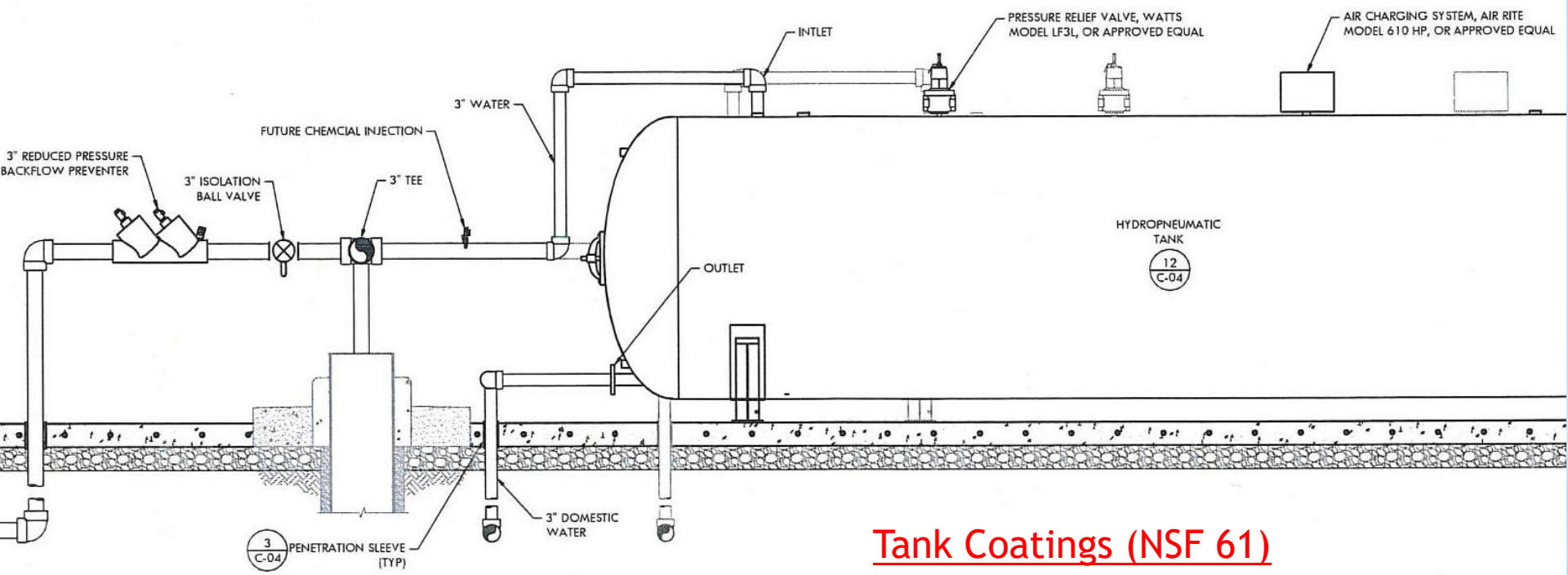
* Best source water possible
  * Test well
  * Zone testing to determine screen intervals

* Well construction:
  * NSF 61 not available on steel casings screens but is for PVC/Fiberglass
  * Bentonite slurry should not be used for seals in the unsaturated zone (above the water table)

Hydro tank / Section

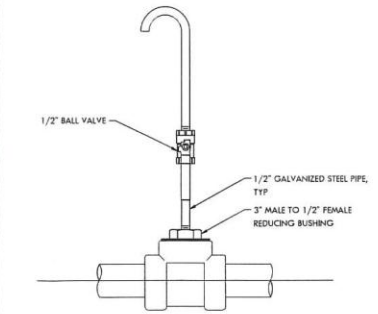
Air compressor

Air Relief Valve



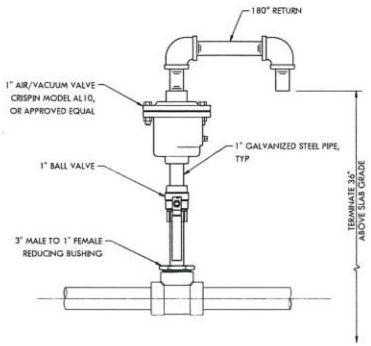
Tank Coatings (NSF 61)

DETAILS



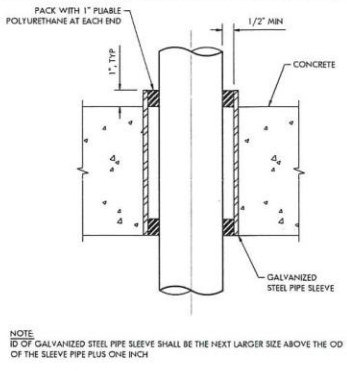
Sample

1 - SAMPLE TAP TYPICAL DETAIL SCALE: NTS

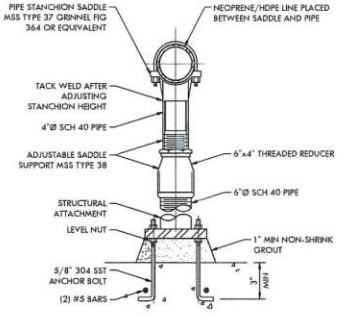


Air Relief

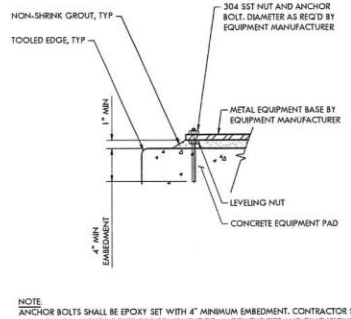
2 - AIR RELEASE VALVE TYPICAL DETAIL SCALE: NTS



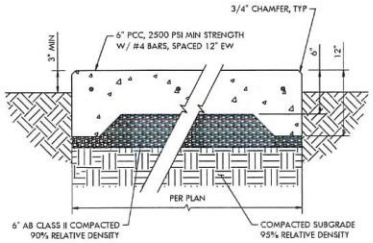
3 - PENETRATION SLEEVE TYPICAL DETAIL SCALE: NTS



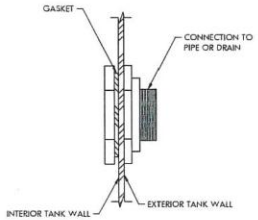
4 - PIPE SUPPORT TYPICAL DETAIL SCALE: NTS



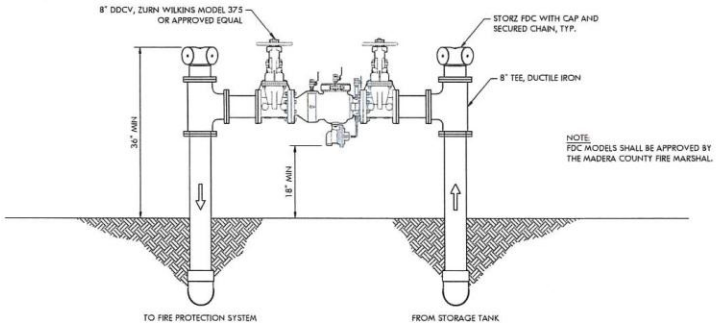
5 - EQUIPMENT ANCHOR TYPICAL DETAIL SCALE: NTS



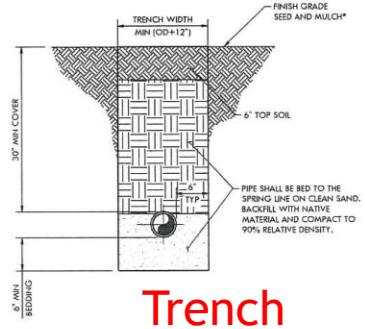
6 - EQUIPMENT PAD TYPICAL DETAIL SCALE: NTS



7 - BULKHEAD FITTING TYPICAL DETAIL SCALE: NTS



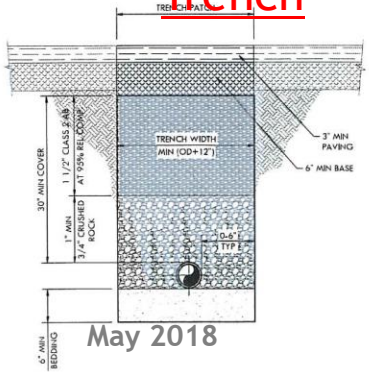
8 - FIRE DEPARTMENT CONNECTION TYPICAL DETAIL SCALE: NTS



Trench

9 C-02 PIPE IN TRENCH TYPICAL DETAIL SCALE: NTS

Trench



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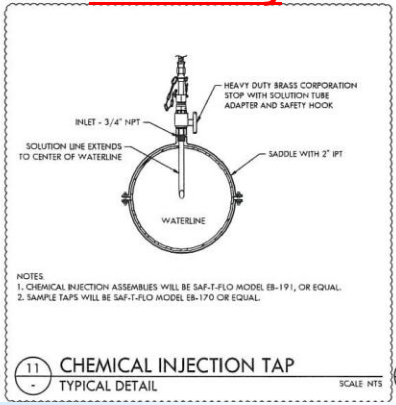
10 - PIPE IN TRENCH - PAVED AREAS TYPICAL DETAIL SCALE: NTS

Chem Inj



11 - CHEMICAL INJECTION TAP TYPICAL DETAIL SCALE: NTS

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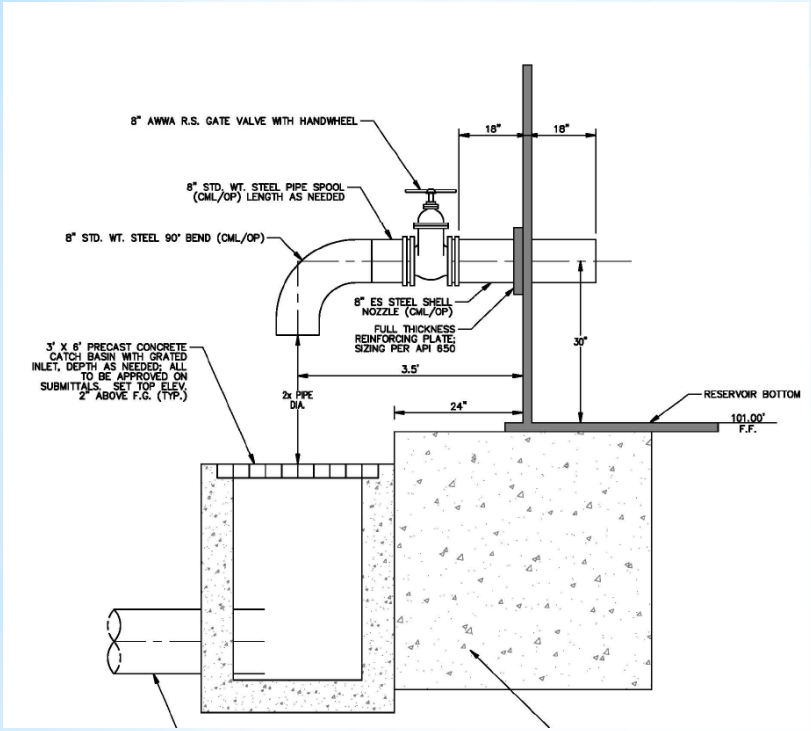
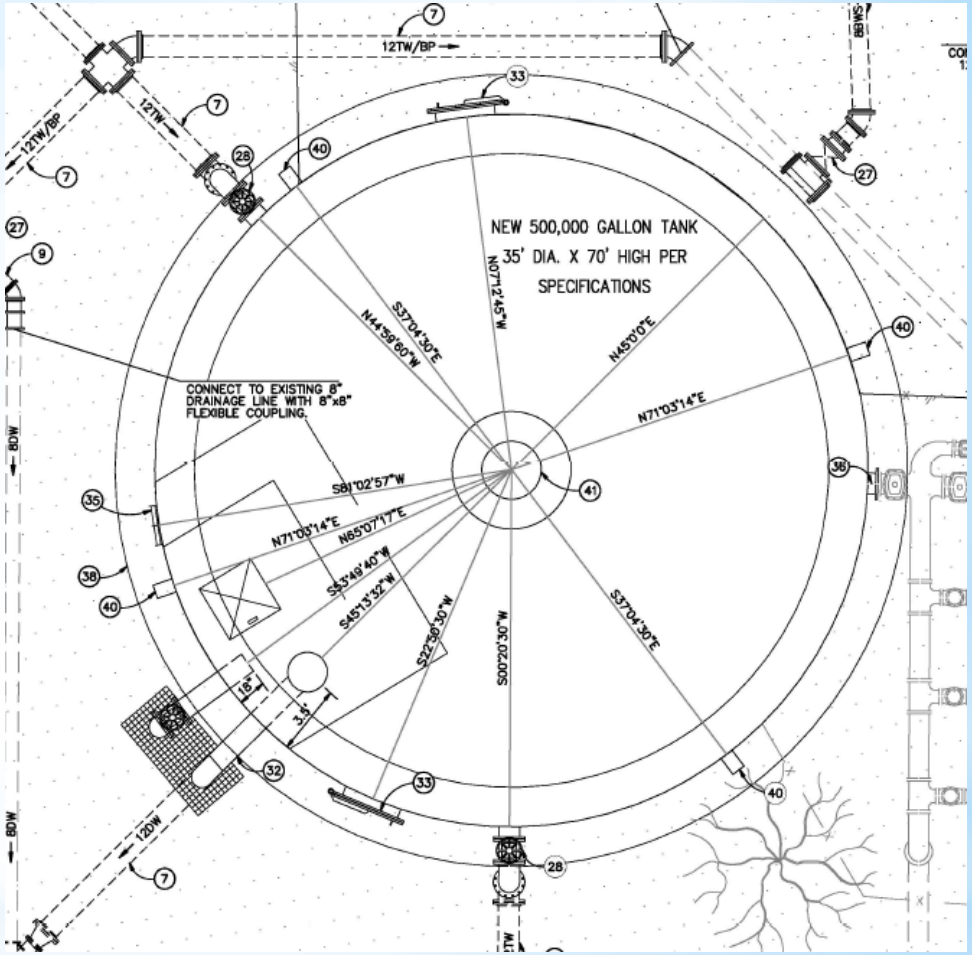
12 - HYDROPNEUMATIC TANK TYPICAL DETAIL 1"=1'-0"

Review Considerations:

* Reservoir sized to serve the demands of the project including reasonable fire flow of the service area (Isn't sized / doesn't extend into unserved / future growth areas)





Appurtenances:

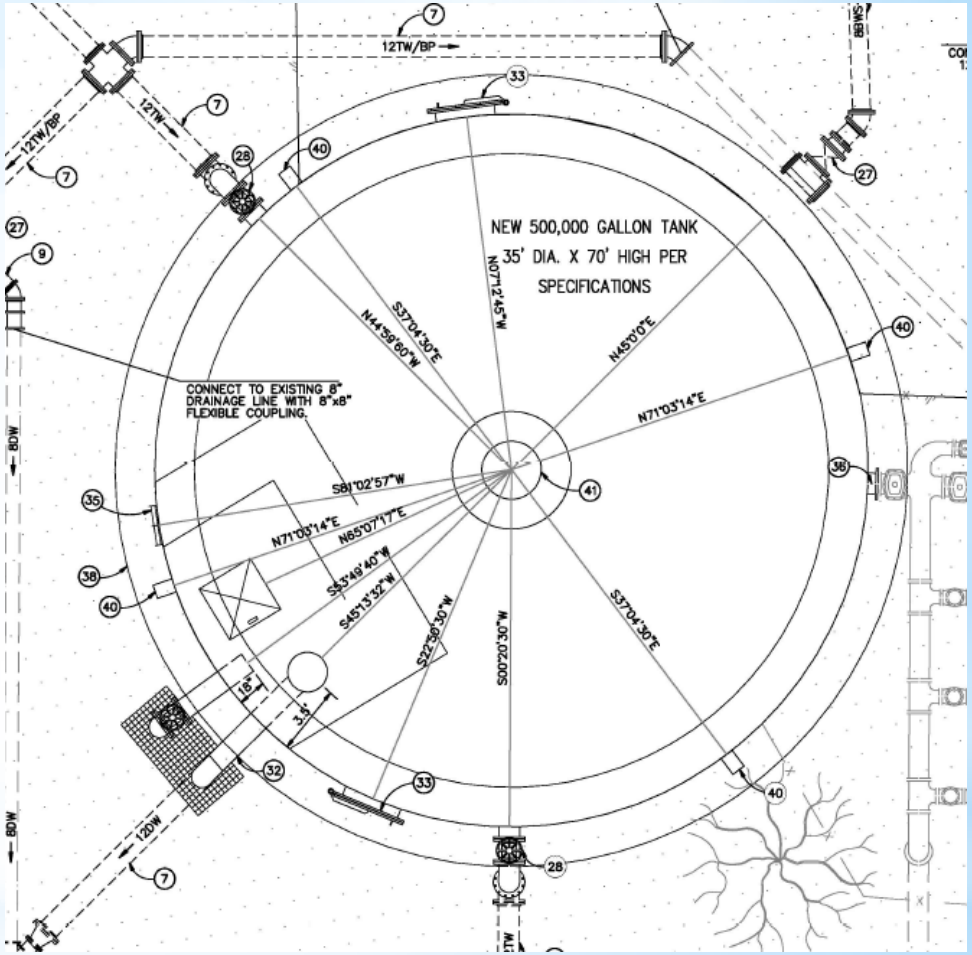
* Air gap for drain and overflow
* Bird and insect resistant screens on vents
* Roof access and hatches
* Manway openings
* Inlet and outlet lines on opposite sides of tank to promote mixing

Review Considerations:

* Rectangular concrete reservoirs are ubiquitous, but no AWWA standard exists.
  * Leaking is a common problem
  * Epoxy sealing of cracks and an proven concrete mix and pouring schedule is critical

* Concrete for reservoirs should be NSF certified
  * http://ca-nv-awwa.org/CANV/downloads/2015/NSF.pdf

* Refer to waterwork standards for appurtenances on all types of reservoirs:
  * https://govt.westlaw.com/calregs/Document/IF8D4898B53D54FC18675CE26453F89DD
  * Site security
  * Adequate water proofing and drainage for buried tanks

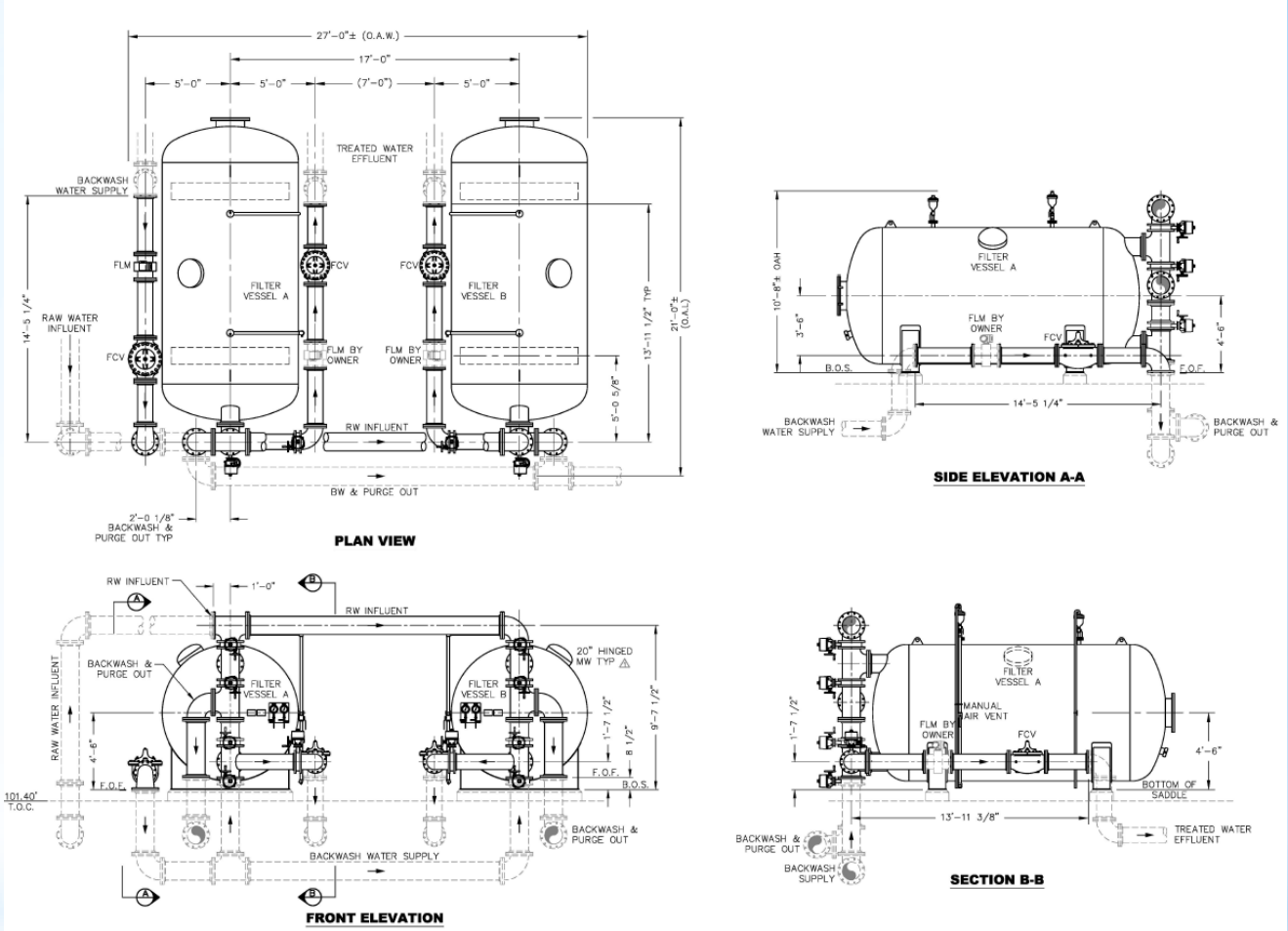


*Reservoir

*Treatment Vessels

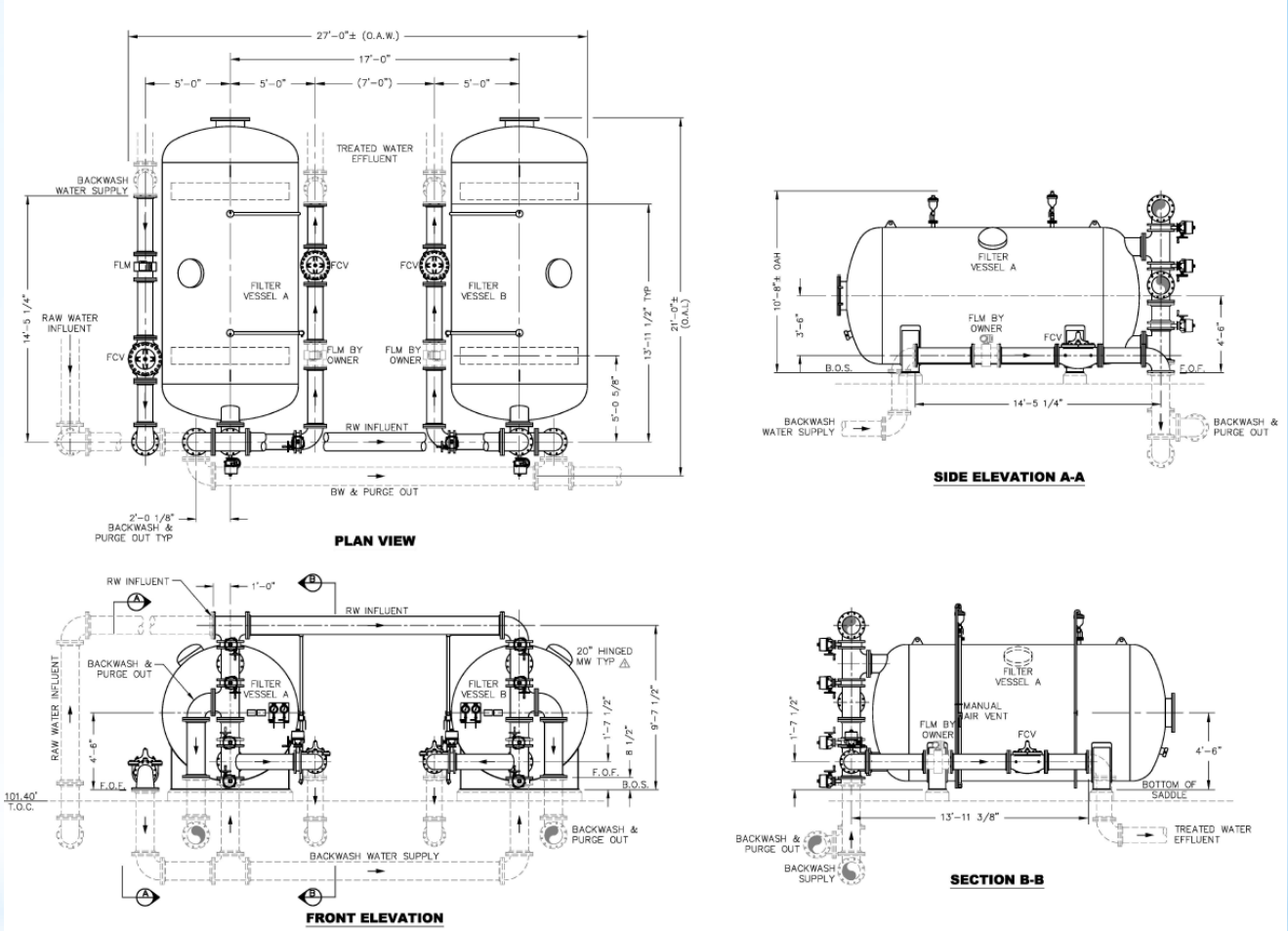
Review Considerations:

* Treatment sized for max flow-rate approved in preliminary engineering and as recommended by treatment technology vendor
* Source water conditions
* Water quality sampling ports
* Redundant / lead and lag design typically
* Operationally flexible piping layout design
* Storage reservoir sized to allow proper run times and minimize backwash cycles
* Waste handling is critical
* Treatment chemical dosage storage and sizing between deliveries and to protect against aging
* Access for maintenance and media change-out



Review Considerations:

* See P&ID
* Pretreatment
* Reduced source capacity when pumping through treatment trains



*Treatment Vessels

* Separation of Water Mains and Non-Potable Pipelines

  - Requests for Alternatives to the Waterworks Standards

§64551.100. Waivers and Alternatives.

- *(a) A water* system *that proposes to use an alternative to a requirement in this chapter shall:*
  - *(1) Demonstrate to the State Board that the proposed alternative would provide at least the* same *level of protection to public health; and*
  - *(2) Obtain written approval from the State Board prior to implementation of the alternative.*

Main Separation

Main Separation

* The water system must accept responsibility for the adequacy of the proposed alternative. The Division may require a written statement, signed by the water system's management, certifying that the proposed alternative adequately protects public health.

* In most circumstances, the Division cannot offer technical assistance with pipeline or infrastructure design. The water system proposing an alternative must demonstrate adequate expertise on the part of its own personnel or its hired consultants.

Main Separation

* The water system should describe how the proposed alternative provides at least the same level of protection to public health as the minimum separation distances prescribed in the regulation.

* While exorbitant cost may present a hardship in meeting the regulatory separation requirements and can be considered, public health must be prioritized above construction costs in determining an acceptable alternative.

* (new pipes in new area should meet standard)

Checklist:

- ensure that the Division has sufficient information to evaluate the proposal
- may also be used to provide written certification that the proposed alternative adequately protects public health

Main Separation

Main Separation

- Upgraded Materials:
  - pipe or construction materials that meet higher standards (thickness, pressure rating, corrosion resistance, pipe/joint stability, flexibility, compaction, resilience, etc.) than what would normally be used if the regulatory separation requirements could be met.

Main Separation

* CONTINUOUS SLEEVE :
  * A protective tube of high-density-polyethylene (HDPE), PVC pipe, metallic or other casing with fully welded or heat fused joints into which a fluid-carrying pipe is inserted for protection. Other forms of encasement may also be considered.

General Considerations:

- Identify soil/field conditions or potential failure modes which increase the risk of pipeline failure during utility repair and construction encroachment.
- Water systems and the water industry have well-established, proven standards for pipelines constructed within their service area. Start there.
- Pressure test
- Corrosion protection
- Minimum cover
- Maximize joint lengts
- Increase protection when conditions drop below standards

*Questions?

Overview

Result:

- Demonstrate to stakeholders / permitting agencies a clearly defined project
- Maximize likelihood that contractor provides intended components for the job and end user at a competitive price
- Minimize change orders, scope, budget, and schedule creep
  - Minimize contractor, shortcuts, assumptions, and errors in bidding
  - Minimize contractor disputes and field changes