GRAFTON WATER DISTRICT

GRAFTON, MASSACHUSETTS
TRINITY AVENUE PUMP STATION

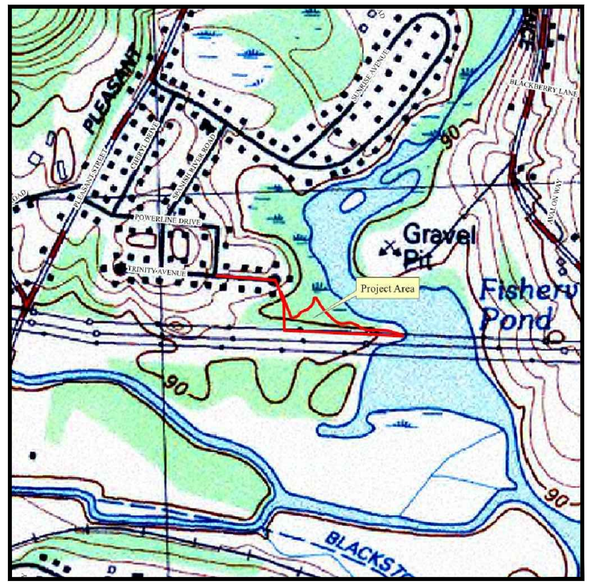
CONTRACT NO. 2

WATER COMMISSIONERS

ROBERT FREDERICO, CHAIRMAN
MICHAEL CORDA
KENNETH GREW

SYSTEM MANAGER

MATTHEW PEARSON



LOCUS MAP

TATA & HOWARD

MARCH 2016

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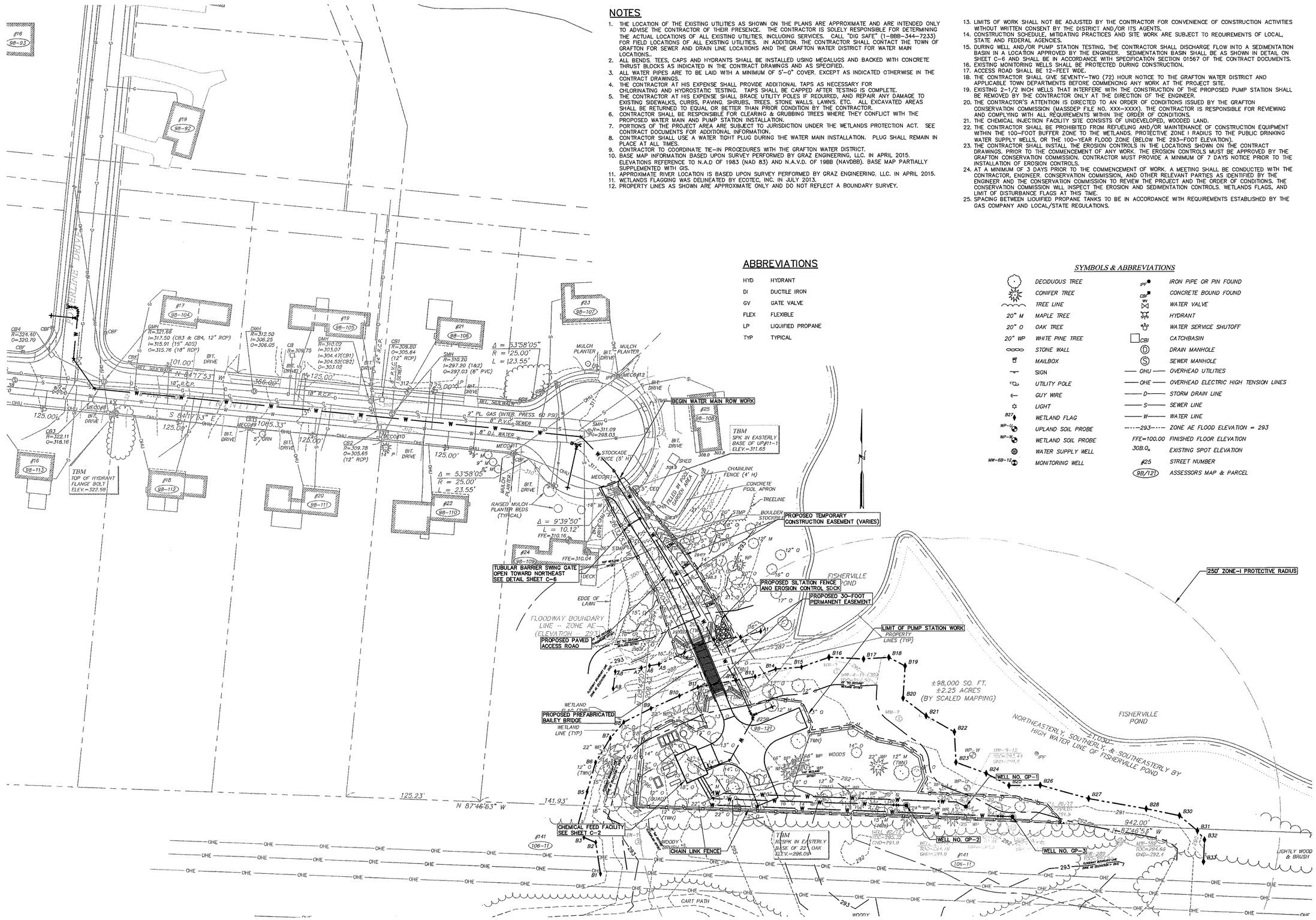
Marlborough, MA



NOTES

1. THE LOCATION OF THE EXISTING UTILITIES AS SHOWN ON THE PLANS ARE APPROXIMATE AND ARE INTENDED ONLY TO ADVISE THE CONTRACTOR OF THEIR PRESENCE. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING THE ACTUAL LOCATIONS OF ALL EXISTING UTILITIES, INCLUDING SERVICES. CALL "DIG SAFE" (1-888-344-7233) FOR FIELD LOCATIONS OF ALL EXISTING UTILITIES. IN ADDITION, THE CONTRACTOR SHALL CONTACT THE TOWN OF GRAFTON FOR SEWER AND DRAIN LINE LOCATIONS AND THE GRAFTON WATER DISTRICT FOR WATER MAIN LOCATIONS..
2. ALL BENDS, TEES, CAPS AND HYDRANTS SHALL BE INSTALLED USING MEGALUGS AND BACKED WITH CONCRETE THRUST BLOCKS AS INDICATED IN THE CONTRACT DRAWINGS AND AS SPECIFIED.
3. ALL WATER PIPES ARE TO BE LAID WITH A MINIMUM OF 5'-0" COVER, EXCEPT AS INDICATED OTHERWISE IN THE CONTRACT DRAWINGS.
4. THE CONTRACTOR AT HIS EXPENSE SHALL PROVIDE ADDITIONAL TAPS AS NECESSARY FOR CHLORINATING AND HYDROSTATIC TESTING. TAPS SHALL BE CAPPED AFTER TESTING IS COMPLETE.
5. THE CONTRACTOR AT HIS EXPENSE SHALL BRACE UTILITY POLES IF REQUIRED, AND REPAIR ANY DAMAGE TO EXISTING SIDEWALKS, CURBS, PAVING, SHRUBS, TREES, STONE WALLS, LAWNS, ETC. ALL EXCAVATED AREAS SHALL BE RETURNED TO EQUAL OR BETTER THAN PRIOR CONDITION BY THE CONTRACTOR.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR CLEARING & GRUBBING TREES WHERE THEY CONFLICT WITH THE PROPOSED WATER MAIN AND PUMP STATION INSTALLATION.
7. PORTIONS OF THE PROJECT AREA ARE SUBJECT TO JURISDICTION UNDER THE WETLANDS PROTECTION ACT. SEE CONTRACT DOCUMENTS FOR ADDITIONAL INFORMATION.
8. CONTRACTOR SHALL USE A WATER TIGHT PLUG DURING THE WATER MAIN INSTALLATION. PLUG SHALL REMAIN IN PLACE AT ALL TIMES.
9. CONTRACTOR TO COORDINATE TIE-IN PROCEDURES WITH THE GRAFTON WATER DISTRICT.
10. BASE MAP INFORMATION BASED UPON SURVEY PERFORMED BY GRAZ ENGINEERING, LLC. IN APRIL 2015. ELEVATIONS REFERENCE TO N.A.D OF 1983 (NAD 83) AND N.A.V.D. OF 1988 (NAVD88). BASE MAP PARTIALLY SUPPLEMENTED WITH GIS.
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13. LIMITS OF WORK SHALL NOT BE ADJUSTED BY THE CONTRACTOR FOR CONVENIENCE OF CONSTRUCTION ACTIVITIES WITHOUT WRITTEN CONSENT BY THE DISTRICT AND/OR ITS AGENTS.
14. CONSTRUCTION SCHEDULE, MITIGATING PRACTICES AND SITE WORK ARE SUBJECT TO REQUIREMENTS OF LOCAL, STATE AND FEDERAL AGENCIES.
15. DURING WELL AND/OR PUMP STATION TESTING, THE CONTRACTOR SHALL DISCHARGE FLOW INTO A SEDIMENTATION BASIN IN A LOCATION APPROVED BY THE ENGINEER. SEDIMENTATION BASIN SHALL BE AS SHOWN IN DETAIL ON SHEET C-6 AND SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 01567 OF THE CONTRACT DOCUMENTS.
16. EXISTING MONITORING WELLS SHALL BE PROTECTED DURING CONSTRUCTION.
17. ACCESS ROAD SHALL BE 12-FEET WIDE.
18. THE CONTRACTOR SHALL GIVE SEVENTY-TWO (72) HOUR NOTICE TO THE GRAFTON WATER DISTRICT AND APPLICABLE TOWN DEPARTMENTS BEFORE COMMENCING ANY WORK AT THE PROJECT SITE.
19. EXISTING 2-1/2 INCH WELLS THAT INTERFERE WITH THE CONSTRUCTION OF THE PROPOSED PUMP STATION SHALL BE REMOVED BY THE CONTRACTOR ONLY AT THE DIRECTION OF THE ENGINEER.
20. THE CONTRACTOR'S ATTENTION IS DIRECTED TO AN ORDER OF CONDITIONS ISSUED BY THE GRAFTON CONSERVATION COMMISSION (MASSDEP FILE NO. XXX-XXXX). THE CONTRACTOR IS RESPONSIBLE FOR REVIEWING AND COMPLYING WITH ALL REQUIREMENTS WITHIN THE ORDER OF CONDITIONS.
21. THE CHEMICAL INJECTION FACILITY SITE CONSISTS OF UNDEVELOPED, WOODED LAND.
22. THE CONTRACTOR SHALL BE PROHIBITED FROM REFUELING AND/OR MAINTENANCE OF CONSTRUCTION EQUIPMENT WITHIN THE 100-FOOT BUFFER ZONE TO THE WETLANDS, PROTECTIVE ZONE I RADIUS TO THE PUBLIC DRINKING WATER SUPPLY WELLS, OR THE 100-YEAR FLOOD ZONE (BELOW THE 293-FOOT ELEVATION).
23. THE CONTRACTOR SHALL INSTALL THE EROSION CONTROLS IN THE LOCATIONS SHOWN ON THE CONTRACT DRAWINGS. PRIOR TO THE COMMENCEMENT OF ANY WORK, THE EROSION CONTROLS MUST BE APPROVED BY THE GRAFTON CONSERVATION COMMISSION. CONTRACTOR MUST PROVIDE A MINIMUM OF 7 DAYS NOTICE PRIOR TO THE INSTALLATION OF EROSION CONTROLS.
24. AT A MINIMUM OF 3 DAYS PRIOR TO THE COMMENCEMENT OF WORK, A MEETING SHALL BE CONDUCTED WITH THE CONTRACTOR, ENGINEER, CONSERVATION COMMISSION, AND OTHER RELEVANT PARTIES AS IDENTIFIED BY THE ENGINEER AND THE CONSERVATION COMMISSION TO REVIEW THE PROJECT AND THE ORDER OF CONDITIONS. THE CONSERVATION COMMISSION WILL INSPECT THE EROSION AND SEDIMENTATION CONTROLS, WETLANDS FLAGS, AND LIMIT OF DISTURBANCE FLAGS AT THIS TIME.
25. SPACING BETWEEN LIQUIFIED PROPANE TANKS TO BE IN ACCORDANCE WITH REQUIREMENTS ESTABLISHED BY THE GAS COMPANY AND LOCAL/STATE REGULATIONS.

ABBREVIATIONS

HYD	HYDRANT
DI	DUCTILE IRON
GV	GATE VALVE
FLEX	FLEXIBLE
LP	LIQUIFIED PROPANE
TYP	TYPICAL

SYMBOLS & ABBREVIATIONS

	DECIDUOUS TREE	IPF	IRON PIPE OR PIN FOUND
	CONIFER TREE	CBF	CONCRETE BOUND FOUND
	TREE LINE		WATER VALVE
20" M	MAPLE TREE		HYDRANT
20" O	OAK TREE		WATER SERVICE SHUTOFF
20" WP	WHITE PINE TREE	CBI	CATCHBASIN
	STONE WALL	D	DRAIN MANHOLE
	MAILBOX	S	SEWER MANHOLE
	SIGN	OHU	OVERHEAD UTILITIES
	UTILITY POLE	OHE	OVERHEAD ELECTRIC HIGH TENSION LINES
	GUY WIRE	D	STORM DRAIN LINE
	LIGHT	S	SEWER LINE
B27	WETLAND FLAG	W	WATER LINE
WP-U	UPLAND SOIL PROBE	293	ZONE AE FLOOD ELEVATION = 293
WP-W	WETLAND SOIL PROBE	FFE=100.00	FINISHED FLOOR ELEVATION
	WATER SUPPLY WELL	30B.O.	EXISTING SPOT ELEVATION
MW-6B-12	MONITORING WELL	#25	STREET NUMBER
		98/121	ASSESSORS MAP & PARCEL

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

Drawn By: BLC | Designed By: MSB | Checked By: PBH | Approved By: KLG

SITE PLAN

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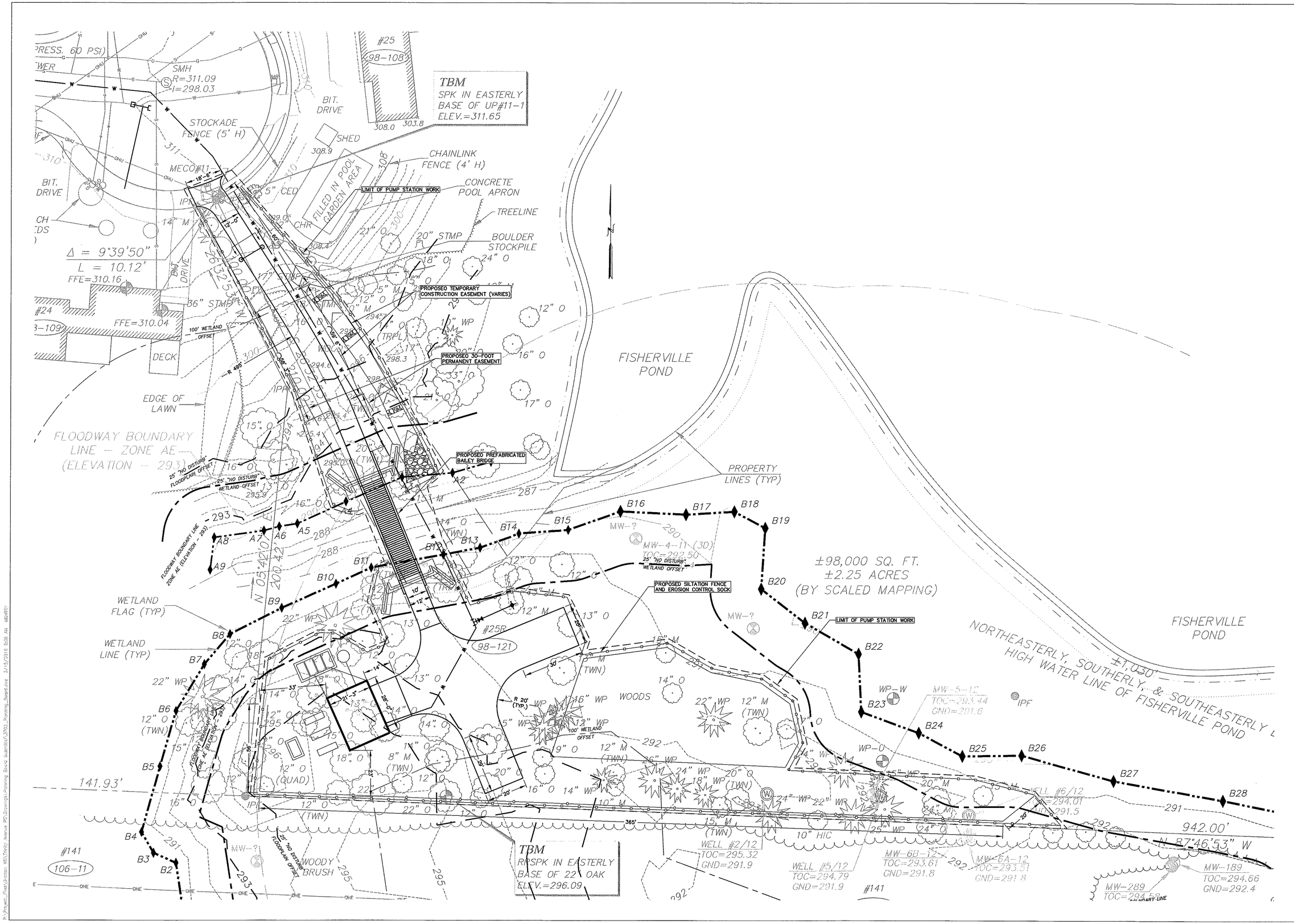
Rev.	Description	Date
	Planning Board Submittal	3/15/16

KIMBALL GANLEY III No. 48368 — COMMONWEALTH OF MASSACHUSETTS — REGISTERED PROFESSIONAL ENGINEER — 3-15-16

TATA & HOWARD

T&H ND.: 3703
DATE: MARCH 2016
SCALE: 1" = 40'

C-1



GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE
PUMP STATION

SITE LAYOUT

Drawn By: BLC | Designed By: MSB | Checked By: PBH | Approved By: KLG

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Rev.	Date	Description
	3/15/16	Planning Board Submittal

MARSHAL H. WOOD CIVIL No. 40389 COMMONWEALTH OF MASSACHUSETTS

3/15/16

TATA & HOWARD

T&H NO.: 3703
DATE: MARCH 2016
SCALE: 1" = 20'

C-2

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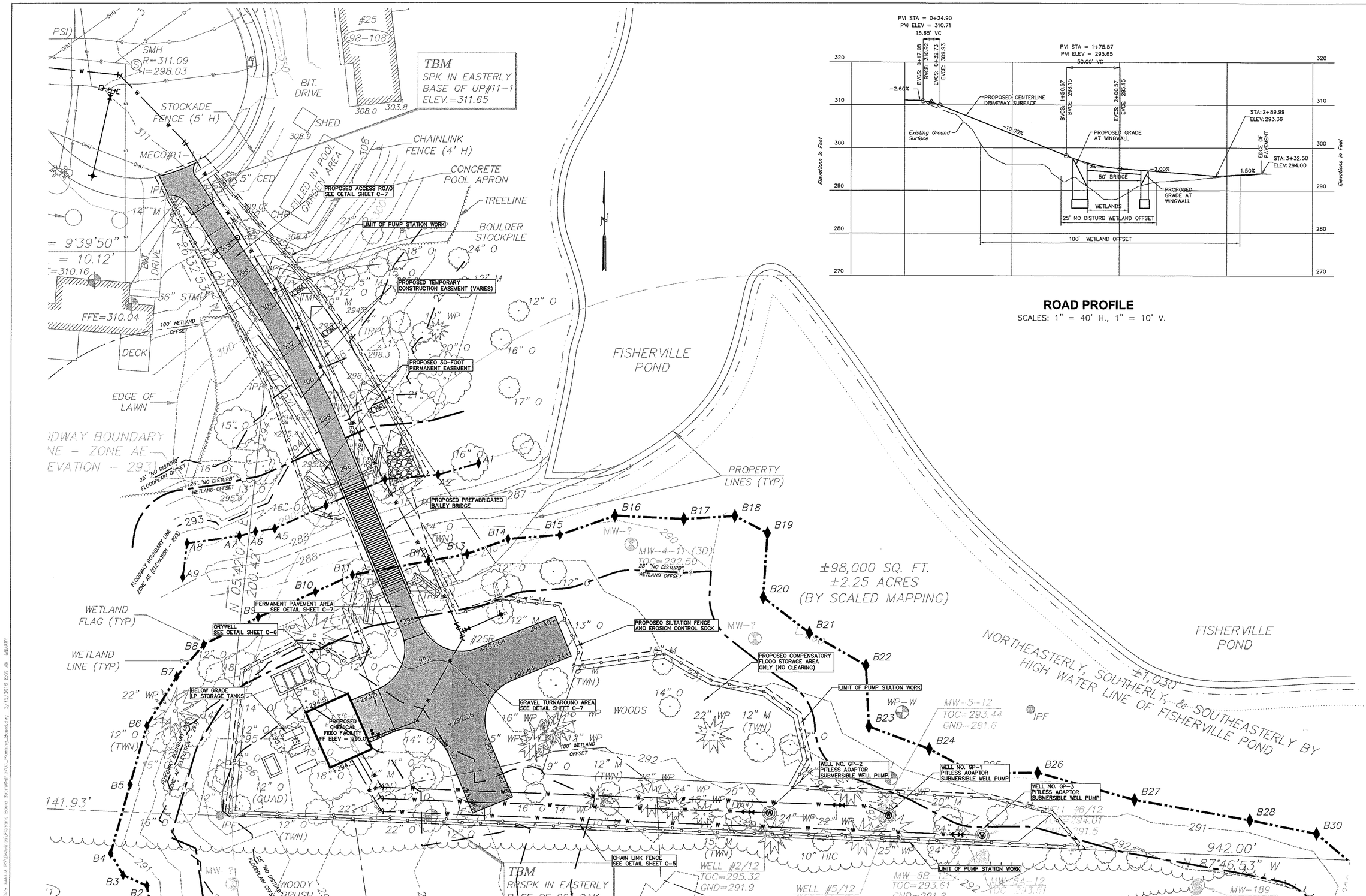

GRADING PLAN
SCALE 1" = 20'

ROAD PROFILE
SCALES: 1" = 40' H., 1" = 10' V.

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

Drawn By: MSB | Designed By: CDH | Checked By: PBH | Approved By: KLG

GRADING PLAN

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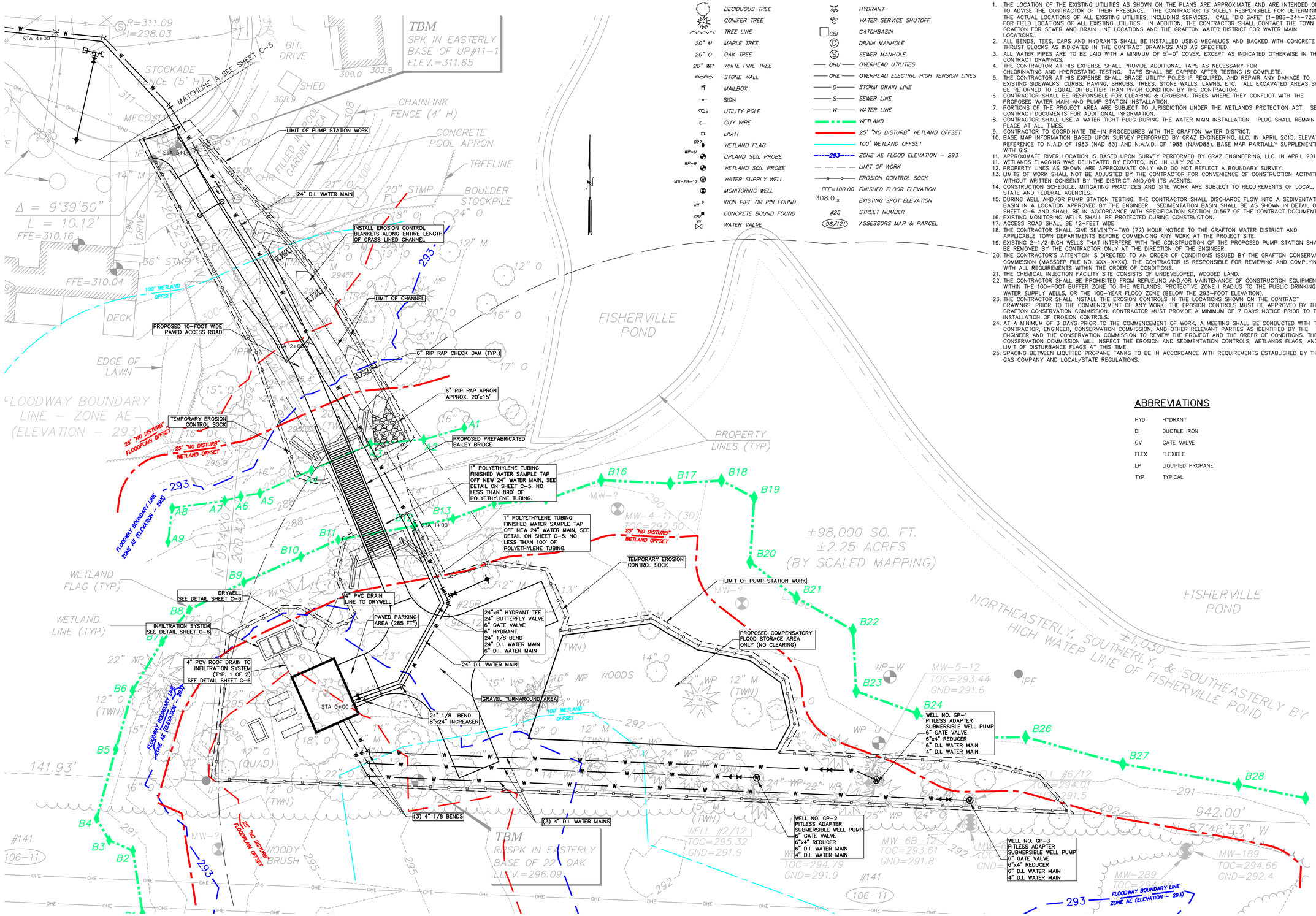
Rev.	Date	Description
	3/15/16	Planning Board Submittal

MARIEL C. CHACKO No. 40025 COMMONWEALTH OF MASSACHUSETTS
5-19-16

TATA & HOWARD

T&H NO.: 3703
DATE: MARCH 2016
SCALE: AS NOTED

C-3



TRINITY AVENUE STA. 0+00 TO STA. 3+25

SCALE: 1" = 20'

SYMBOLS & ABBREVIATIONS

	DECIDUOUS TREE		HYDRANT
	CONIFER TREE		WATER SERVICE SHUTOFF
	TREE LINE	CBI	CATCHBASIN
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	GUY WIRE		WETLAND
	LIGHT		25' "NO DISTURB" WETLAND OFFSET
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LP	LIQUIFIED PROPANE
TYP	TYPICAL

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE PUMP STATION

UTILITY PLAN 1

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Rev.	Date	Description
	3/15/16	Planning Board Submittal

Drawn By: BLC | Designed By: MSB | Checked By: PBH | Approved By: KLG

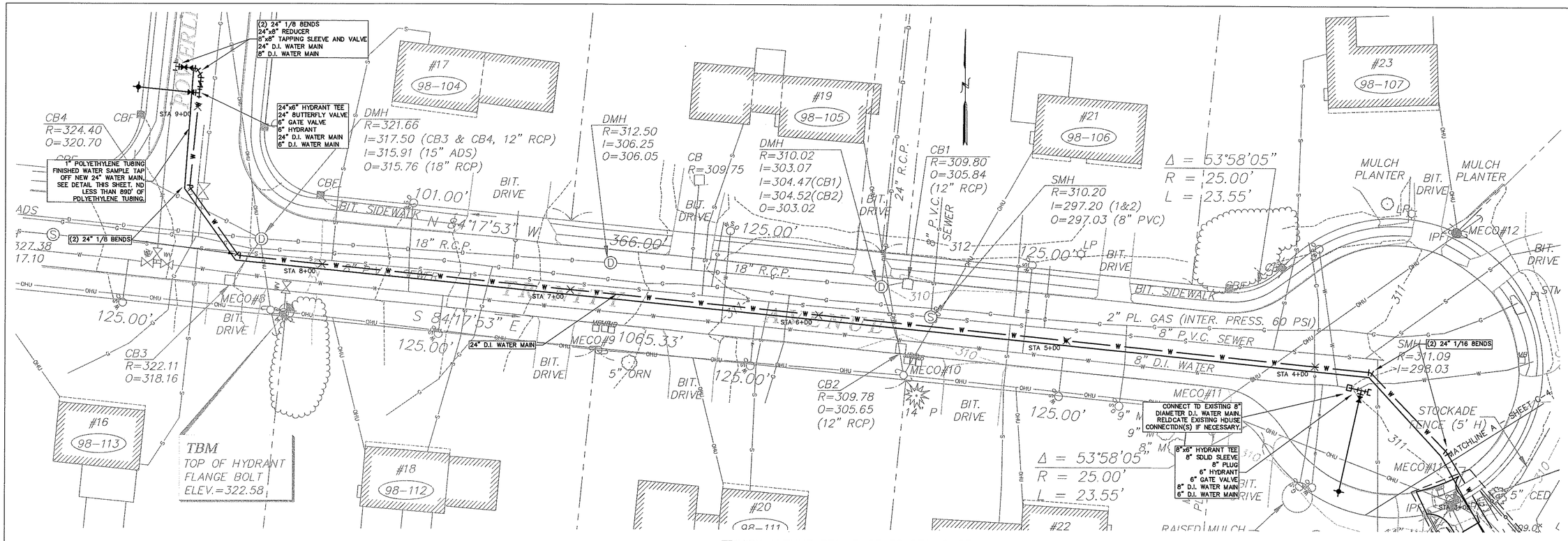
COMMONWEALTH OF MASSACHUSETTS
KATHY L. KIRWIN
CIVIL
No. 45644
REGISTERED PROFESSIONAL ENGINEER
3-15-16

TATA & HOWARD

T&H NO.: 3703
DATE: MARCH 2016
SCALE: 1" = 20'

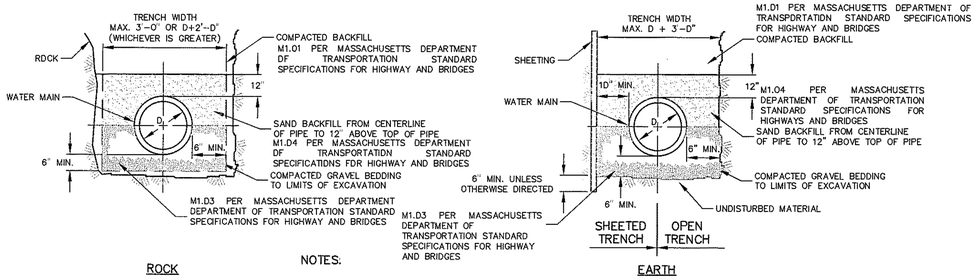
C-4

P:\Project_Files\Grafton WD\Trinity Avenue PS\Drawings\Planning Board Submittal\3703_Planning_Board.dwg 3/15/2016 9:03 AM MBARRY



TRINITY AVENUE STA. 3+25 TO STA. 9+25

SCALE: 1" = 20'

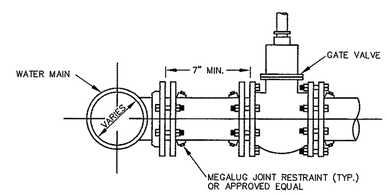


NOTES:

1. CONTRACTOR SHALL MAINTAIN A MINIMUM COVER OF 5'-0" FROM THE TOP OF PIPE.

TYPICAL WATER MAIN TRENCH SECTIONS

SCALE: NONE

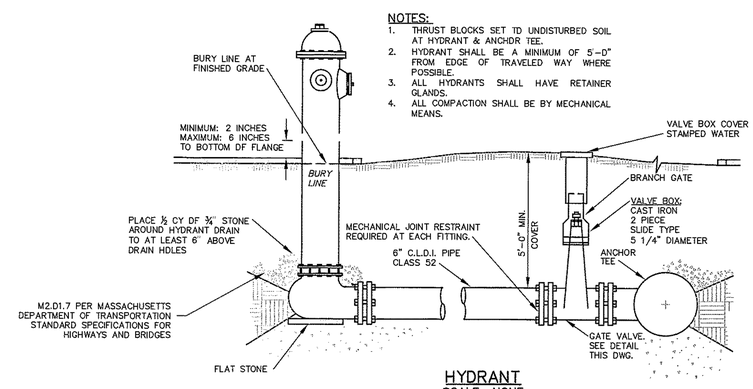


MECHANICAL JOINT RESTRAINT

SCALE: NONE

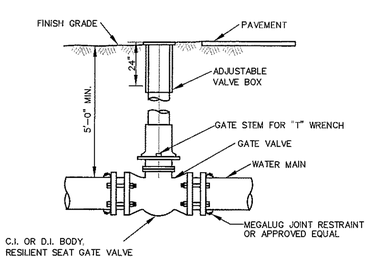
NOTES:

1. THRUST BLOCKS SET TO UNDISTURBED SOIL AT HYDRANT & ANCHOR TEE.
2. HYDRANT SHALL BE A MINIMUM OF 5'-0" FROM EDGE OF TRAVELED WAY WHERE POSSIBLE.
3. ALL HYDRANTS SHALL HAVE RETAINER GLANDS.
4. ALL COMPACTION SHALL BE BY MECHANICAL MEANS.



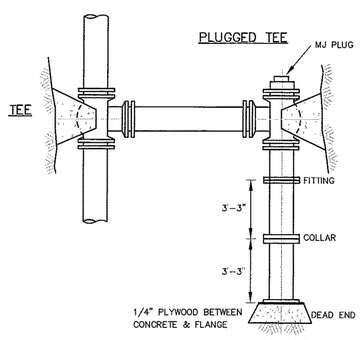
HYDRANT

SCALE: NONE

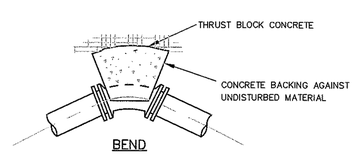


GATE VALVE

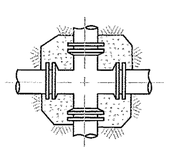
SCALE: NONE



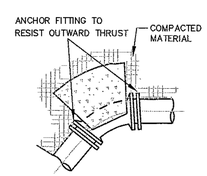
END CAP



BEND



CROSS



VERTICAL BEND

NOTES:

1. CONCRETE SHALL BE 3,000 PSI MINIMUM AT 28 DAYS.
2. THRUST BLOCKS SHALL BE PLACED AGAINST UNDISTURBED EARTH WHENEVER POSSIBLE.
3. ALL FITTINGS SHALL BE SUPPORTED IN CONCRETE.
4. FOR FIRE HYDRANT THRUSTING SEE HYDRANT DETAIL.
5. POURED CONCRETE NOT TO COME WITHIN 6" OF MECHANICAL JOINTS.

AREA OF BEARING FACE OF CONCRETE THRUST BLOCKS IN SQUARE FEET
Based on 250 P.S.I. & 1.5 ton/s.f. allowable soil bearing capacity

PIPE SIZE IN.	1/4 BEND	1/8 BEND	1/16 BEND	PLUG & TEES
4,6,8	6.0	2.9	2.3	4.5
12	13.3	6.7	3.7	9.6

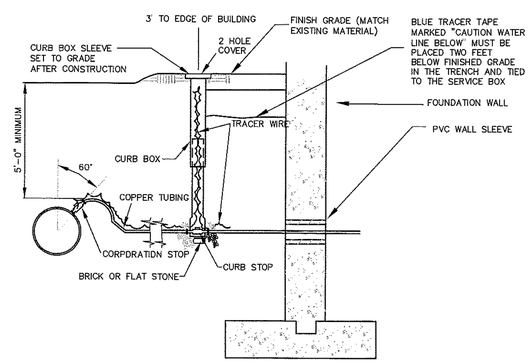
MINIMUM LENGTH OF PIPE TO BE RESTRAINED IN THE REQUIRED DIRECTION (IN FEET)
Based on Ductile Iron Pipe with a 150 PSI Test Pressure with 5.0 feet of Bury in Unified Soil Classification SM.

PIPE SIZE IN.	1/4 BEND	1/8 BEND	1/16 BEND	TEES*	PLUG/CAP
6	16.0	7.0	3.0	29.0	29.0
12	33.0	14.0	6.0	48.0	69.0

(*) Lengths shown are for the Tee Branch. The required length of restraint for the Tee Run is 18 feet.

CONCRETE BACKING

SCALE: NONE



SERVICE/SAMPLE CONNECTION

SCALE: NONE

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

Drawn By: BLC | Designed By: MSB | Checked By: PBH | Approved By: KLG

UTILITY PLAN 2

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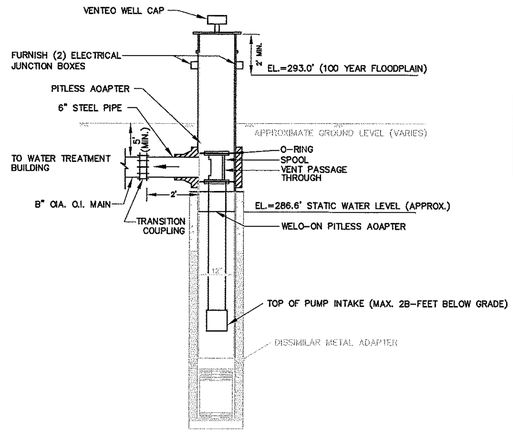
Rev.	Date	Description
	3/15/16	Planning Board Submittal

COMMONWEALTH OF MASSACHUSETTS — KARRELL GERICKE DUNLAP No. 40503 — PROFESSIONAL ENGINEER — 3/15/16

TATA & HOWARD

T&H NO.: 3703
DATE: MARCH 2016
SCALE: 1" = 20'

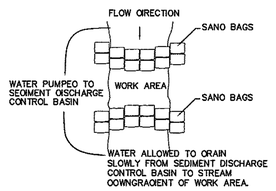
C-5



WELL NO.	WELL DEPTH (FEET)	SCREEN LENGTH (FEET)
GP-1	37'	6'
GP-2	39'	6'
GP-3	36'	5'

NOTE:
1. SEE SPECIFICATION SECTIONS 11216 AND 131DD FOR ADDITIONAL INFORMATION.

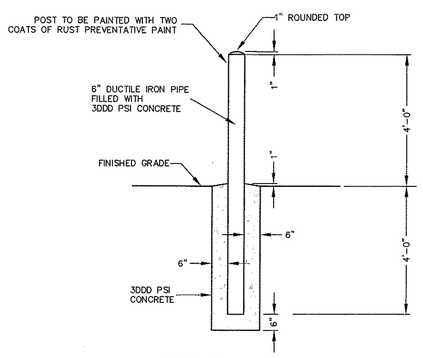
GRAVEL PACKED WELL WITH PITLESS ADAPTER
SCALE: NONE



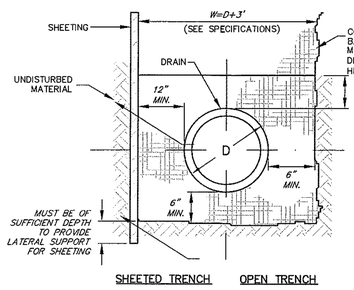
PLAN

SECTION

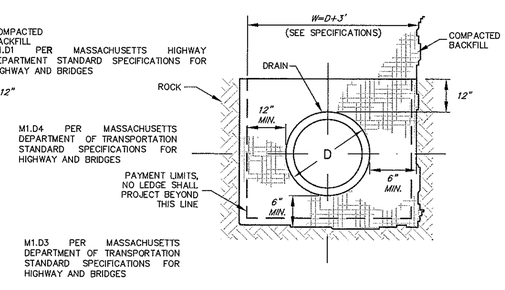
TYPICAL COFFERDAM
N.T.S.



BOLLARD DETAIL
SCALE: NONE

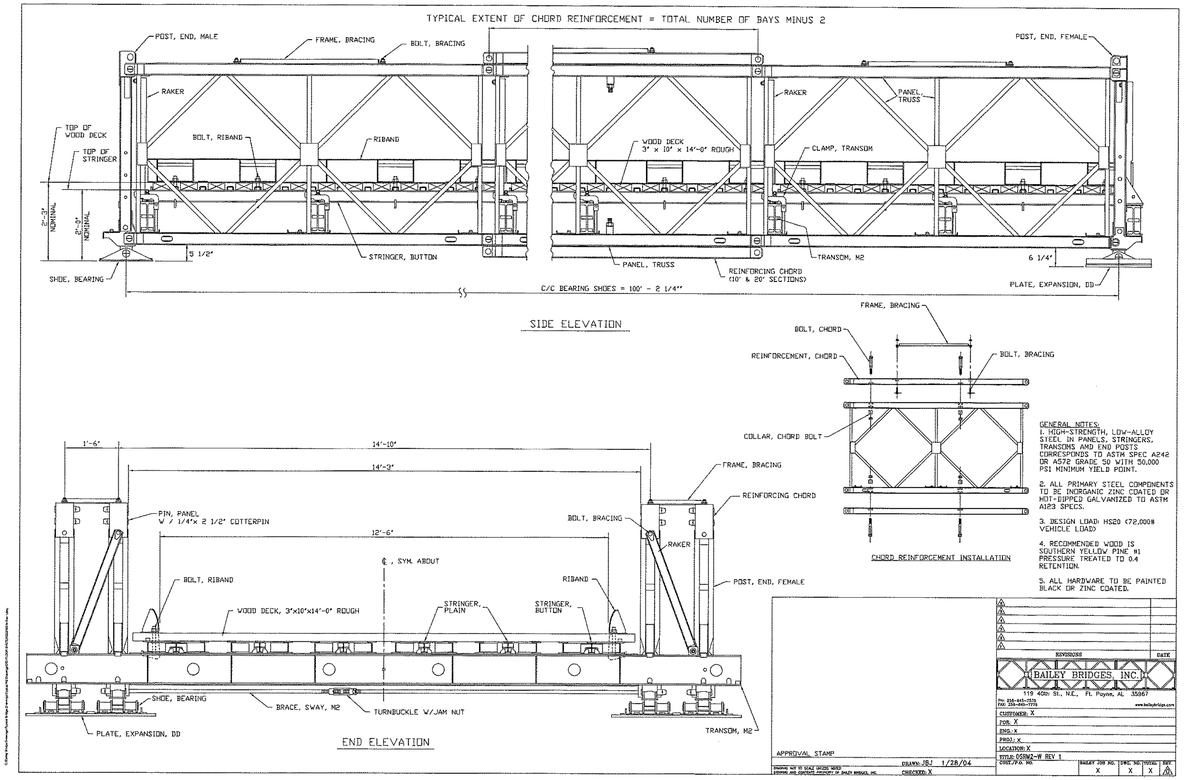


EARTH



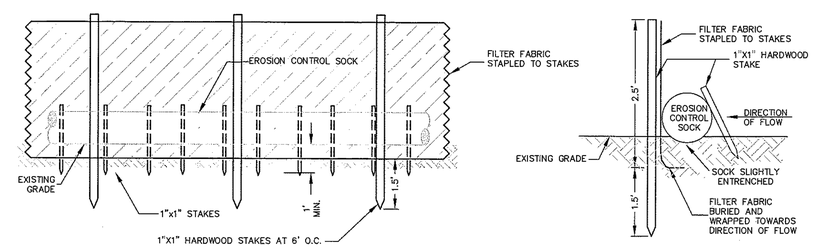
ROCK

PVC DRAINAGE LINE TRENCH SECTIONS
SCALE: NONE

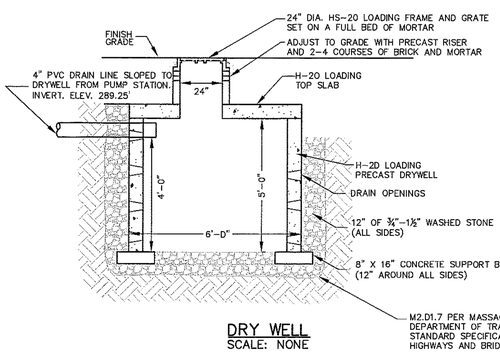


BAILEY BRIDGE
SCALE: NONE

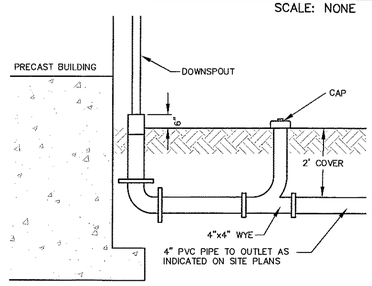
NOTES:
1. BARBWIRE ARM BLADES ON FENCE WILL BE VERTICAL FOR ENTIRE LENGTH OF CANTILEVER GATE
2. ALL GATES ARE WELD CONSTRUCTION



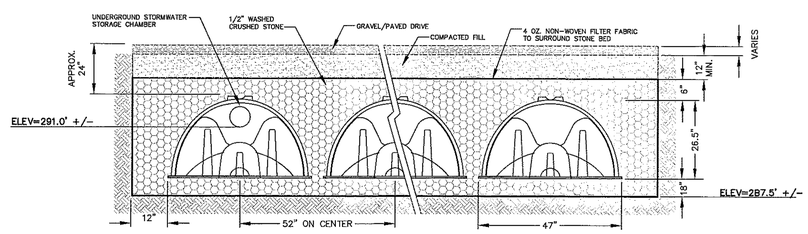
EROSION CONTROLS
SCALE: NONE



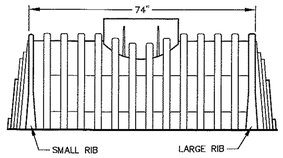
DRY WELL
SCALE: NONE



ROOF DRAIN
SCALE: NONE



UNDERGROUND DRAINAGE BASIN
SCALE: NONE



UNDERGROUND DRAINAGE BASIN
SCALE: NONE

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE PUMP STATION

DETAILS 1

Drawn By: BLC | Designed By: MSB | Checked By: PBH | Approved By: KLG

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Rev.	Description	Date
	Planning Board Submittal	3/15/16

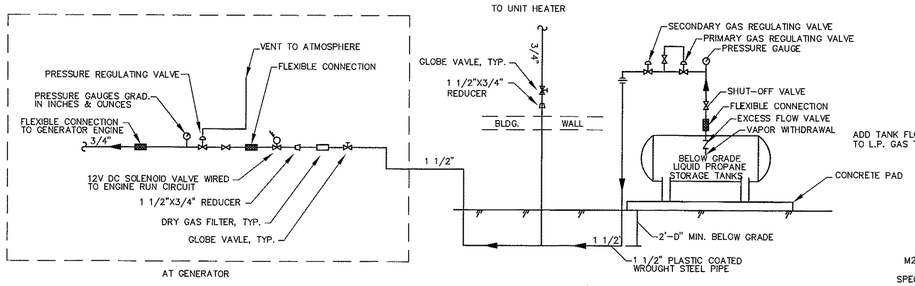
COMMONWEALTH OF MASSACHUSETTS
MICHAEL SHAUN MCGRATH
No. 49804
REGISTERED PROFESSIONAL ENGINEER
3/15/16

TATA & HOWARD

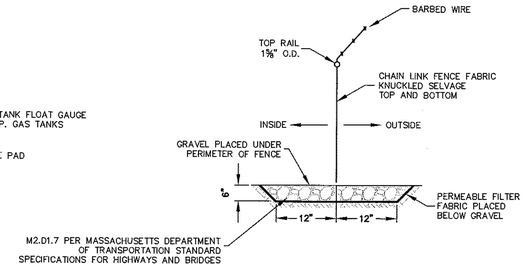
T&H NO.: 3703
DATE: MARCH 2016
SCALE: AS NOTED

C-6

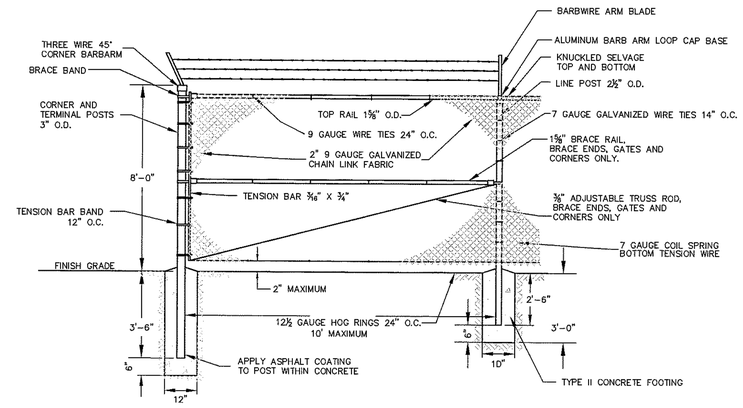
P:\Project_Files\Station 103\Trinity avenue PS\Drawings\Planning Board Submittal\3703_Planning_Board.dwg 3/15/2016 2:14 AM MSBARRY



LPG SYSTEM SCHEMATIC
SCALE: NONE

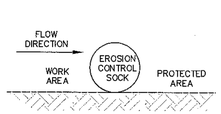


FENCE GRAVEL UNDERLAY
SCALE: NONE

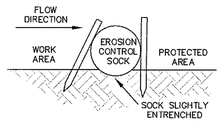


NOTES:
1. SEE SPECIFICATION FOR CHAIN LINK FENCE COATING AND COLOR.

CHAIN LINK FENCE WITH BARBED WIRE
SCALE: NONE



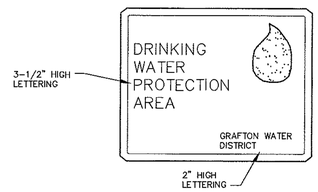
CONVENTIONAL INSTALLATION



STAKED INSTALLATION

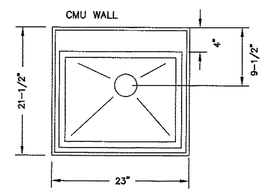
NOTES:
1. SOCK INSTALLED IN VEGETATED AREAS AND IN AREAS WITH MINIMAL SLOPES AND A LOW RISK OF RUNOFF SHALL BE CONVENTIONAL INSTALLATION.
2. SOCKS INSTALLED IN AREAS WITH A MODERATE RISK OF RUNOFF AND MODERATE SLOPES SHALL BE INSTALLED WITH A SLIGHT ENTRENCHMENT WITH NO STAKING.
3. SOCKS INSTALLED IN AREAS WITH A HIGH RISK OF RUNOFF OR STEEP SLOPES SHALL BE INSTALLED WITH ENTRENCHMENT AND STAKING.
4. FINAL INSTALLATION TECHNIQUES SHALL BE AS RECOMMENDED BY THE MANUFACTURER AND AS DIRECTED BY THE ENGINEER.

EROSION CONTROL SOCK
SCALE: NONE



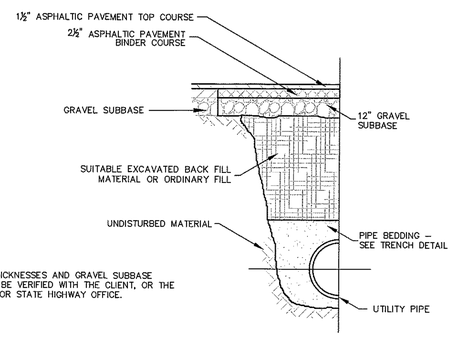
DRINKING WATER PROTECTION AREA SIGN (TYP. OF 2)
SCALE: NONE

NOTE: COLORS TO BE APPROVED BY OWNER/ENGINEER



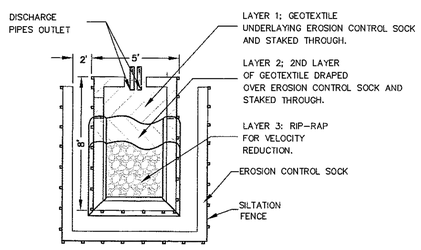
SAMPLE SINK
SCALE: NONE

NOTE:
1. SEE PLUMBING DRAWINGS FOR ADDITIONAL REGARDING SAMPLE SINK AND ANALYZER.



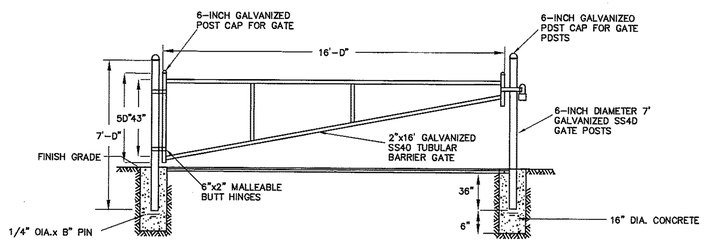
NOTES:
1. ALL PAVEMENT THICKNESSES AND GRAVEL SUBBASE THICKNESSES SHALL BE VERIFIED WITH THE CLIENT, OR THE APPROPRIATE TOWN OR STATE HIGHWAY OFFICE.

ACCESS ROAD SECTION "A"
SCALE: NONE

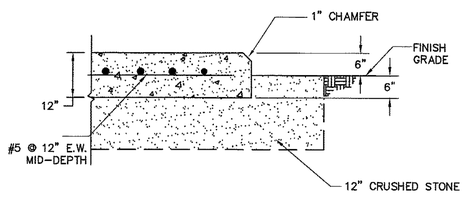


PLAN

SEDIMENTATION DISCHARGE CONTROL
SCALE: NONE

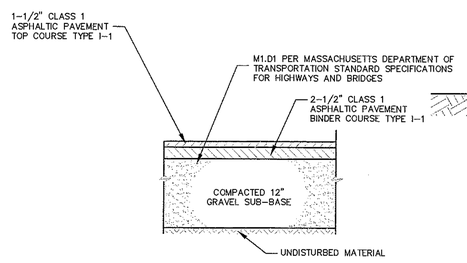


TUBULAR BARRIER GATE DETAIL
SCALE: NONE

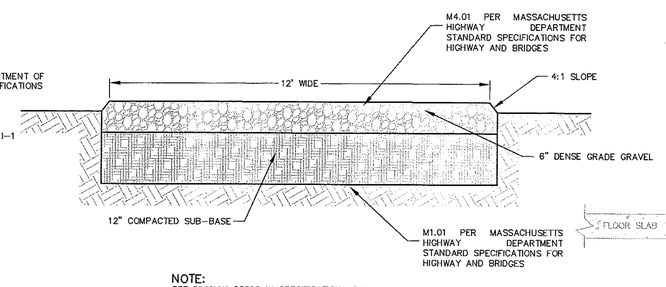


L.P. TANK CONCRETE PAD DETAIL
SCALE: NONE

NOTE: PAD DETAIL AND PAD DIMENSIONS TO BE APPROVED BY THE PROPANE SUPPLIER.

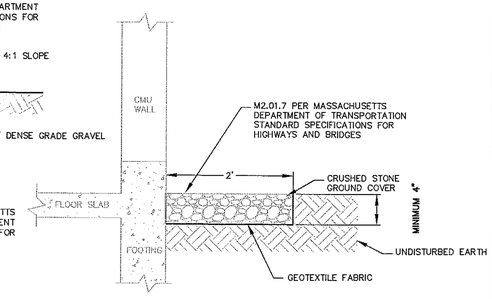


ASPHALTIC PAVEMENT SECTION
SCALE: NONE



NOTE:
SEE DIVISION 022D0 IN SPECIFICATIONS FOR GRADATION REQUIREMENTS

GRAVEL ACCESS ROAD
SCALE: NONE



2-FOOT WIDE STONE DRY STRIP
SCALE: NONE

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

DETAILS 2

Rev.	Date	Description
	3/15/16	Planning Board Submittal

Drawn By: BLC | Designed By: MSB | Checked By: PBH | Approved By: KLG

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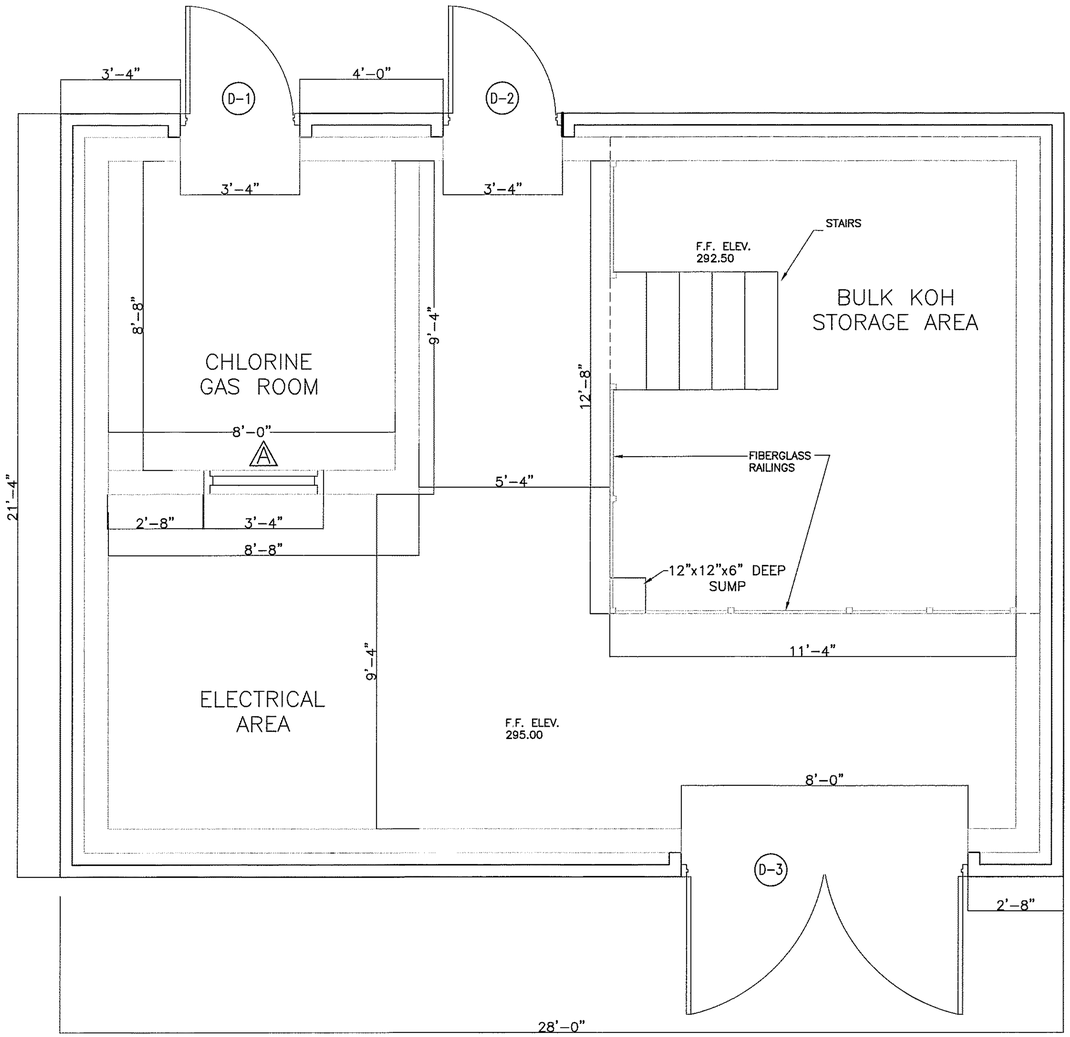
TATA & HOWARD

T&H NO.: 37D3
DATE: MARCH 2016
SCALE: AS NOTED

C-7

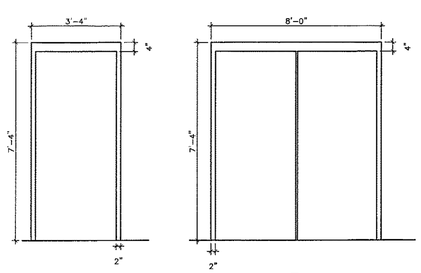


FINISH SCHEDULE																	
LOCATION	FLOOR		BASE	WALLS								CEILING	DOORS & FRAMES	REMARKS
				NORTH		SOUTH		EAST		WEST				
○ INDICATES SURFACE WHICH DOES NOT REQUIRE PAINTING ● INDICATES SURFACE WHICH REQUIRES PAINTING , COATING OR LINER.	CONCRETE	SEALED CONCRETE SYNTHETIC LINER		PAINTED CMU	SYNTHETIC LINER	PAINTED CMU		PAINTED CMU	SYNTHETIC LINER	PAINTED CMU	SYNTHETIC LINER	PAINTED GYPSUM BOARD	PAINT	CMU = CONCRETE MASONRY UNIT
ELECTRICAL AREA/CORRIDOR		●		●		●		●		●		●	●	
KOH CONTAINMENT AREA		●			●		●		●		●	●	●	
CHLORINE ROOM		●		●		●		●		●		●	●	

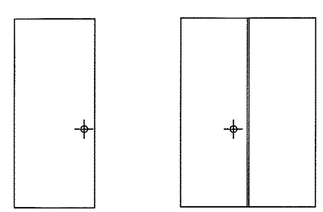
LOUVER/DAMPER SCHEDULE								
L/D NO.	LOCATION	SIZE		LOUVER		FREE AREA SQ. FEET	LOCATION OF SIMMILAR DETAILS FOR HEAD, JAMB AND SILL	NOTES
		W.	H.	CFM	VELOCITY			
L/D-1	CHLORINE ROOM						A-2	EXHAUST LOUVER (MOTORIZED DAMPER)
L/D-2	CHLORINE ROOM						A-2	INTAKE LOUVER (MOTORIZED DAMPER)
L/D-3	CAUSTIC/ELEC. AREA						A-2	EXHAUST LOUVER (MOTORIZED DAMPER)
L/D-4	CAUSTIC/ELEC. AREA						A-2	INTAKE LOUVER (MOTORIZED DAMPER)

WINDOW SCHEDULE										
TYPE	DESCRIPTION	QTY	FRAME SIZE		ROUGH OPENING		MANUFACTURER	STYLE	MODEL NO.	REMARKS
			WIDTH	HEIGHT	WIDTH	HEIGHT				
A	FIXED	2	3'-4"	4'-0"	–	–	KAWNEER OR EQUAL	FIXED	SEE SPEC.	FIXED

DOOR SCHEDULE									
DOOR NO.	LOCATION	DOOR SIZE		DOOR		FRAME TYPE	HDWR. SET	LOCATION OF DETAILS FOR HEAD, JAMB AND SILL	NOTES
		W.	H.	TYPE	THICKNESS				
D-1	EXTERIOR CHEMICAL AREA	3'	7'-0"	1	1-3/4"	A	1	DWG. A-2	SINGLE DOOR
D-2	EXTERIOR CHLORINE ROOM	3'	7'-0"	1	1-3/4"	A	1	DWG. A-2	SINGLE DOOR
D-3	EXTERIOR ELECTRICAL AREA	3'-10"	7'-0"	2	1-3/4"	B	2	DWG. A-2	DOUBLE DOOR



FRAME TYPE
SCALE: NONE



DOOR TYPE
SCALE: NONE

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE
PUMP STATION

ARCHITECTURAL

PLAN VIEW

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Rev	Date	Description
	3/15/16	Planning Board Submittal

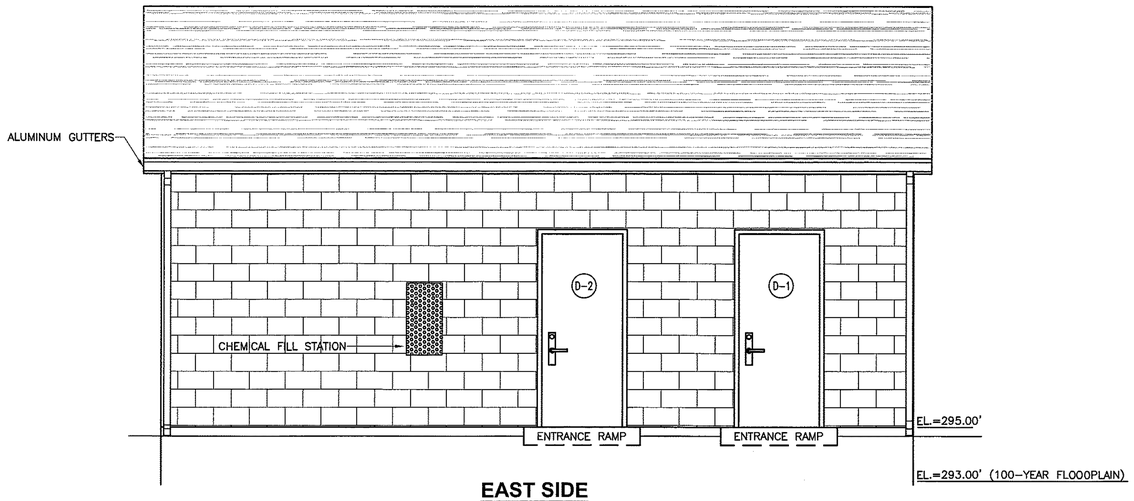
Drawn By: MSB | Designed By: RSP | Checked By: PBH | Approved By: KLG

COMMONWEALTH OF MASSACHUSETTS
KARENA L. GRACEY
No. 46268
REGISTERED PROFESSIONAL ENGINEER
3-15-16

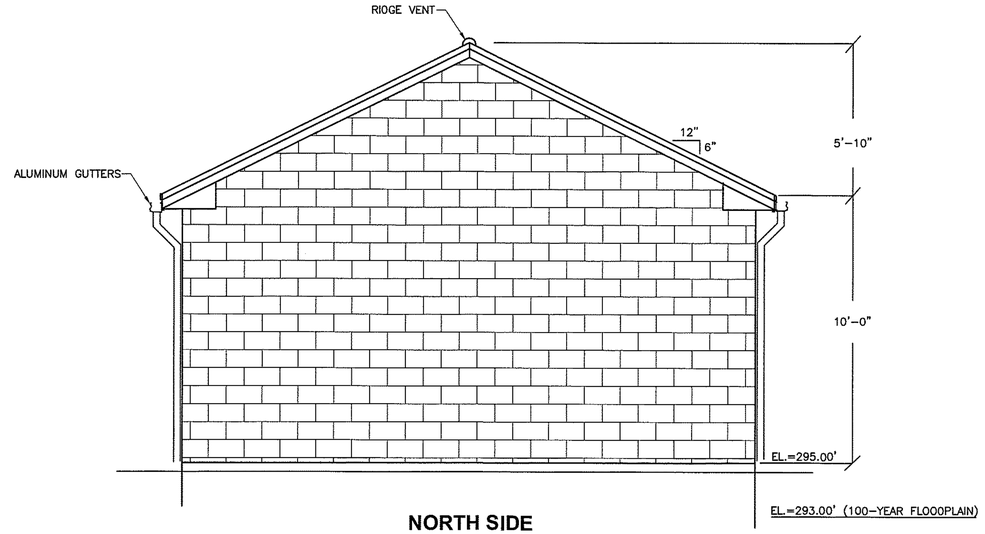
TATA & HOWARD

T&H NO.: 3703
DATE: MARCH 2016
SCALE: AS NOTED

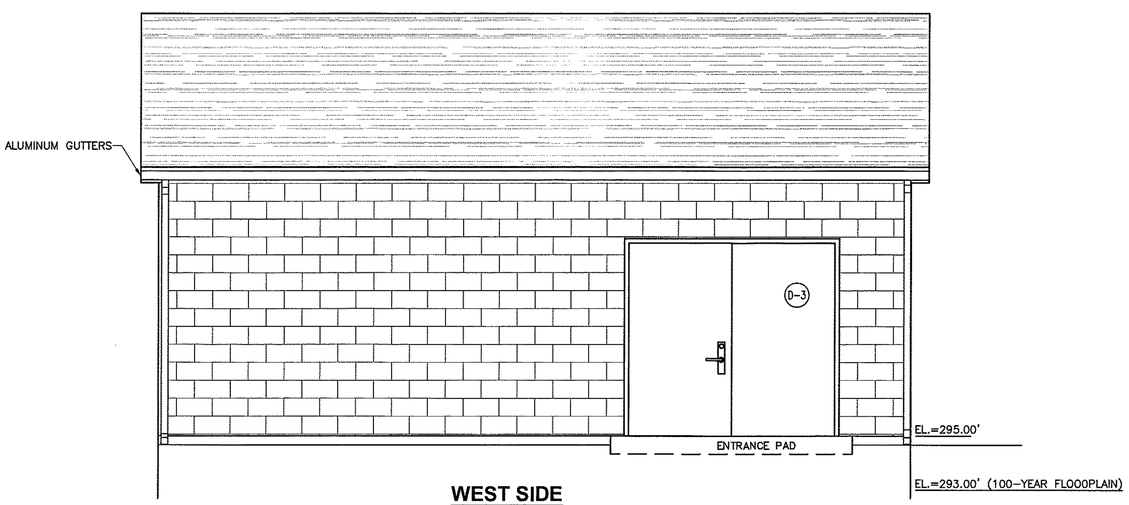
A-1



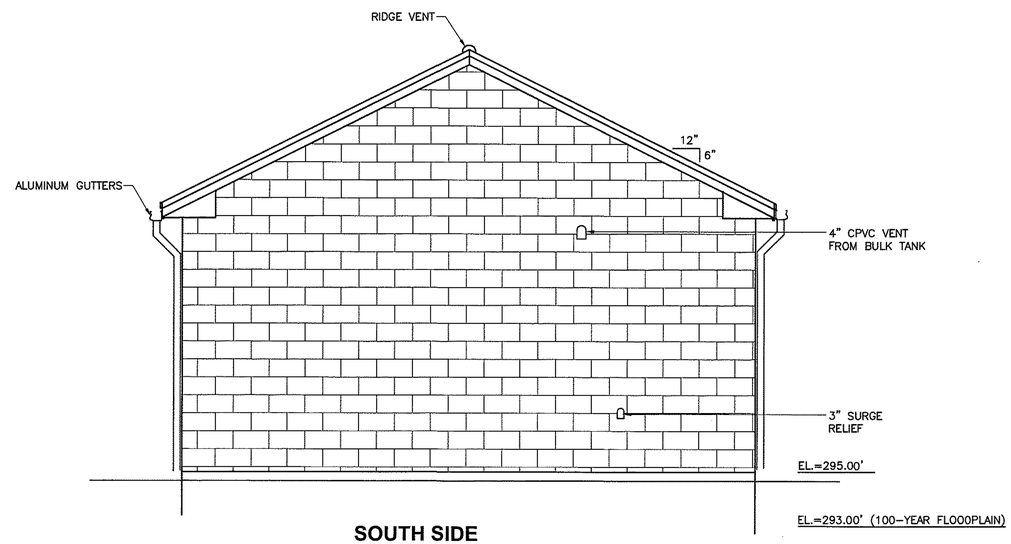
EAST SIDE
SCALE: 3/8" = 1'-0"



NORTH SIDE
SCALE: 3/8" = 1'-0"



WEST SIDE
SCALE: 3/8" = 1'-0"



SOUTH SIDE
SCALE: 3/8" = 1'-0"

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE
PUMP STATION

Drawn By: MSB | Designed By: RSP | Checked By: WSA | Approved By: KLG

ARCHITECTURAL
ELEVATIONS

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Rev.	Date	Description
	3/15/16	Planning Board Submittal

COMMONWEALTH OF MASSACHUSETTS
KIRBY L. GINSEY
CIVIL
No. 40506
REGISTERED PROFESSIONAL ENGINEER
3.15.16

TATA & HOWARD

T&H NO.: 3703
DATE: MARCH 2016
SCALE: AS NOTED

A-2

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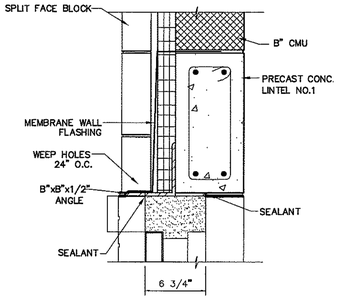
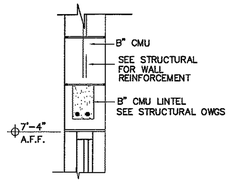
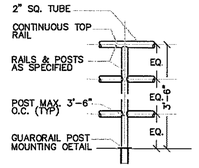


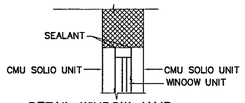
EXTERIOR DOOR HEAD
SCALE: 1 1/2" = 1'



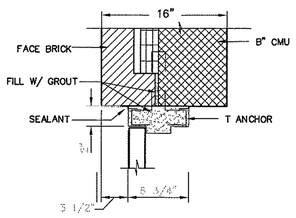
DETAIL WINDOW HEAD
SCALE: NONE



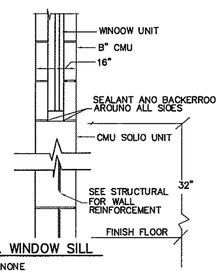
DETAIL GUARDRAIL/RAILING
SCALE: NONE



DETAIL WINDOW JAMB
SCALE: NONE

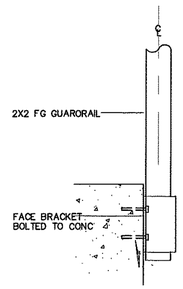


EXTERIOR DOOR JAMB
SCALE: NO SCALE

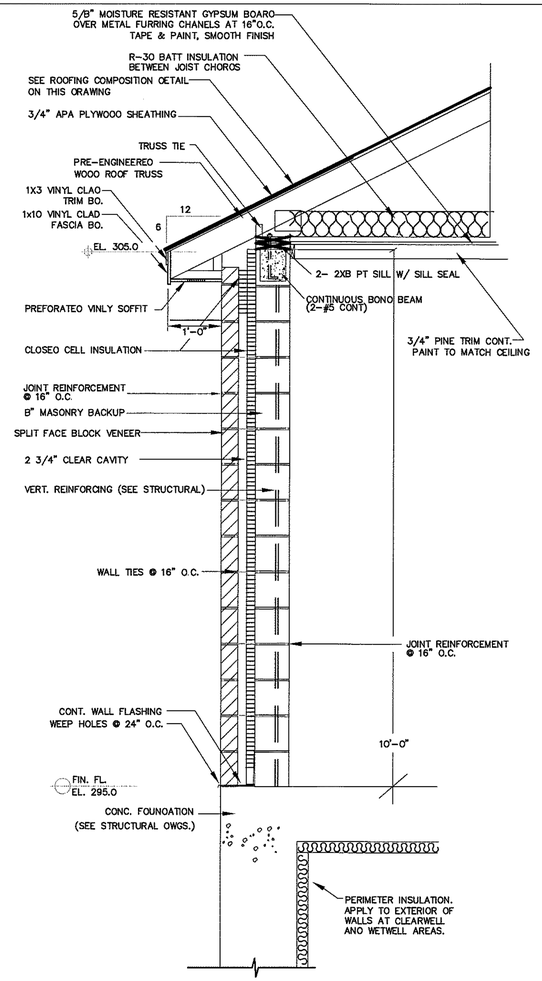


DETAL WINDOW SILL
SCALE: NONE

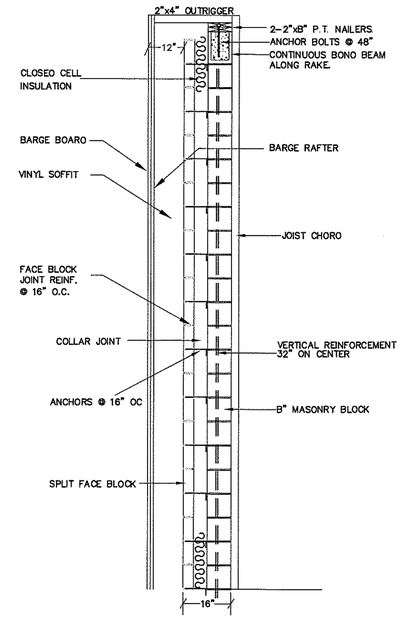
TYPICAL SECTIONS AT INTERIOR FIXED WINDOWS



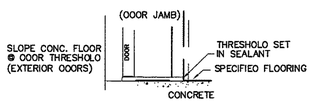
FACE MOUNTED RAILING POST DETAIL ENLARGED
SCALE: 1"=1'-0"



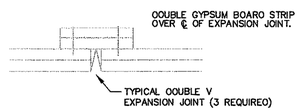
TYPICAL EXTERIOR BUILDING WALL SECTION
SCALE: 3/4"=1'



TYPICAL GABLE END
SCALE: 1/2"=1'

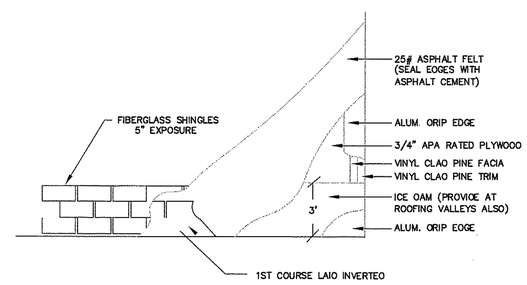


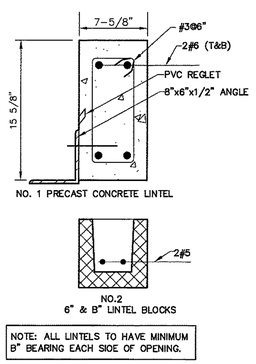
DETAIL EXTERIOR DOOR SILL
SCALE: NONE



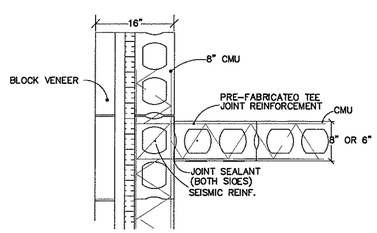
TYPICAL GYPSUM BOARD EXPANSION JOINT

N.T.S.

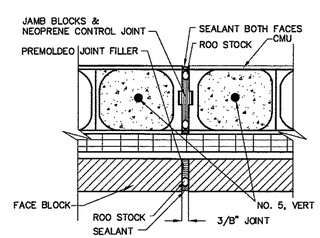




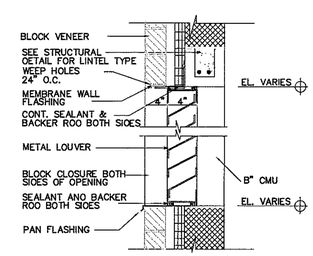
CONCRETE/MASONRY LINTELS
SCALE: 1 1/2" = 1'-0"



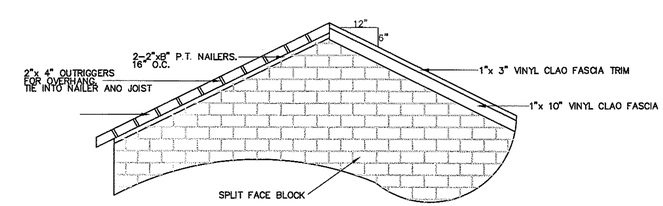
INTERSECTION OF EXTERIOR & INTERIOR MASONRY WALLS
SCALE: NONE



MASONRY CONTROL JOINT
SCALE: 1-1/2"=1'



DETAIL TYPICAL METAL LOUVER – NO SILLS
SCALE: NONE



GABLE END EAVE FRAMING/FINISH
SCALE: 1/4"=1'

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE PUMP STATION

ARCHITECTURAL

DETAILS & SCHEDULES

Drawn By: RSP | Designed By: RSP | Checked By: WSA | Approved By: KLG

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Rev.	Date	Description
	3/15/16	Planning Board Submittal

KARSTEN L. GRAVES CIVIL No. 45032 — 3/15/16

TATA & HOWARD

T&H NO.: 3703
DATE: MARCH 2016
SCALE: AS NOTED

A-3

GENERAL

1. Refer to the project specifications for general contract requirements for materials, workmanship, and shop drawings.
2. Refer to Architectural, Mechanical, and Electrical drawings, approved shop drawings for location and dimensions of chases, reglets, inserts, openings, sleeves, depressions, and requirements for attachment of finishes.
3. All dimensions shown on the structural drawings shall be field coordinated by the Contractor with the Architectural, Mechanical and Electrical drawings and any inconsistencies reported to the Structural Engineer before proceeding with the affected work.
4. Contractor shall verify all dimensions and elevations in the field. Notify the Architect/Engineer immediately, in writing, of any field condition uncovered during construction that is not consistent with the plans, that is structurally inadequate, or that will impair Architectural layouts or attachment of finishes.
5. All construction work shall comply with the Massachusetts State Building Code and IBC 2009 Building Code.
6. Work not indicated on a part of the drawings but reasonably implied to be similar to that shown at corresponding places, shall be included in the Contractor's work.
7. The Contractor shall be completely responsible for the safety of adjacent structures, property, his workmen, and the public, as affected by the construction of this project.
8. All Contractors are required to examine the drawings and specifications carefully, visit the site and fully inform themselves as to all existing conditions and limitations, prior to agreeing to perform the work. Failure to visit the site and familiarize themselves with the existing conditions and limitations will in no way relieve the Contractor from furnishing any materials or performing any work in accordance with drawings and specifications without additional cost to the owner.

DEMOLITION, SHORING AND UNDERPINNING WORK

1. Before proceeding with any demolition, the area must be surveyed to ensure that no damage will be made to any structure beyond the adjacent to the demolition.
2. Provide temporary shoring and bracing for floors, roofs and walls during demolition and maintain this temporary construction in place until the new structural work is completed and tied to the remaining existing construction. Remove demolished items promptly from the building. Do not overload existing floors with construction debris.
3. Protect adjacent foundations during excavation by sheet piling, bracing, shoring, etc. as required by field conditions. Do not undermine existing footings.

FOUNDATION BACKFILL AND DRAINAGE

1. All footings shall be carried down 6" into the undisturbed compacted structural fill or sand layer having a minimum bearing capacity of 1.25 tons per suare foot.
2. Bearing material as well as footing elevations are based on available information described in Stephens Associates geotechnical report. If upon excavation down to levels shown acceptable bearing material is not encountered, the footing shall be lowered or increased in size at the direction of the Architect/Engineer. All loose sand pockets shall be removed and replaced with compacted structural fill.
3. Removal of existing fill materials: Remove all forest mat, subsoil and fill material down to the sand layer and install the compacted crushed stone layer per the Geotechnical Report.
4. All engineered fills shall be compacted to 95% modified proctor density. The entire backfilling and compacting operations shall be witnessed by a field representative or the owner who is experienced and trained in supervising earthwork operations and conducting quality control field testing.
5. The Architect/Engineer assumes no responsibility for the validity of the subsurface conditions described on the drawings, borings, or test pits. These data are included only to assist the contractor during bidding and subsequent construction, and represent conditions only at those specific locations at the particular time they were made.
6. No footing shall be placed in water.
7. All exterior construction shall be carried down a minimum of 4'–0" below finished grade, unless otherwise shown on the plans.
8. All footing excavations shall be finished by hand.
9. All footing excavations shall be inspected by the Architect/Engineer before the footings are poured in order to confirm that the foundation material is adequate to sustain the design bearing pressure.
10. Material adjacent to and below footing shall be kept from freezing at all times. If material is found to be frozen it shall be removed and replaced with concrete. If any frozen material should be found below slab on grade, it shall be removed and replaced with 95% compacted granular material.
11. Unless otherwise noted, all footings shall be centered in each direction under supported members.
12. All foundation walls, retaining walls, and grade beams shall be braced during the operations of backfilling and tamping. Bracing shall be left in position until the permanent restraints have been installed.
13. Install drainage system as shown on the mechanical drawings.
14. Contractor shall carry out continuous pumping of ground water until sufficient dead load has accumulated to prevent flotation of any part of the structure. Site dewatering method during construction shall be submitted to the Atchitect/Engineer for review.
15. Protect street, sidewalks, and adjacent building foundations during excavation by sheet piling, bracing, shoring, etc., as required by field conditions. Excavations and shoring shall be inspected by a competent registered engineer employed by the contractor and protection against slides and cave–ins shall be increased if he deems necessary.
16. See architectural drawings and specifications for perimeter insulation.
17. Important Note; Soil bearing layer must be inspected by either the geotechnical or structural engineer prior to pouring the concrete mat.

CAST IN PLACE CONCRETE

1. All concrete work shall comply with the standard "Specifications for Structural Concrete Buildings" ACI 301 and the "Building Code Requirements for Reinforced Concrete" ACI 318 latest Editions.
2. All concrete shall have a 4000–PSI minimum 28–day compressive strength. Maximum water cement ratio shall be 0.43. At mud mat use 3,000 PSI concrete.
3. Controlled concrete shall be used, proportioned, mixed and placed under the supervision of an approved Concrete Control Engineer.
4. All slabs shall be placed without horizontal construction joints.
5. Construction joints at foundation walls, foundation mat and slabs on grade shall be used as shown on the drawings. Coodinate construction joint locations with the structural engineer. Spacing of foundation wall construction joints shall not exceed 50'–0".
6. Slabs on grade shall be placed in rectangles not to exceed 2,500 square feet in area. Control joints shall be placed in the panels within 24 hours after casting. Foundation shall be placed in rectangles not exceeding 5,000 sf.
7. Wherever sleeves are inserted in concrete slabs, beams or walls, they shall consist of galvanized steel or cast iron pipe.

REINFORCING

1. All reinforcing bar detailing shall be as specified in the American Concrete Institute "Manual of Standard Practice for Detailing Reinforced Concrete Structures" ACI 315, amended to date.
2. All reinforcing steel except as otherwise noted shall be ASTM A615 Billet Steel deformed bars Grade 60.
3. All welded wire fabric shall conform to ASTM A185. Lap splices shall be 8" min, embed 4" min at end supports.
4. Where continuous bars are called for, indicated, or required they shall be run continuously around corners, doweled into intersecting walls, lapped at necessary splices, splices staggered wherever possible, and hooked at discontinuous ends. Laps shall be 50 diameters of the bar unless otherwise noted.
5. Unless otherwise noted, at all four sides of openings provide 2–#5 at top and bottom in slabs, and 1–#5 at each face in walls, all bars extending 2'–0" beyond opening or hooked if necessary. In wall and grade beams where opening is 4'–0" or over, opening faces shall be reinforced.
6. Provide and schedule with shop drawings all necessary accessories to hold the reinforcing securely and accurately in position. High chairs shall be spaced 4'–0" o.c. maximum and wired to bottom slab reinforcing. Support bars on high chairs shall be #5 minimum. Slab bolsters shall be spaced at 3'–0" O.C. maximum.
7. Clearance of main reinforcing bars from adjacent concrete surfaces shall be:
A. Where unformed face of concrete is in contact with earth, 3".
B. Where formed face of concrete is in contact with earth, 2", where exposed to water or weather, 2" for bar size larger than #5, 1–1/2" for #5 and smaller bars. At tank walls use 2" cover, minimum, for all rebars.
C. The maximum allowable deviation from the figures above, when placing reinforcing in the forms shall be 1/4" for concrete shapes 10" in depth or width.
D. In slabs: 2" at surfaces exposed to liquid, 1 1/2" at other areas. At interior exposed faces of walls: 1 1/2".
8. All reinforcinging shall be approved by the Architect/Engineer. Do not cut or displace any reinforcing steel to accommodate the installation of mechanical or electrical embedded items without the expressed written approval of the Architect. Coordinate the installation of pipes and conduit in the slab with the placing of the reinforcing steel and mesh, to ensure that the top bars and mesh are in their proper position at the top of the slab and are not cut or displaced by conduit or pipes.
9. Notify the Architect at least 24 hours in advance of any concreting so that he may inspect the arrangement of reinforcing steel. Cast no concrete until the inspection has been made or waived by the Architect.

STRUCTURAL STEEL

1. Structural steel design, materials and workmanship shall conform to the requirements of AISC "Specification for the Design, Fabrication and Erection of Structural Steel Buildings" latest edition.
2. Structural steel shall be new structural carbon steel conforming to the following ASTM designation:
A. ASTM A572 grade 50 or ASTM A992 for rolled shapes except ASTM A36 for channels, angles and plates.
B. ASTM A53 for steel pipes
C. ASTM A500 Grade B for cold formed steel tubing
3. All shop and field connections shall be by welding or high strength bolts.
4. Structural steel sections and details not specifically shown shall be similar to those shown for similar situations as determined by the Architect/Engineer.
5. All bolted connections shall be high strength conforming to:
A. ASTM A325N bolts for all steel to steel connections except A325 for slip critical connections. Use 3/4" or 7/8" diameter bolts, unless otherwise noted.
B. A307 bolts for anchor bolts. Bolts and nuts shall be hot dipped galvanized per ASTM A153. Bolts and nuts must be treated as an assembly.
C. The minimum number of bolts per connection shall be two.
6. A325 bolts shall be installed with the bolt tension specified in "Specifications for Structural Joints using ASTM A325 or ASTM A490 Bolts".
7. Hot dip galvanize all structural steel columns, beams, lintels, hardware, miscellaneous metal and connections after fabrication in accordance with ASTM A123.
8. Provide spray on and/or gypsum wallboard to achieve the required fire rating.
9. The Engineer shall review for approval the size, location and method of cutting penestrations in structural steel members for all trades.
10. All welding will be inspected by a qualified testing agency retained by the owner. Cooperate fully with the testing agency to repair all defective welds.
11. The Contractor shall check prior to the erection of structural steel, the level and location of all bearing surface and anchor bolts, any deficiencies shall be corrected by the General Contractor to the satisfaction of the Structural Steel Contractor.
12. Submit for Architect/Engineer approval complete shop drawings for all structural steel, steel joists, steel–roof decking and steel floor decking.
13. Field welding at galvanized steel: remove galvanized coating prior to welding. After welding is complete, apply 2 coats of zinc compound.

MASONRY

1. Masonry walls shall be 8" nominal thickness.
2. Concrete masonry units shall have a minimum compressive strength of 3,000 PSI on the net area, and grout strength shall be at least equal to the CMU strength. Masonry design strength: f'm = 2,100 PSI.
3. Mortar shall be Type M high strength mortar conforming to ASTM C270–886.
4. All reinforced masonry walls shall have #5@4'–0"o.c. minimum vertical reinforcing at interior walls and #5@2'–7"o.c. at exterior walls. Provide 2#5 vertical ea side of each wall opening, at each corner, and at ends of walls unless otherwise noted. Provide 2#5 horizontal continuous reinforcing rods at 4'–0" o.c. vertical spacing above foundation wall. Add 2#5 horizontal reinforcing at window sills and louver openings. Extend 2'–6" beyond each opening.
5. All reinforced masonry walls shall have #9 gauge wire ladders (Ladur type) at 16" o.c. minimum horizontal reinforcement.
6. Where core filling is noted as "Solid" indicates that all slots and cells shall be filled. All cores with vertical reinforcing shall be grouted solid. Filling cores with mortar shall not be acceptable and special care shall be taken to keep cores free of mortar droppings. The top two courses below each floor level and roof shall be filled continuously with grout.
7. Grout shall be places using high or low lift grouting procedure per NCMA recommendations.
8. Provide hollow load bearing concrete masonry units conforming to ASTM C90, Type 1, and moisture controlled units.
A. Size: Provide units with nominal 8" high x 16" long face dimensions (7 5/8" x 15 5/8" actual), unless indicated otherwise. Provide thickness indicated, or if not indicated, as necessary to create a properly supported, structurally safe wall built within the height to width limitations required by codes and recommended by the National Concrete Masonry Association.
B. Shapes: Provide special shaped units for lintels, corners, jambs, and headers, control joints and other conditions. Never expose cores. Provide round corner edge at exposed corners.
C. Weight: Provide normal weight units.

CARPENTRY

1. All wood members to be used for newframing shall be new material.
2. All new lumber and plywood must have a grade stamp from the associations having jurisdiction which indicates specie, mill numbr, moisture content, when surfaced, and grade or stress rating.
3. Lumber Materials:
A. Lumber Grading Rules: NFPA or WWpa
B. Framing Members for supporting roof: SPF #2 15 percent maximum moisture content. Minimum bearing length of joists on wood ledgers shal be 1 1/2".
C. Plates shall be pressure treated (2) 2x8 minimum. pressure applied. Design properties: E = 2.0 x 106 PSI, Fb = 2,800 PSI and shall be coated with a waterproof adhesive and then bonded together by heat with
D. Micro–Lam members shall be laminated veneer lumber item. The veneet material Fv = 285 PSI. All lumber in contact with concrete or exterior masonry shall be pressure treated in accordance with current American Wood Preservers Association (AWPA) Standards. The retention shall be 0.40 lbs per cubic foot.
4. Plywood roof sheathing shall be 3/4" interior type with exterior glue. Plywood shall be nailed to the framing system. Fasten all plywood construction with 8d nails @ 4" o.c. at boundaries, panel edges and 10" o.c. at intermediate framing. Use blocked diaphragm construction with 2x6 blocking at panel edges.
5. In areas to receive ceilings, strap the underside of all joists with 1x3 merchantable spruce. Shim strapping as nedessary to produce a level ceiling.
6. Refer to the New Hampshire State Building Code nailing schedule for nailing and bolting not otherwise specified in the drawings.
7. All new member to new or existing member connections shall be joist or beam hangers; lag bolted or thru–bolted connections shall be used where indicated on the drawings. All connector items shall be used in accordance with the "Timber Construction Manual" (AITC, latest edition) recommendations. Use Simpson ZMAX connectors at specified locations.

MASONRY LOOSE LINTELS

1. Unless otherwise indicated on the drawings, provide one angle for each 4" of masonry thickness for all masonry openings in accordance with the following schedule:

MAXIMUM MASONRY OPENING	INTERIOR	EXTERIOR
UP TO 4'–0"	L4x3 1/2x1/4	L4x3 1/2x5/16
4'–1" TO 6'–0"	L5x3 1/2x1/4	L5x3 1/2x5/16
6'–1" TO 8'–0"	L6x3 1/2x3/8	L6x3 1/2x3/8

2. All exterior lintels shall be galvanized.
3. Lintels shall be 12" longer than masonry openings.
4. Angle long leg shall be vertical.
5. All lintels in pairs shall be welded or bolted together at 2'–0" o.c. In wall panels at midspan for walls up to 10 feet in height.

DESIGN LOADS

Design Code	Massachusetts State Building Code, latest edition
Wind Load	
Basic Wind Speed (3 sec gust)	100 MPH
Wind Importance Factor (Iw)	1.100
Wind Exposure	C
Internal Pressure Coefficient (GCPi)	+0.18/–0.18
Designed Wind Pressure	24.00 PSF
Live Load	
Slab on Grade	250 PSF
Ground Snow Load	55 PSF
Electric Room Ceiling Precast Planks	30 PSF
Mechanical Equipment	See Mechanical Dwgs
Seismic Load	
Seismic Importance Factor (Ie)	1.150
Site Class	D
Mapped Sprectral Response Acceleration	Ss = 0.240g S1 = 0.066g
Sprectral Response Coefficients	Sms = 0.384g Sm1 = 0.158g
Seismic Design Category	B
Basic Force Resisting Systems Used	Intermediate Reinforced Masonry Shear Walls R = 3 1/2

MISCELLANEOUS

1. Wherever sleeves are inserted in concrete slabs, beams, or walls, they shall consist of galvanized steel or cast iron pipe.
2. Contractor shall carry out continuous pumping of ground water until sufficient dead load has accumulated to prevent floatation of any part of the structure.
3. Contractor shall verify all dimensions on the job.
4. Furnish and place all supports, temporary and permanent, whether shoring, bracing, needling or sheet piling necessary to brace existing walls to remain, and party walls, so that no horizontal or vertical settlement occurs to these walls.
5. All compacted fill under slab on grade shall be compacted to a minimum density of 95%.
6. All trenches dug in earth basement slabs for grade beams shall be lined completely with a 1" lean concrete mix to stabilize the bottom and sloping sides.

ROOF TRUSSES NOTES

1. See General Notes for project requirements.
2. Truss spacing shall be 2'–0" o.c. maximum.
3. Truss manufacturer shall design and detail all trusses and submit calculations and shop drawings for approval. Truss design shall comply with the "Design Specification for Light Gage Metal Plate Connectors with Wood Trusses".
4. Design loads shall be as follows:
Top Chord
A. Ground Snow Load = 55 PSF + Snowdrift
B. Dead Load = 10 PSF + Truss Weight
Bottom Chord
A. Live Load = 10 PSF or 150 lb. Concentrated Load.
B. Dead Load = 10 PSF + MEP loads per project requirements
Wind Load
A. Net Uplift = 20 PSF

5. Provide web braces as required by design. Coordinate with mechanical requirements.
6. Double trusses shall be nailed together with 2–12d nails at 12" o.c.
7. Provide 2x4 wood blocking at all bottom chords at 8'–0" o.c., maximum. Provide horizontal truss at bottom chord elevation at ends of buildings.

CONDUITS AND PVC PIPES EMBEDDED IN CONC SLABS

1. Minimum conduit spacing shall be 3 (three) diameters on center.
2. Minimum distance from the top of slab to top of pipe shall be 4 inches; and from bottom of slab to underside of pipe, 4 inches.
3. At pipes parallel to bearing walls or beams, the minimum clear distance from the face of wall or beam to face of pipe shall be 18 inches.

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE
PUMP STATION

Drawn By: RC | Designed By: RH | Checked By: RH | Approved By: RH

GENERAL NOTES

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Rev.	Date	Description
2	05.06.11	REVISED SNOW LOAD

Roger Hobeika Associates Inc
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Watertown, Massachusetts 02472
phone 1.617.924.5257
fax 1.617.924.1481

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T&H NO.: 37023
DATE: JANUARY 2016
SCALE: NONE
SHEET: 1 OF 1

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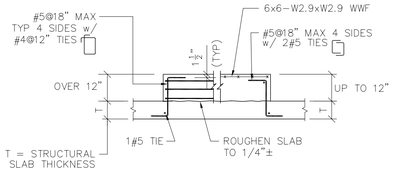
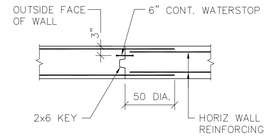
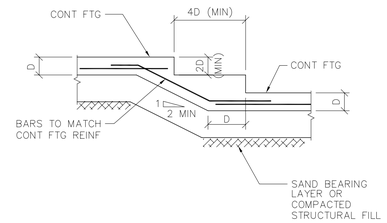


TYPICAL SECTION @ EQUIPMENT PAD – FOR SIZE & LOCATION
SEE MECHANICAL DRAWINGS

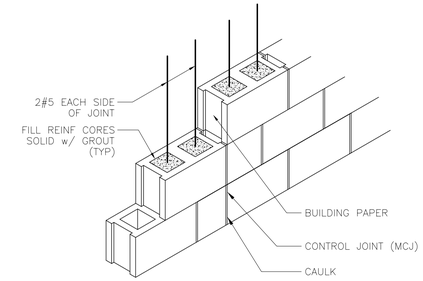
TYPICAL DETAIL AT CONCRETE PADS



TYPICAL VERTICAL WALL CONSTRUCTION JOINT

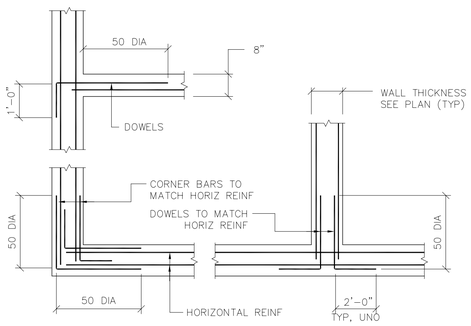


TYPICAL STEPPED FOOTING DETAIL

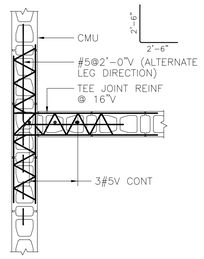


NOTE: INTERRUPT HORIZ REINF AT CONTROL JOINTS.

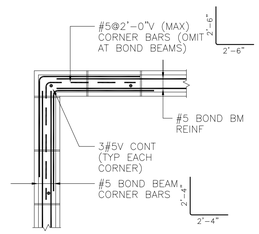
MICHIGAN TYPE MASONRY CONTROL JT DETAIL



TYPICAL HORIZONTAL WALL REINF DETAILS

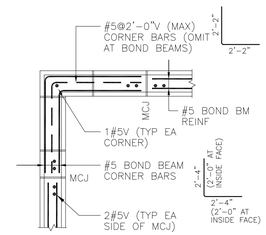


MASONRY WALL INTERSECTIONS



BOND BEAM SPACING TO MATCH HORIZ WALL
REINFORCING PER GENERAL NOTES.

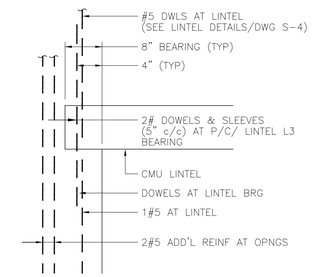
INTERIOR BOND BEAM CORNERS



NOTE 1: BOND BM REINF SPACING TO MATCH
HORIZ WALL REINF PER GENERAL NOTES.
NOTE 2: BOND BEAM AND HORIZ WALL REINF
TO STOP AT MASONRY CONTROL JOINTS.

EXTERIOR BOND BEAM CORNERS

TYPICAL MASONRY WALL DETAILS



NOTE: TYPICAL AT P/C LINTEL BEARING – PROVIDE
2"ø GALV STEEL SLEEVE AND #5x5'-0" DWLS EMBEDEDDED
INTO CMU WALL. BEARING LENGTH TO BE 8" AND DOWEL
LOCATION TO BE 4" FROM DOOR JAMB. GROUT SLEEVE SOLID.

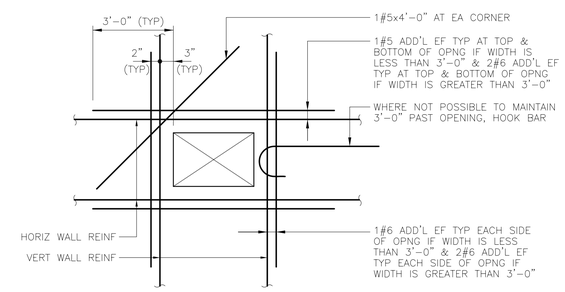
TYP VERTICAL REINF DETAIL at LINTEL BEARING

CONCRETE REINFORCING SPLICE SCHEDULE

LAP SPLICE	TENSION LAP SPLICE			
CONCRETE	fc' = 3,000 PSI		fc' = 4,000 PSI	
BAR SIZE	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
#3	28"	21"	24"	19"
#4	37"	29"	32"	25"
#5	46"	36"	40"	31"
#6	56"	43"	48"	37"
#7	81"	63"	70"	53"
#8	93"	72"	79"	61"

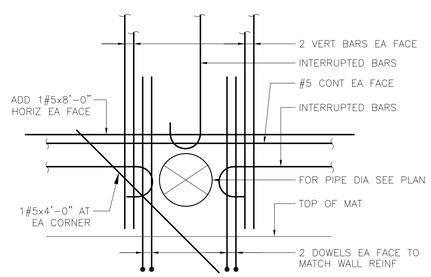
NOTES:

1. ALL SPLICES ARE LAP SPLICES UNLESS OTHERSWIESE NOTED IN SECTIONS.
2. A TOP BAR IS HORIZONTAL WITH AT LEAST 12" OF FRESH CONCRETE BELOW.



NOTE: EXTEND REINFORCING BARS 3'-0" MINIMUM BEYOND OPENING
INTO WALL, PROVIDE STANDARD BEND & TURN BARS VERTICALLY AT
WALL CORNERS AND/OR COLUMNS.

TYPICAL WALL OPNG REINF DETAIL



WALL REINF DETAIL AT SLEEVE OPENINGS LARGER THAN 8" DIA

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE
PUMP STATION

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TYPICAL DETAILS

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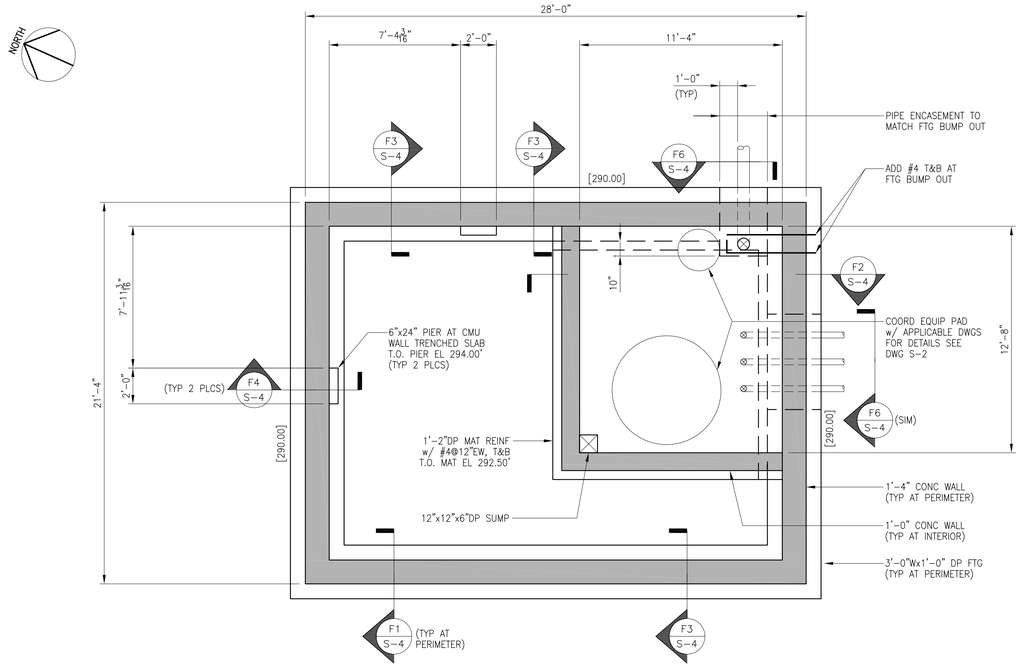
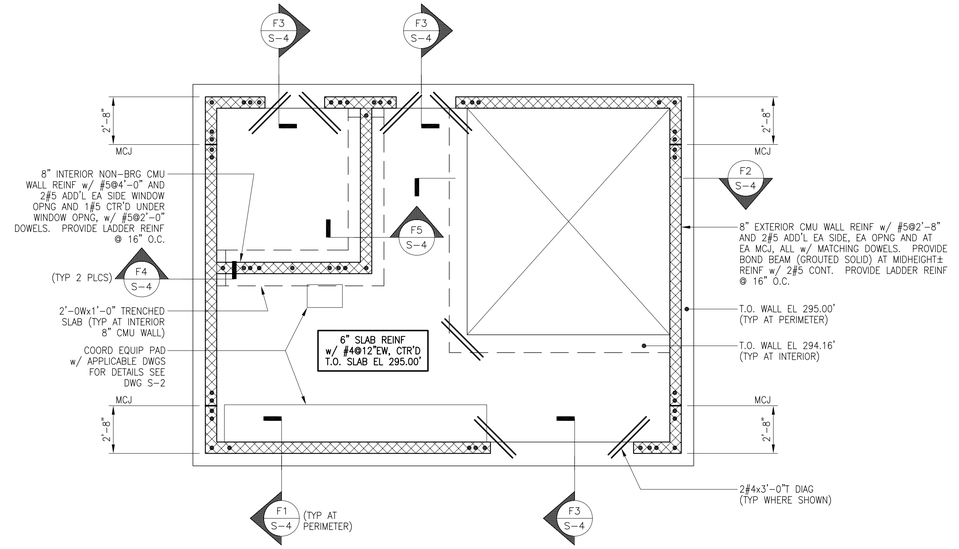
S-2



FOUNDATION PLAN

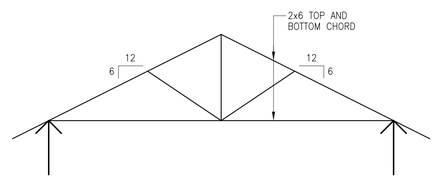
$\frac{1}{4}$"=1'-0"



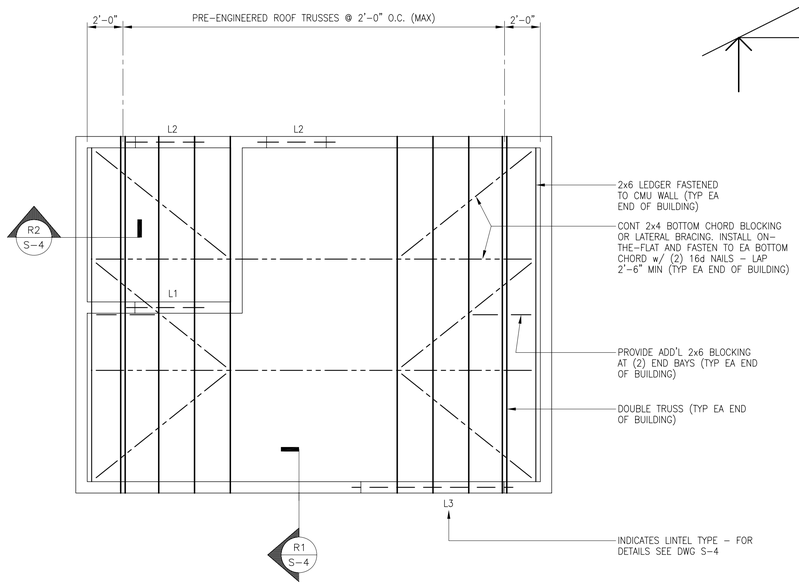
NOTE: MCJ INDICATES LOCATION OF MASONRY CONTROL JOINT. FOR DETAIL SEE DWG S-2.

MAIN FLOOR PLAN

$\frac{1}{4}$"=1'-0"

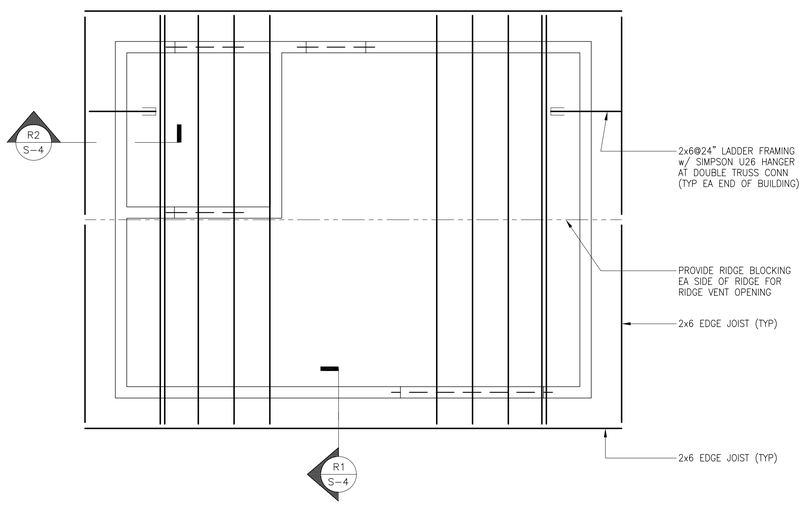


TRUSS ELEVATION



ROOF TRUSS BOTTOM CHORD FRAMING PLAN

$\frac{1}{4}$"=1'-0"



ROOF CONSTRUCTION: $\frac{3}{4}$" PLYWOOD SHEATHING OVER ROOF TRUSSES.

ROOF TRUSS TOP CHORD FRAMING PLAN

$\frac{1}{4}$"=1'-0"

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE PUMP STATION

FRAMING PLANS

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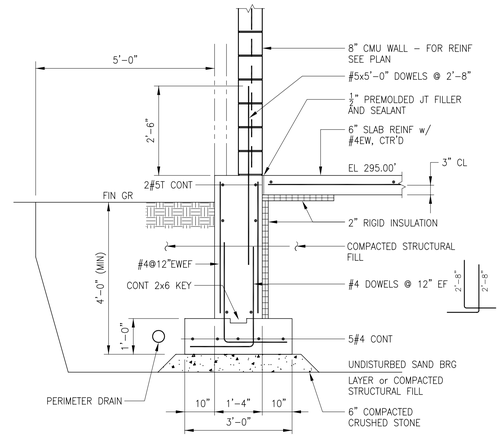
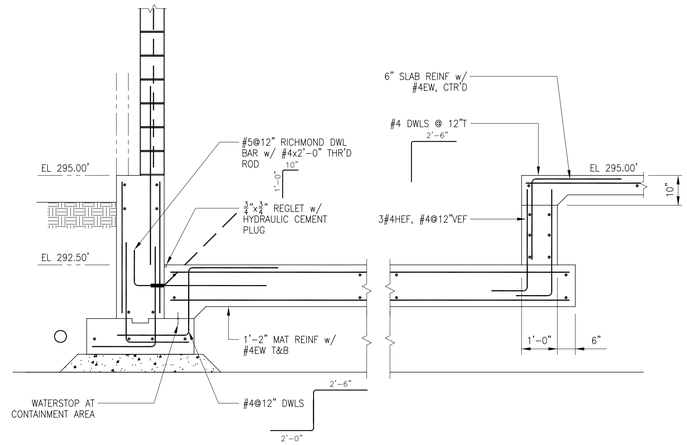
S-3



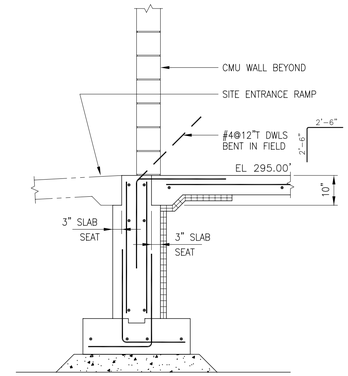
NOTE: GROUND WATER AT EL 288.00' to 290.20'±.

SECTION F1 / S-3
1/2"=1'-0"



NOTE: FOR INFO NOT SHOWN SEE SECT F1.

SECTION F2 / S-3
1/2"=1'-0"



NOTE: FOR INFO NOT SHOWN SEE SECT F1.

SECTION F3 / S-3
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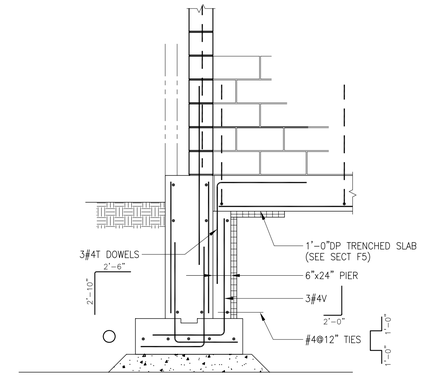
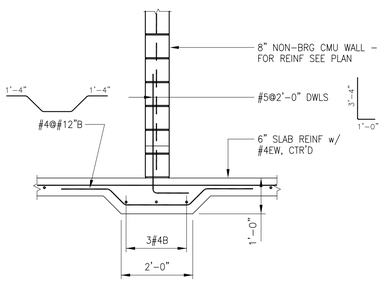
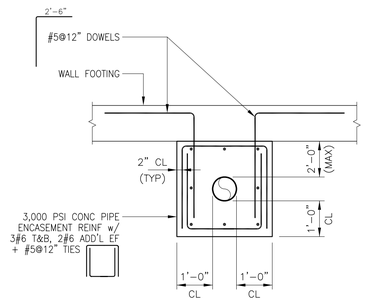


NOTE: FOR INFO NOT SHOWN SEE SECT F1.

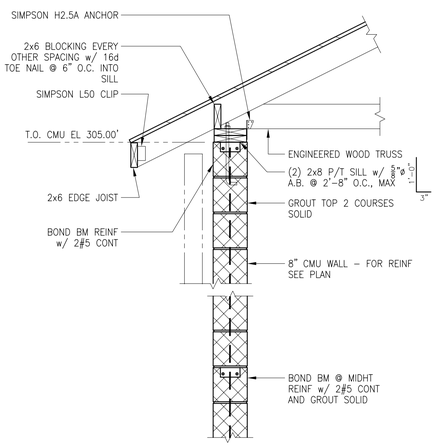
SECTION F4 / S-3
1/2"=1'-0"



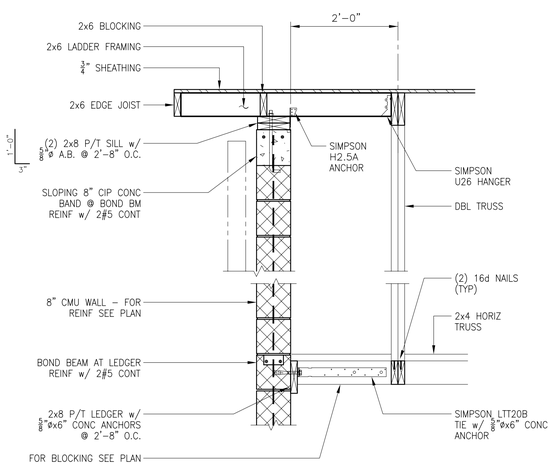
SECTION F5 / S-3
1/2"=1'-0"



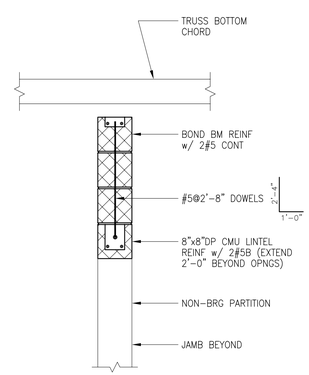
SECTION F6 / S-3
1/2"=1'-0"



SECTION R1 / S-3
3/4"=1'-0"

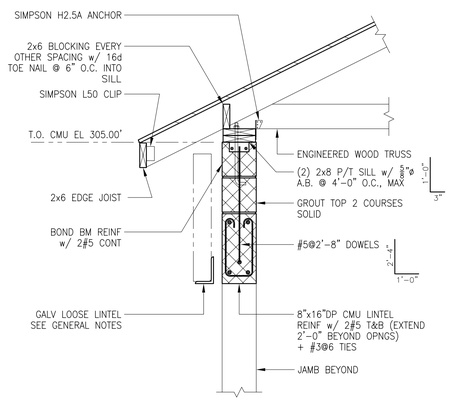


SECTION R2 / S-3
3/4"=1'-0"



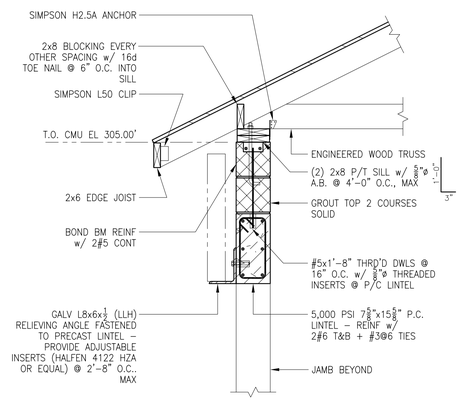
NOTE: FOR CMU LINTEL BEARING SEE DWG S-2.

LINTEL L1
3/4"=1'-0"



NOTE: FOR CMU LINTEL BEARING SEE DWG S-2.

LINTEL L2
3/4"=1'-0"



NOTE: FOR P/C LINTEL BEARING SEE DWG S-2.

LINTEL L3
3/4"=1'-0"

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE PUMP STATION

SECTIONS AND DETAILS

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Designed By: RH
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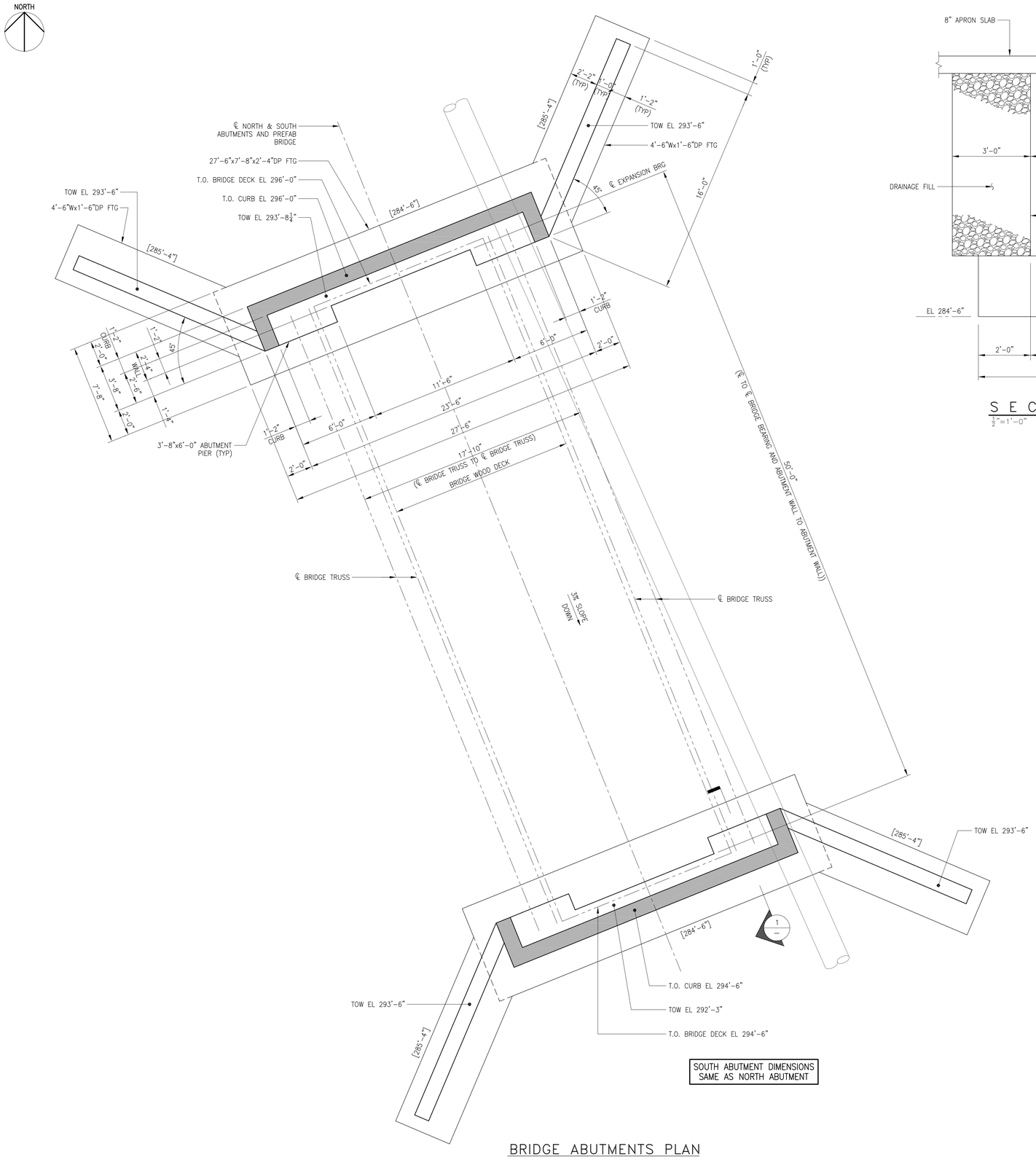
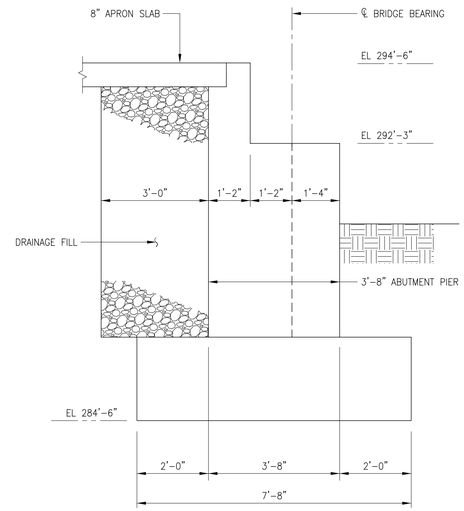


BRIDGE ABUTMENTS PLAN

$\frac{1}{4}$"=1'-0"



SECTION 1

$\frac{1}{2}$"=1'-0"

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE PUMP STATION

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BRIDGE ABUTMENTS PLAN AND SECTIONS

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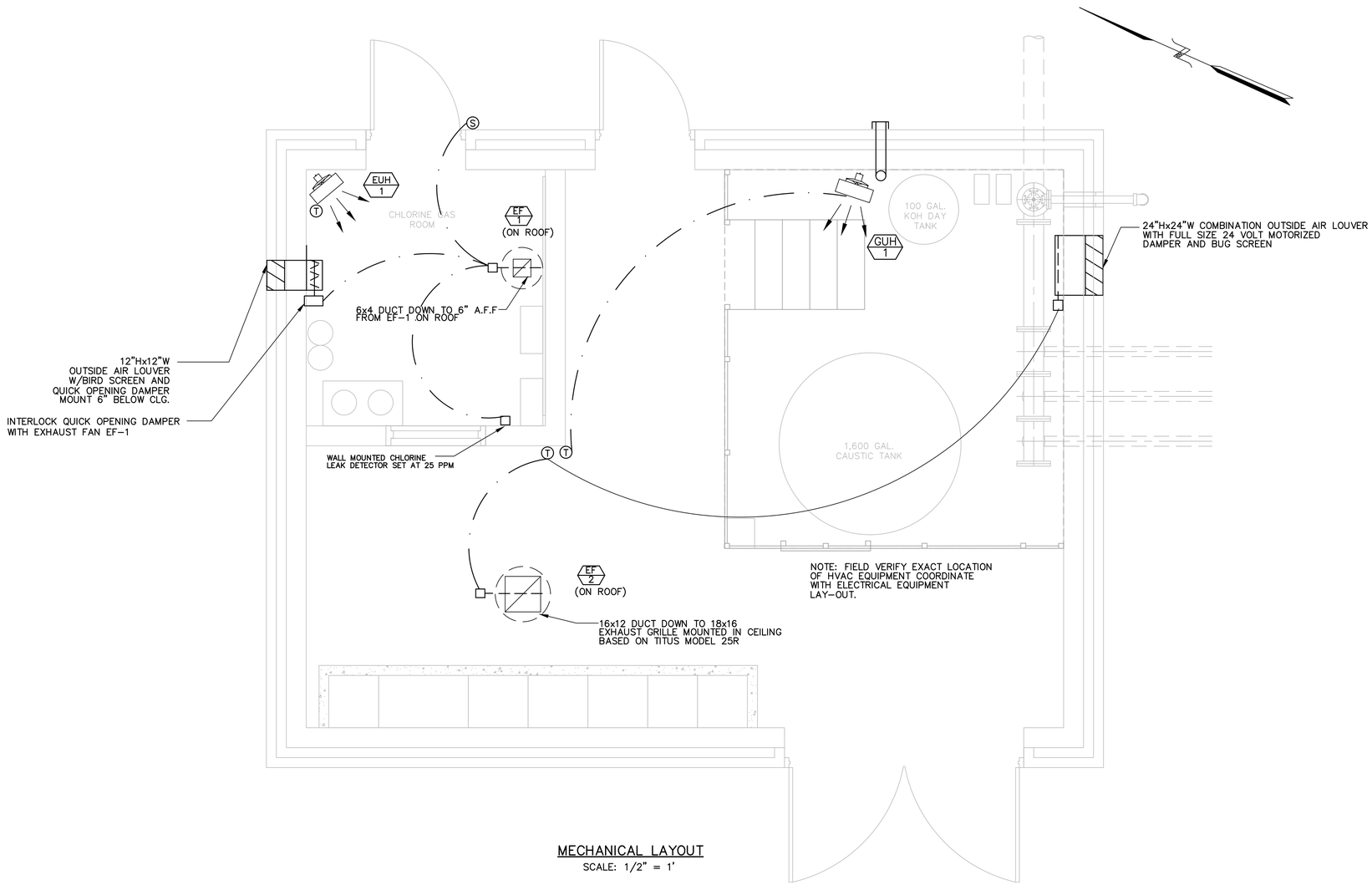
S-5



MECHANICAL LAYOUT

SCALE: 1/2" = 1'

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

MECHANICAL PLAN

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DATE: MARCH 2016
SCALE: AS NOTED

M-1

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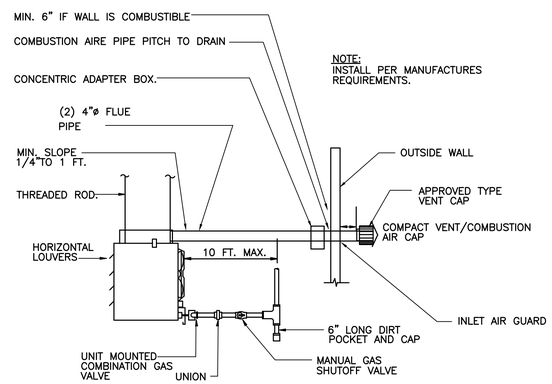
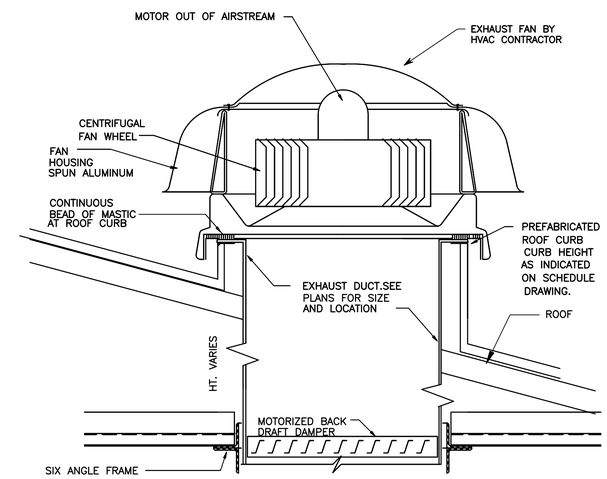
HVAC CONSTRUCTION NOTES

1. DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH 1995 2ND EDITION SMACNA STANDARDS.
2. COORDINATE DUCTWORK AND PIPING WITH PLUMBING, FIRE PROTECTION AND ELECTRICAL. MAKE OFFSETS AND TRANSITIONS TO COORDINATE WITH OTHER TRADES WITHOUT ADDITIONAL EXPENSE TO THE OWNER.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND BEARING COSTS OF NECESSARY PERMITS, BONDS, AND FEES FOR WORK. SECURE AND PAY ALL FEES FOR PERMITS, UTILITY CONNECTIONS, AND INSPECTION OF WORK.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING AS REQUIRED FOR PROPER INSTALLATION OF THE MATERIAL AND EQUIPMENT.
5. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ALL APPLICABLE LAWS, ORDINANCES, STATE AND LOCAL CODES AND SHALL BE SUBJECT TO CONTROL OF PUBLIC AUTHORITIES HAVING JURISDICTION.



GAS FIRED UNIT HEATER DETAIL

NOT TO SCALE



ROOF FAN DETAIL

NOT TO SCALE

ELECTRIC HEATER SCHEDULE (EUH)

UNIT NO.	TYPE	MBH	CFM	ELEC COIL KW	ELEC COIL AMPS	MOTOR DATA @ 60 HZ HP	RPM	VOLT	PH	SELECTION BASED ON	REMARKS
EUH-1	ELECT. UNIT HEATER	17.0	270	5.0	6.0	1/10	1400	480	3	QMARK IUH	PROVIDE MOUNTING BRACKET BUILT-IN THERMOSTAT

NOTE: 1. CORROSION RESISTANT UNIT HEATER

FAN SCHEDULE (EF)

MARK	CFM	S.P.	RPM	ELECTRICAL VOLT	ø	HZ	HP	TYPE	SERVICE	MFG	ROOF OPENING	ACCESSORIES
EF-1	75	0.25	749	120	1	60	1/8	ROOF DIRECT DRIVE	CHLORINE	GREENHECK	14.5"x14.5"	BACKDRAFT DAMPER ROOF CURB 1
EF-2	1200	0.375	1534	120	3	60	1/4	ROOF BELT DRIVE	PUMP. RM	GREENHECK	14.5"x14.5"	MOTORIZED DAMPER ROOF CURB 2

NOTES: 1. PROVIDE EF-1 WITH PERMATECTOR COATING AND A 24 VOLT EXTERIOR WALL MOUNTED SWITCH WITH ON/OFF/AUTO. NEMA4X RATED
NOTES: 2. PROVIDE EF-2 WITH PERMATECTOR COATING AND A 24 VOLT WALL MOUNTED THERMOSTAT WITH ON/OFF/AUTO SUB BASE. NEMA4X RATED

GAS UNIT HEATER SCHEDULE (GUH)

MARK	SERVES	MBH IN	MBH OUT	CFM	RPM	H.P.	ELECTRICAL VOLT	PH.	HZ.	INTAKE/ EXHAUST SIZE 2@	DESIGN EQUIPMENT	NOTES
GUH-1	FILTER ROOM	30.0	25.0	465	1550	1/35	120	1	60	4"	REZNOR UDAS-30	1,2,3,4,5

NOTES:
1. PROVIDE OPTIONAL STAINLESS STEEL HEAT EXCHANGER AND BURNER.
2. SINGLE STAGE GAS CONTROL VALVE
3. PROVIDE HANGER KIT.
4. PROVIDE WALL MOUNTED THERMOSTAT.
5. PROVIDE INTAKE/EXHAUST AIR COMPACT TERMINATION KIT OPTION CC14

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

MECHANICAL SCHEDULES

DETAILS & NOTES

Drawn By: MSB | Designed By: RSP | Checked By: WSA | Approved By: KLG

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M-2

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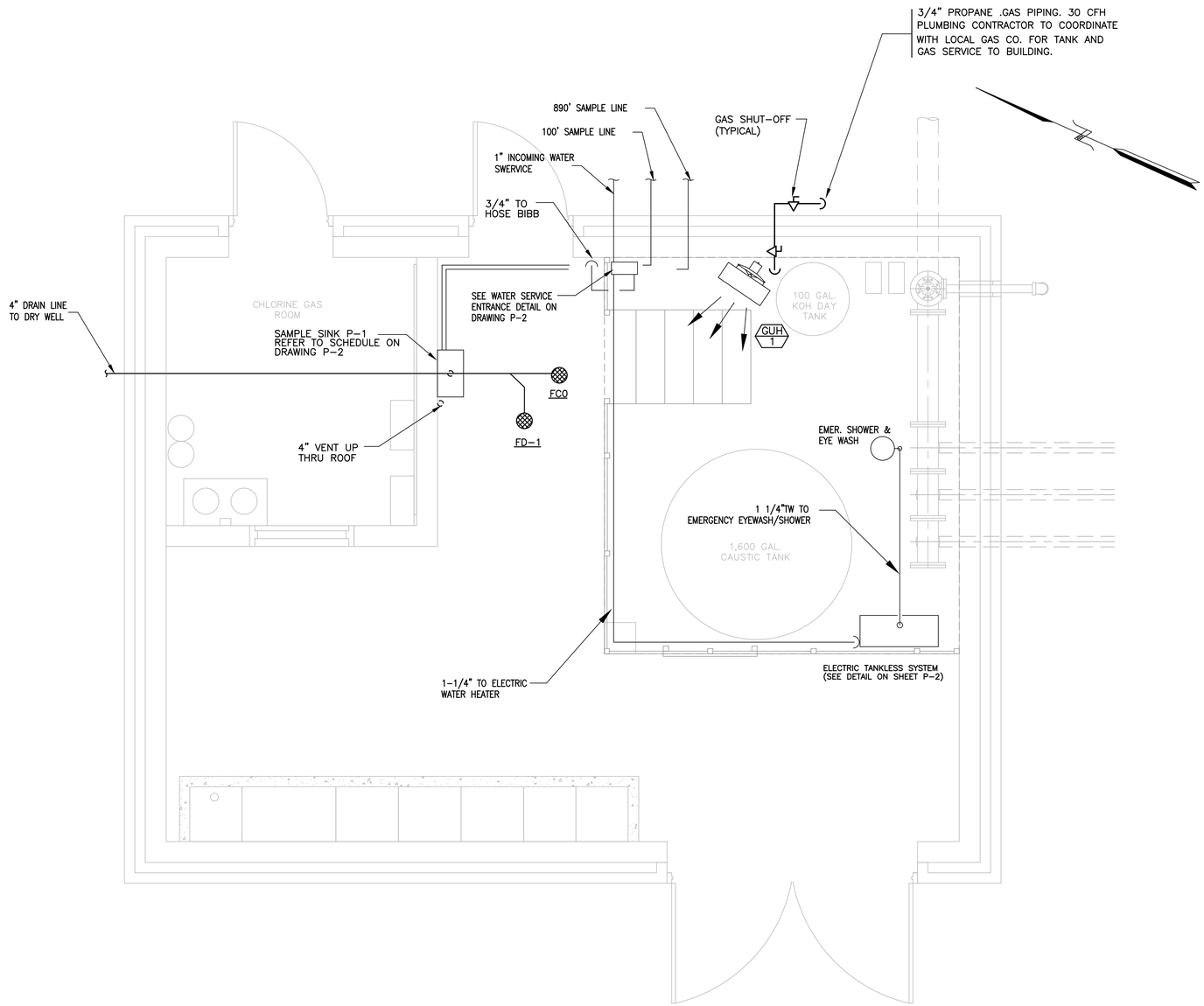

PLUMBING LAYOUT
SCALE: 1/2" = 1'

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

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PLUMBING PLAN

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PLUMBING FIXTURE SCHEDULE									
TAG	FIXTURE	MANUFACTURER	MODEL NO.	FAUCET – VALVE	WASTE	VENT	CW	HW	REMARKS
P-1	SERVICE SINK	CRANE/FIAT	FL1	DELTA 2133	2"	1-1/2"	1/2"	–	

DRAIN SCHEDULE						
TAG	FIXTURE	MANUFACTURER	MODEL NO.	WASTE	VENT	REMARKS
FD-1	FLOOR DRAIN	SMITH	2210	3"	2"	1
FCO	FLOOR CLEANOUT	SMITH	4220	–	–	

NOTE:1 INSTALL PROSET TRAP GUARD DEVICE

PLUMBING GENERAL NOTES

1.) REFER TO ARCHITECTURAL DRAWINGS FOR FINISHED FLOOR ELEVATIONS.

2.) ALL WORK PERFORMED SHALL CONFORM TO ALL APPLICABLE LAWS, STATE AND LOCAL CODES AND SHALL BE SUBJECT TO CONTROL OF PUBLIC AUTHORITIES HAVING JURISDICTION.

3.) CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND BEARING COSTS OF NECESSARY PERMITS, BONDS AND FEES FOR WORK. SECURE AND PAY ALL FEES FOR PERMITS, UTILITY CONNECTIONS AND INSPECTION OF WORK.

4.) THE FINAL ARRANGEMENT OF THE WORK SHALL SUIT FIELD CONDITIONS.

5.) VERIFY ALL DIMENSIONS IN THE FIELD.

6.) EQUIPMENT & PIPING INSTALLATION SHALL BE COORDINATED WITH ALL OTHER BUILDING SYSTEMS AND BUILDING COMPONENTS. ALL WORK WHICH CAUSES INTERFERENCE DUE TO FAILURE OF COORDINATION SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE.

7.) AFTER INSTALLATION ALL EQUIPMENT AND PIPING SYSTEMS SHALL BE TESTED TO DEMONSTRATE CAPABILITY TO PERFORM SATISFACTORILY. ANY DEFICIENCIES SHALL BE CORRECTED AND RETESTED. ALL EQUIPMENT, MATERIAL, AND LABOR REQUIRED FOR TESTING SHALL BE FURNISHED BY THE CONTRACTOR.

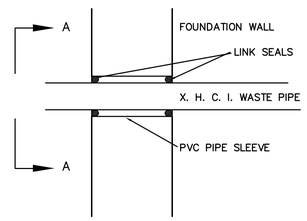
8.) PRIOR TO TESTING ALL PIPING SYSTEMS SHALL BE THOROUGHLY CLEANED AND BE IN PROPER CONDITION.

9.) ARCHITECTURAL BACKGROUND INFORMATION IS SHOWN FOR COORDINATION PURPOSES ONLY. REFER TO THE PROPER DRAWINGS FOR EXACT LOCATIONS, SIZES & QUANTITIES OF OTHER TRADES WORK.

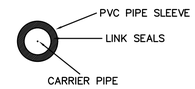
10.) ABOVE SLAB PLUMBING PIPING SHALL BE HELD AS HIGH AS POSSIBLE.

11.) NO PLUMBING PIPING SHALL BE RUN IN OR THROUGH THE ELECTRIC ROOMS.

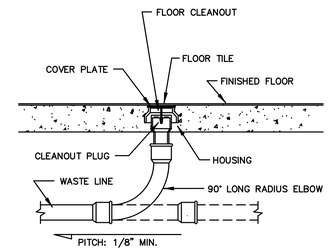
12.) PLUMBING CONTRACTOR IS RESPONSIBLE FOR ALL FINAL CONNECTIONS TO SITE UTILITIES. COORDINATE EXACT LOCATION, INV., AND UTILITY MATERIALS IN FIELD.



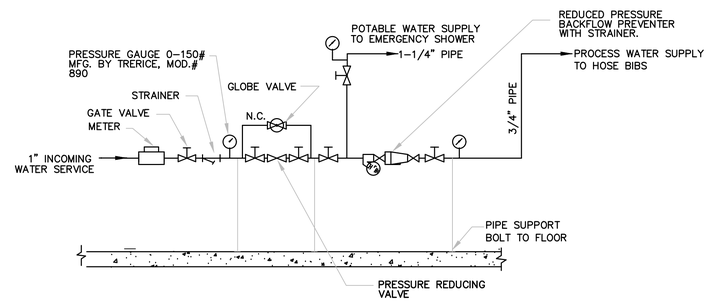
TYPICAL PIPE PENETRATION
THROUGH CONCRETE WALLS
SCALE: NONE



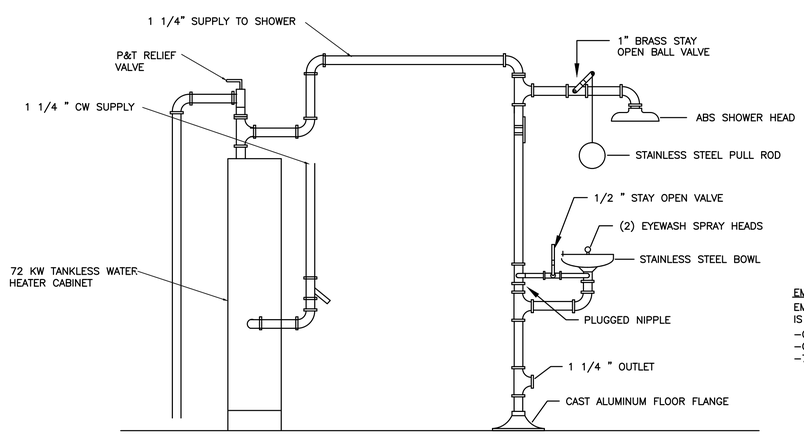
SECTION A – A



FLOOR CLEANOUT DETAIL
NO SCALE



WATER SERVICE ENTRANCE



EMERGENCY SHOWER AND EYEWASH SYSTEM

EMERGENCY SHOWER SYSTEM

EMERGENCY SHOWER/EYEWASH ELECTRIC TANKLESS WATER SYSTEM IS BASED ON KELTECH MODEL SN723/480D

–OUTPUT SIGNAL
–GROUND FAULT PROTECTION
–72 KW 480/3/60 87 AMPS 20 GPM AT 24°T.DIFF.

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE
PUMP STATION

Drawn By: MSB | Designed By: RSP | Checked By: WSA | Approved By: KLG

PLUMBING SCHEDULES

DETAILS & NOTES

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	3/15/16	Planning Board Submittal

TATA & HOWARD

T&H NO.: 3703
DATE: MARCH 2016
SCALE: AS NOTED

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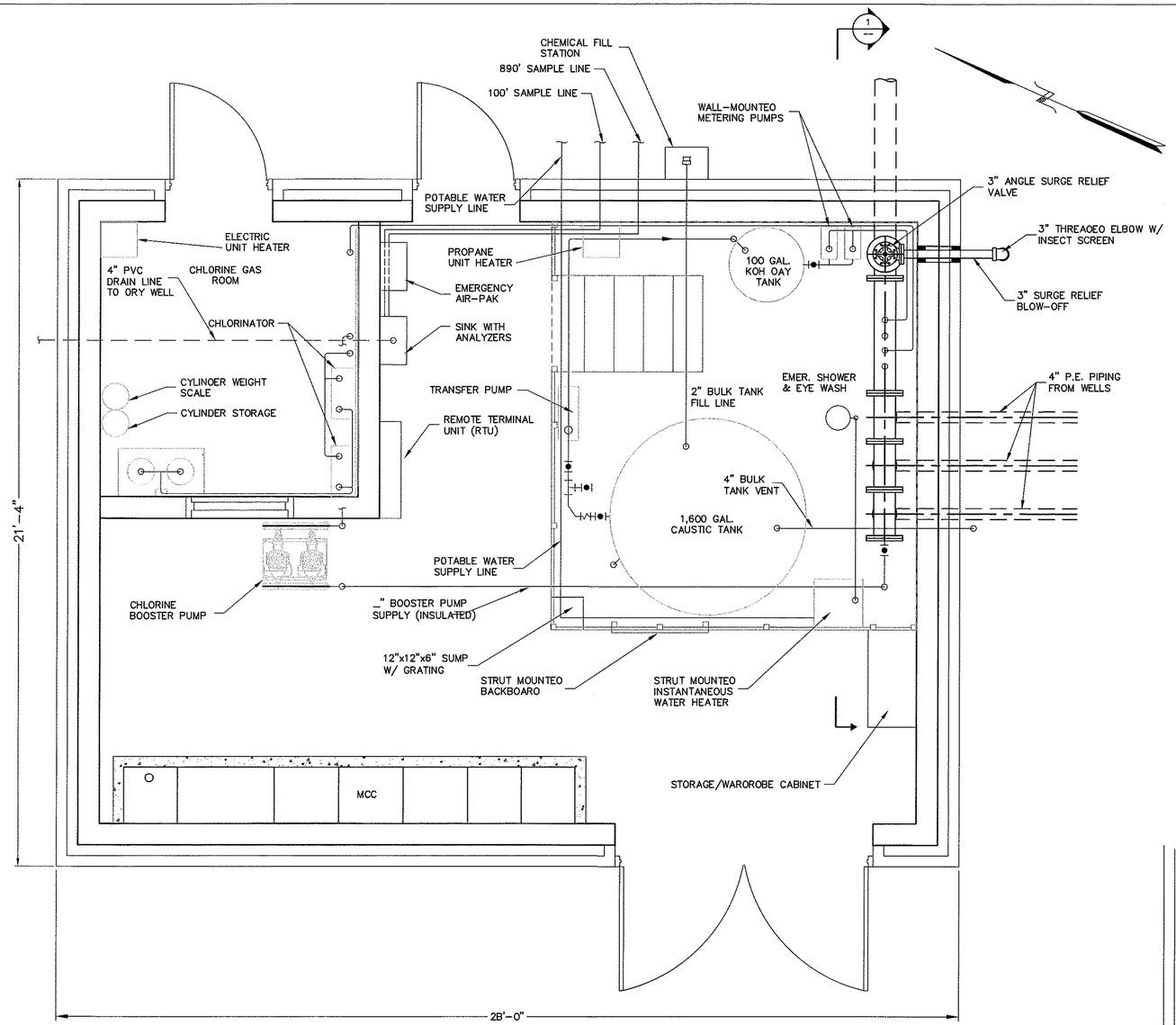
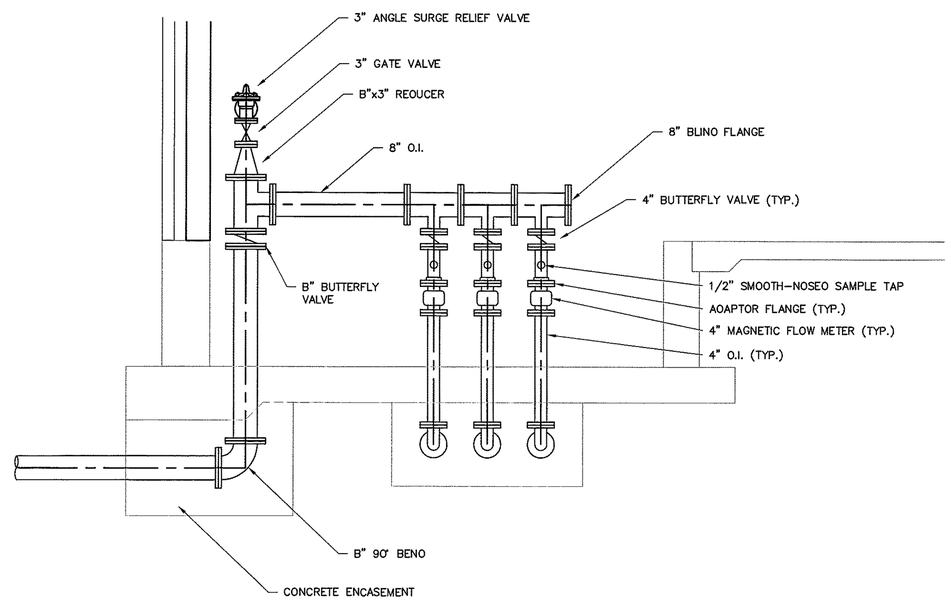


PROCESS FLOOR PLAN

SCALE: 1/2" = 1'-0"



SECTION 1

SCALE: 1/2" = 1'-0"

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE PUMP STATION

Drawn by: MSB | Designed by: RSP | Checked by: WSA | Approved by: KLG

PROCESS PLAN & SECTION

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MARCEL GOUDREY CIVIL No. 46508 — COMMONWEALTH OF MASSACHUSETTS — REGISTERED PROFESSIONAL ENGINEER — 3/15/16

TATA & HOWARD

T&H NO.: 3703
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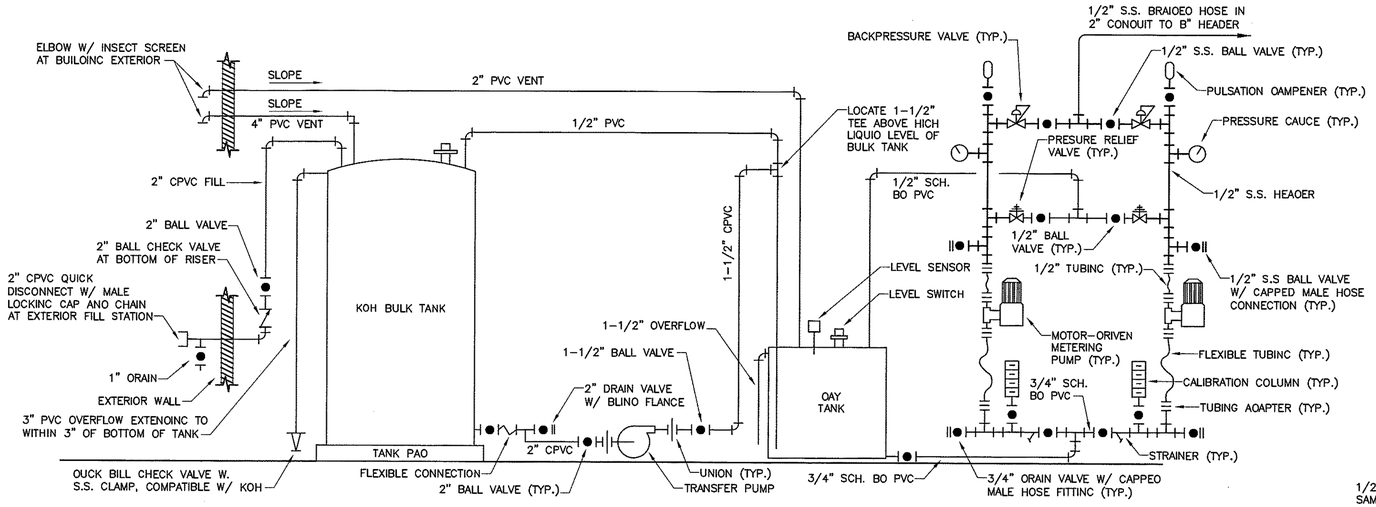
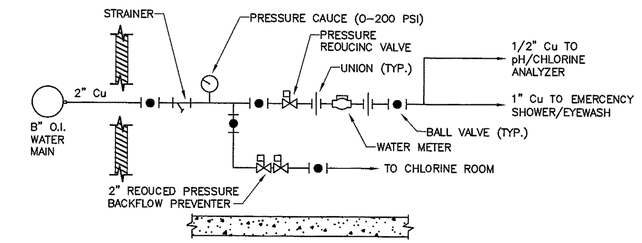


NOTES:
1. 1/2" STAINLESS STEEL HEADER TO BE COMPRISED OF SCH. 40 TYPE 304/316 STAINLESS STEEL THREADED PIPE, CAST STAINLESS STEEL FITTINGS, AND STAINLESS STEEL BALL VALVES.

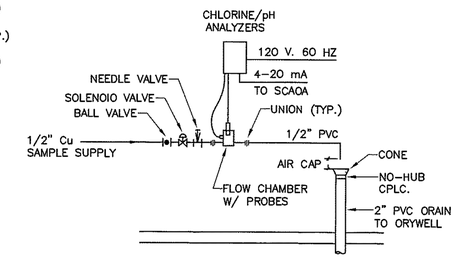
CAUSTIC FEED SYSTEM SCHEMATIC

SCALE: NONE



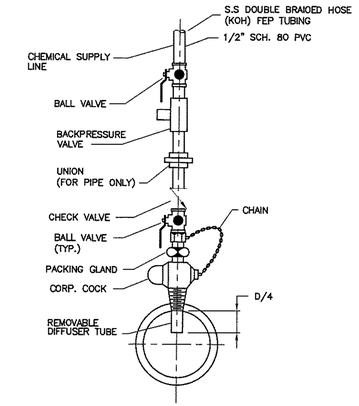
SCHEMATIC OF WATER SUPPLY PIPING

SCALE: NONE



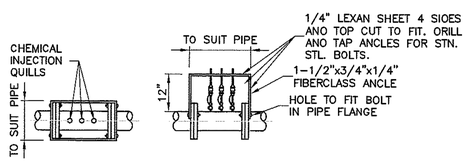
PIPING SCHEMATIC FINISHED WATER MONITORING EQUIPMENT

SCALE: NONE



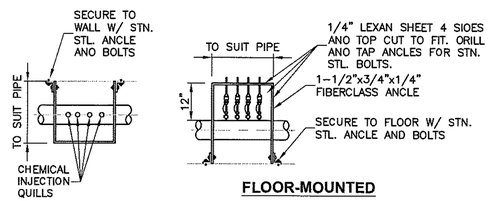
PIPE CHEMICAL DIFFUSER DETAILS

SCALE: NONE



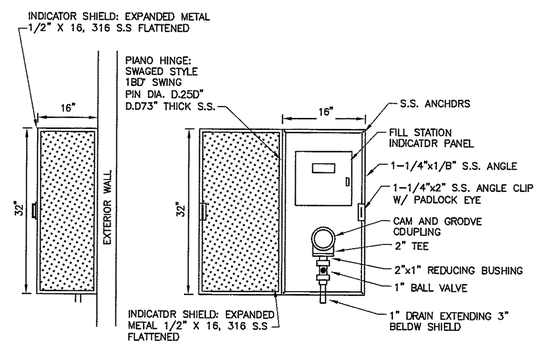
CHEMICAL FEED CORPORATION GUARD PIPELINE-MOUNTED

SCALE: NONE



CHEMICAL FEED CORPORATION GUARD FLOOR/WALL-MOUNTED

SCALE: NONE

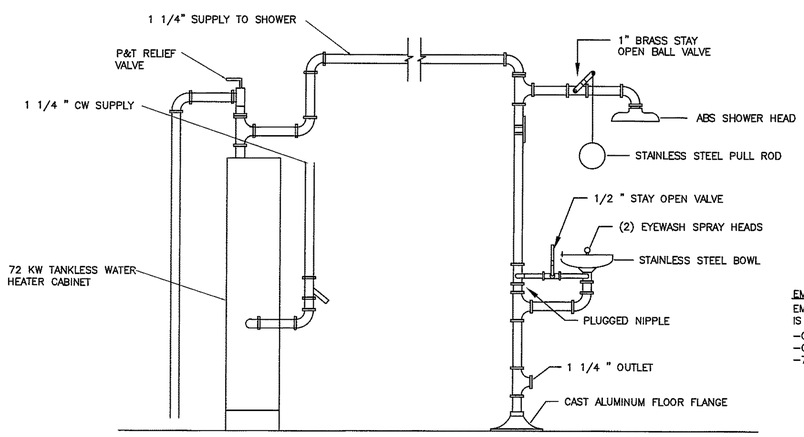


SIDE VIEW FRONT VIEW, COVER OPEN

NOTES:
1. ALL MATERIALS OF FABRICATION, INCLUDING HARDWARE, SHALL BE TYPE 316 STAINLESS STEEL.
2. FILL LINE COVER SHALL BE LABELED WITH APPROPRIATE CHEMICAL.
3. A NAME PLATE (316 S.S.) SHALL BE PROVIDED FOR EACH FILL LINE INCLUDING CHEMICAL NAME, FORMULA, 4-DIGIT UN NUMBER AND BULK TANK ID WHICH THE LINE IS TO FILL.
4. INDICATOR SHIELD DIMENSIONS SHALL BE COORDINATED WITH EQUIPMENT BEING HOUSED.

CHEMICAL FILL AND INDICATOR SHIELDS

SCALE: NONE

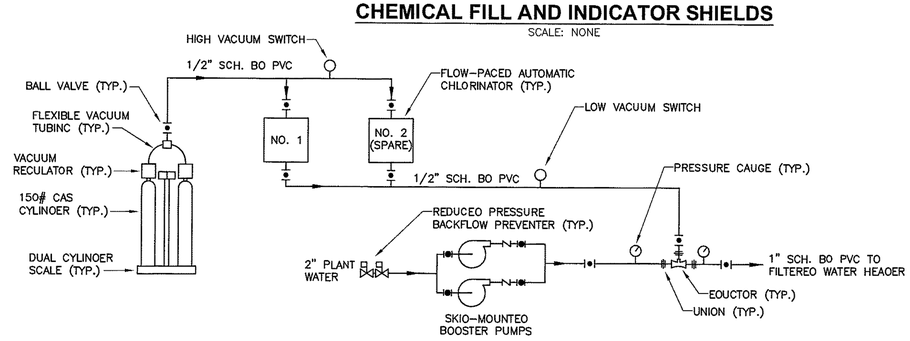


EMERGENCY SHOWER SYSTEM

EMERGENCY SHOWER/EYEWASH ELECTRIC TANKLESS WATER SYSTEM IS BASED ON KELTECH MODEL SN723/4BOD
-OUTPUT SIGNAL
-GROUND FAULT PROTECTION
-72 KW 4BD/3/60 B7 AMPS 2D GPM AT 24°T.DIFF.

EMERGENCY SHOWER AND EYEWASH SYSTEM

SCALE: NONE



CHLORINE GAS FEED SYSTEM

SCALE: NONE

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE PUMP STATION

Drawn By: LSS | Designed By: RSP | Checked By: WSA | Approved By: KLG

PROCESS DETAILS

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COMMONWEALTH OF MASSACHUSETTS — KENNETH L. HOWARD — CIVIL — No. 40588 — REGISTERED PROFESSIONAL ENGINEER
3-15-16

TATA & HOWARD

T&H NO.: 37D3
DATE: MARCH 2016
SCALE: AS NOTED

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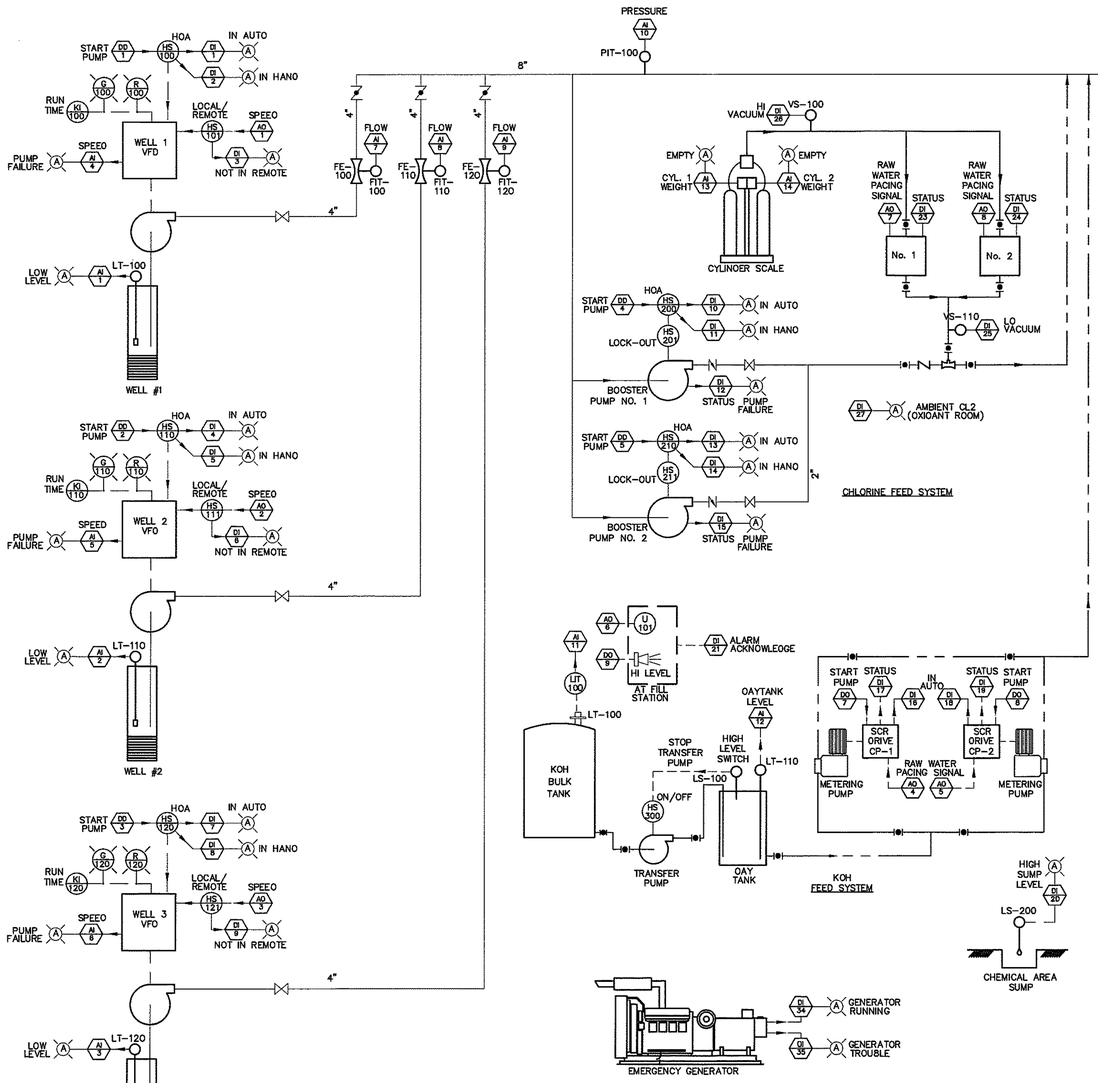

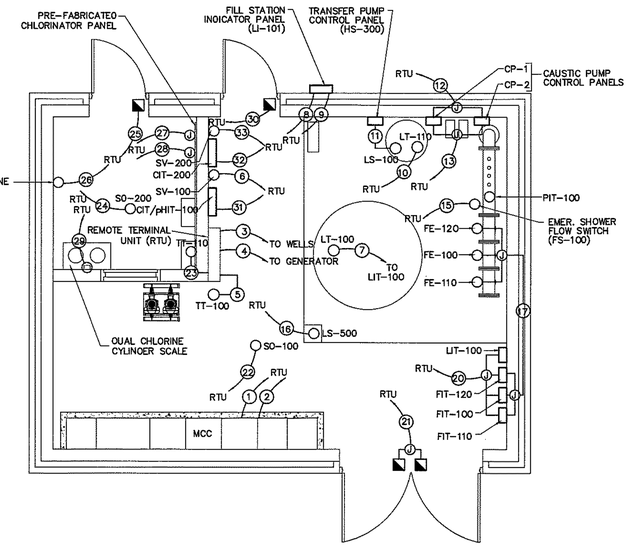

SCADA RTU INPU/OUTPUT LISTING

DESCRIPTION	DISCRETE INPUT	DISCRETE OUTPUT	ANALOG INPUT	ANALOG OUTPUT
WELL PUMP NO. 1 "IN HAND"	1			
WELL PUMP NO. 1 "IN AUTO"	2			
WELL PUMP NO. 1 "IN REMOTE"	3			
WELL PUMP NO. 2 "IN HAND"	4			
WELL PUMP NO. 2 "IN AUTO"	5			
WELL PUMP NO. 2 "IN REMOTE"	6			
WELL PUMP NO. 3 "IN HAND"	7			
WELL PUMP NO. 3 "IN AUTO"	8			
WELL PUMP NO. 3 "IN REMOTE"	9			
Cl2 BOOSTER PUMP NO. 1 "IN AUTO"	10			
Cl2 BOOSTER PUMP NO. 1 "IN HAND"	11			
Cl2 BOOSTER PUMP NO. 1 STATUS	12			
Cl2 BOOSTER PUMP NO. 2 "IN AUTO"	13			
Cl2 BOOSTER PUMP NO. 2 "IN HAND"	14			
Cl2 BOOSTER PUMP NO. 2 STATUS	15			
CAUSTIC PUMP NO. 1 "IN AUTO"	16			
CAUSTIC PUMP NO. 2 STATUS	17			
CAUSTIC PUMP NO. 2 "IN AUTO"	18			
CAUSTIC PUMP NO. 1 STATUS	19			
CAUSTIC SUMP FLOOD	20			
CAUSTIC TANK ALARM ACKNOWLEDGE	21			
EMERGENCY SHOWER FLOW	22			
CHLORINATOR NO. 1 STATUS	23			
CHLORINATOR NO. 2 STATUS	24			
CHLORINATOR LOW VACUUM ALARM	25			
CHLORINATOR HIGH VACUUM ALARM	26			
AMBIENT AIR HIGH CHLORINE ALARM	27			
ATS "STANDBY POWER"	28			
ATS "LOSS OF NORMAL POWER"	29			
INTRUSION	30			
FIRE - ELECTRICAL ROOM	31			
FIRE - CHLORINE ROOM	32			
LOSS OF POWER - RTU	33			
GENERATOR RUNNING	34			
GENERATOR TROUBLE	35			
START/STOP WELL PUMP NO. 1		1		
START/STOP WELL PUMP NO. 2		2		
START/STOP WELL PUMP NO. 3		3		
START/STOP Cl2 BOOSTER PUMP #1		4		
START/STOP Cl2 BOOSTER PUMP #2		5		
OPEN SAMPLE LINE SOLENOID VALVE		6		
START/STOP CAUSTIC PUMP NO. 1		7		
START/STOP CAUSTIC PUMP NO. 2		8		
SOUND BUZZER - FILL STATION		9		
SOUND ALARM BUZZER - RTU		10		
WELL NO. 1 LEVEL			1	
WELL NO. 2 LEVEL			2	
WELL NO. 3 LEVEL			3	
WELL PUMP NO. 1 SPEED			4	
WELL PUMP NO. 2 SPEED			5	
WELL PUMP NO. 3 SPEED			6	
WELL NO. 1 FLOW			7	
WELL NO. 2 FLOW			8	
WELL NO. 3 FLOW			9	
DISTRIBUTION SYSTEM PRESSURE			10	
CAUSTIC BULK TANK LEVEL			11	
CAUSTIC DAY TANK LEVEL			12	
CHLORINE CYLINDER NO. 1 WEIGHT			13	
CHLORINE CYLINDER NO. 2 WEIGHT			14	
CHLORINE RESIDUAL			15	
pH			16	
CAUSTIC AREA TEMPERATURE			17	
CHLORINE ROOM TEMPERATURE			18	
ELECTRICAL ROOM TEMPERATURE			19	
WELL PUMP NO. 1 SPEED				1
WELL PUMP NO. 2 SPEED				2
WELL PUMP NO. 3 SPEED				3
CAUSTIC PUMP NO. 1 FLOW RACE				4
CAUSTIC PUMP NO. 2 FLOW RACE				5
CAUSTIC BULK TANK LEVEL				6
CHLORINATOR NO. 1 FLOW RACE				7
CHLORINATOR NO. 2 FLOW RACE				8

CONDUIT SCHEDULE

CONDUIT NO.	CONDUIT SIZE	CONDUCTORS	SCADA I/O REFERENCE
PUMP STATION RTU			
1	2"	60-#14	DI-1 thru 15,28,29 DO-1 thru 5 SPARE
2	1"	6-2C/#18TS	AI-4,5,6 AO-1,2,3
3	1"	3-2C/#16TS	AI-1,2,3
4	3/4"	8-#14	DI-34,2S SPARE
5	3/4"	1-2C/#18TS	AI-17
6	3/4"	1-2C/#18TS	AI-11
7	3/4"	TRANSDUCER CABLE	
8	3/4"	1-2C/#18TS	AO-6
9	3/4"	6-#14	DI-21 DO-9 SPARE
10	3/4"	1-2C/#18TS	AI-12
11	3/4"	4-#14	TO TRANSFER PUMP CONTROL PANEL
12	1"	16-#14	DI-16 thru 19 DO-7,8 SPARE
13	3/4"	2-2C/#18TS	AO-4,5
14	3/4"	1-2C/#18TS	AI-10
15	3/4"	2-#14	DI-22
16	3/4"	2-#14	DI-20
17	3/4"	METER-SUPPLIED CABLE	
18	3/4"	METER-SUPPLIED CABLE	
19	3/4"	METER-SUPPLIED CABLE	
20	3/4"	3-2C/#18TS	AI-7,8,9
21	3/4"	2-#14	DI-30
22	3/4"	S-#14	DI-31
23	3/4"	1-2C/#18TS	AI-1B
24	3/4"	5-#14	DI-32
2S	3/4"	2-#14	DI-30
26	3/4"	2-#14	DI-27
27	3/4"	2-2C/#18TS	AO-7,8
2B	3/4"	8-#14	DI-23 thru 26
29	3/4"	2-2C/#18TS	AI-13,14
30	3/4"	2-#14	DI-30
31	3/4"	2-2C/#18TS	AI-15,16
32	3/4"	2-#14	DO-6
33	3/4"	1-2C/#18TS	AI-19

LEGEND:

- A - ANALOG
- D - DISCRETE
- I - INPUT
- O - OUTPUT
- SCADA INTERFACE
- ALARM AT SCADA
- MCC/STARTER MOUNTED
- LOCALLY MOUNTED
- INDICATING LIGHT-R=RED G=GREEN
- ELECTRICAL SIGNAL
- PROCESS LINE
- CHEMICAL LINE
- FLOW METERING DEVICE
- BALL VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- SOLENOID VALVE
- PRESSURE REDUCING VALVE
- GATE VALVE

CIT	CHLORINE RESIDUAL INDICATOR/TRANSMITTER
FE	FLOW ELEMENT
FIT	FLOW INDICATOR/TRANSMITTER
FS	FLOW SWITCH
HS	HAND SWITCH
HOA	HAND-OFF-AUTO SWITCH
KI	RUNNING TIME METER
LI	LEVEL INDICATOR
LS	LEVEL (FLOAT) SWITCH
LT	LEVEL TRANSMITTER
LIT	LEVEL INDICATOR/TRANSMITTER
pHIT	pH INDICATOR/TRANSMITTER
PIT	PRESSURE INDICATOR/TRANSMITTER
RTU	SCADA REMOTE TERMINAL UNIT
SV	SOLENOID VALVE
TT	TEMPERATURE TRANSMITTER
SD	SMOKE DETECTOR

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRINITY AVENUE PUMP STATION

P&ID

Drawn By:	MSB
Designed By:	RFC
Checked By:	PBH
Approved By:	KLG

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I-1

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ELECTRICAL LEGEND

LIGHT FIXTURE. LETTER REFERS TO FIXTURE SCHEDULE:

LIGHT FIXTURE, CAPITAL LETTER INDICATES FIXTURE TYPE, NUMERAL INDICATED CIRCUIT NUMBER AND SMALLER LETTER SWITCH CONTROL. HATCH INDICATES EMERGENCY FIXTURE.

EXIT SIGN – WALL MOUNTED – DIRECTIONAL ARROWS AS INDICATED

EXIT SIGN – CEILING MOUNTED – DIRECTIONAL ARROWS AS INDICATED

SWITCHES. 48" TO A.F.F. EXCEPT AS NOTED:

S	SINGLE POLE
S	MULTI-GANG
S_2	TWO POLE
S^3	THREE WAY
S^4	FOUR WAY
S_P	SINGLE POLE WITH RED PILOT LIGHT
S_M	SINGLE POLE WITH THERMAL ELEMENT

CONVENIENCE OUTLETS. MOUNTED 18" UNLESS OTHERWISE NOTED:

OUTLET SUBSCRIPTS:

WP– WEATHERPROOF TYPE

GFI – GROUND FAULT INTERRUPTER TYPE

C – MOUNTED ABOVE ABOVE COUNTER OR 42" AFF

DUPLEX – 20A, 125V, GROUNDING TYPE

TWIST LOCK – 20A, 125V, GROUNDING TYPE,

QUAD – 20A, 125V, GROUNDING TYPE.

CATV OUTLET. PROVIDE 3/4" CONDUIT WITH PULL STRING EXTEND CONDUIT TO TELEPHONE BACK BOARD

TELEPHONE OUTLET. PROVIDE 3/4" CONDUIT WITH PULL STRING EXTEND CONDUIT TO TELEPHONE BACK BOARD

MISCELLANEOUS:

MOTOR, NUMERAL INDICATES HORSEPOWER

MAGNETIC MOTOR STARTER. SIZED AS REQUIRED.

CONTACTOR. NEMA 1 ENCLOSURE. #POLES AND COIL VOLTAGE AS REQUIRED.

COMBINATION MAGNETIC MOTOR STARTER/DISCONNECT. # OF POLES AND SIZE AS REQUIRED

DISCONNECT SWITCH, FUSED, UNLESS NOTED OTHERWISE, # OF POLES AND RATING AS REQUIRED

DISCONNECT SWITCH, UNFUSED, UNLESS OTHERWISE NOTED, # OF POLES AND RATING AS REQUIRED

POWER AND/OR LIGHTING PANELBOARD

J OR J JUNCTION BOX

THERMOSTAT

X X MECHANICAL EQUIPMENT – SEE MECH. EQUIP. SCHEDULE

RACEWAYS AND CONDUCTORS

CONDUIT TURNING UP

CONDUIT TURNING DOWN

HOMERUN TO PANELBOARD; 2#12 & #12G IN 1/2"C. TO 20A.1P CIRCUIT BREAKER (TYPICAL UNLESS NOTED OTHERWISE)

CONDUIT UNDERGROUND

OH OVERHEAD WIRING

UP WOOD UTILITY POLE

S INGROUND HANDHOLE, "S" INDICATES SIGNAL, "P" INDICATES POWER

FIRE ALARM SYSTEM:

F MANUAL PULL STATION, M.H. 42" A.F.F.

F COMBINATION AUDIO/VISUAL INDICATOR, M.H. 7'6" A.F.F. FIELD SELECTABLE CD RATING.

F VISUAL INDICATOR, M.H. 7'6" A.F.F. FIELD SELECTABLE CD RATING.

F COMBINATION AUDIO/VISUAL INDICATOR, CEILING MOUNTED. FIELD SELECTABLE CD RATING.

F VISUAL INDICATOR, CEILING MOUNTED. FIELD SELECTABLE CD RATING.

D DUCT SMOKE DETECTOR

H HEAT DETECTOR

S SMOKE DETECTOR

F BUILDING MASTER FIRE BOX

FACP FIRE ALARM CONTROL PANEL

FAAP FIRE ALARM ANNUNCIATOR

B SPRINKLER BELL

R EXTERIOR BEACON

PS PRESSURE SWITCH, PROVIDED BY E.C.

TS TAMPER SWITCH, PROVIDED BY E.C.

FS WATER FLOW SWITCH, PROVIDED BY E.C.

PIV POST INDICATING VALVE

R REMOTE INDICATING LIGHT

RTS REMOTE TEST SWITCH

R MONITOR/CONTROL MODULE

ABBREVIATIONS

ACB	AIR CIRCUIT BREAKER
ALT	ALTERNATE
AL	ALUMINUM
AWG	AMERICAN WIRE GAUGE
A	AMPERE(S)
ATS	AUTOMATIC TRANSFER SWITCH
BW	BUSWAY
CLG	CEILING
CKT	CIRCUIT
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
COND	CONDUCTOR
C	CONDUIT
CONN	CONNECT
CC	CONTROL CABINET
CP	CONTROL PANEL
CU	COPPER
CT	CURRENT TRANSFORMER
DIM	DIMMER CONTROL
D.C.	DIRECT CURRENT
DISC	DISCONNECT
DPP	DISTRIBUTION POWER PANEL
DT	DOUBLE THROW
DN	DOWN
E	ELECTRIC
E.C.	ELECTRIC CONTRACTOR
EUH	ELECTRIC UNIT HEATER
EWC	ELECTRIC WATER COOLER
EMT	ELECTRIC METALLIC TUBING
EM	EMERGENCY
ELR	END OF LINE RESISTOR
EXIST	EXISTING
XP	EXPLOSION PROOF
FDR	FEEDER
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
F.P.C.	FIRE PROTECTION CONTRACTOR
FLUOR	FLUORESCENT
FL	FLOOR
F	FUSE
FS	FUSIBLE SWITCH
GEN	GENERATOR
G.C.	GENERAL CONTRACTOR
GRD	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
HH	HANDHOLE
HID	HIGH INTENSITY DISCHARGE
HP	HORSE POWER
HPS	HIGH PRESSURE SODIUM
IMC	INTERMEDIATE METAL CONDUIT
INC	INCANDESCENT
IC	INTERCOM
ISO	ISOLATED NEUTRAL
JB	JUNCTION BOX
K	KEY OPERATED
KVAR	KILOVARS
KVA	KILOVOLT AMPERES
KW	KILOWATT
LP	LIGHTING PANEL
LPS	LOW PRESSURE SODIUM
LV	LOW VOLTAGE
MGST	MAGNETIC STARTER
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUG ONLY
MH	MANHOLE
MTS	MANUAL TRANSFER SWITCH
MC	MECHANICAL CONTRACTOR
MIKE	MICROPHONE
MTR	MOTOR
MCC	MOTOR CONTROL CENTER
KCMIL	THOUSAND CIRCULAR MILLS
NF	NON FUSED
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NTS	NOT TO SCALE
NIC	NOT IN CONTRACT
OL	OVERLOAD ELEMENT
OC	OVER COUNTER
PNL	PANEL
P	PILOT INDICATOR
PVC	POLYVINYL CHLORIDE
PLBG C	PLUMBING CONTRACTOR
PT	POTENTIAL TRANSFORMER
PF	POWER FACTOR
PP	POWER PANEL
PRI	PRIMARY
PS	PULL SWITCH
RECP	RECEPTACLE
R	RELAY
RC	REMOTE CONTROL
RGS	RIGID GALVANIZED STEEL
RWT	REFLECTED WAVE TRAP
S	SIGNAL
SEC	SECONDARY
SP	SINGLE POLE
ST	SINGLE THROW
SPK	SPEAKER
SW	SWITCH
SWBD	SWITCHBOARD
TCC	TEMPERATURE CONTROL CONTRACTOR
TEMP	TEMPORARY
T	TELEPHONE
TV	TELEVISION
TB	TERMINAL BOX
XFMR	TRANSFORMER
TYP	TYPICAL
UE	UNDERGROUND ELECTRIC
UG	UNDERGROUND
UH	UNIT HEATER
UNG	UNGROUNDED
UNP	UNGROUNDED PRIMARY
UPS	UNINTERRUPTIBLE POWER SYSTEM
US	UNDERGROUND SIGNAL
VP	VAPOR PROOF
VAR	REACTIVE VOLT AMPERES
V	VOLT
VA	VOLTAMP
VFD	VARIABLE FREQUENCY DRIVE
W	WATT
WP	WEATHERPROOF

INSTRUMENTATION PIPING AND MOUNTING

1. ALL WORK SHALL CONFORM TO THE MASSACHUSETTS ELECTRICAL CODE (M.E.C.) LATEST EDITION.
2. COORDINATE ALL ELECTRICAL EQUIPMENT LOCATIONS AND MECHANICAL APPURTENANCES WITHIN THE EXISTING CONDITIONS TO PROVIDE ADEQUATE WORKING AND ACCESS PER N.E.C. REQUIREMENTS.
3. WHERE EXISTING ELECTRICAL DEVICES AND PROCESS DEVICES ARE INDICATED THOSE LOCATIONS ARE APPROXIMATE AND NOT ALL ELECTRICAL DEVICES MAY BE INDICATED. (FIELD VERIFY ALL ELECTRICAL ITEMS WHERE POSSIBLE.)
4. CONDUITS, RACEWAYS AND CABLES SHALL BE PROPERLY AND SECURELY ATTACHED TO BUILDING STRUCTURAL COMPONENTS AS REQUIRED BY N.E.C. ALL FASTENERS AND HARDWARE SHALL BE APPROVED FOR THE INSTALLATION AND THE CONDITIONS ENCOUNTERED.
5. EACH JUNCTION IN ANY OF THE WIRING SYSTEMS SHALL BE MADE IN AN APPROVED JUNCTION BOX. SUCH BOX SHALL BE SUITABLE FOR THE SIZE AND NUMBER OF CONDUCTORS AND DEVICES TO BE INSTALLED, AS WELL AS THE CONDITION ENCOUNTERED. ALL SPLICES SHALL BE MADE WITH APPROVED, MECHANICAL CONNECTORS.
6. CONTRACTOR SHALL VERIFY ALL STRUCTURAL, PROCESS AND MECHANICAL CONDITIONS PRIOR TO ROUGH–IN FOR ELECTRICAL WIRING AND EQUIPMENT.
7. ALL ELECTRICAL WORK SHALL BE CAREFULLY COORDINATED WITH THE ON–SITE CONDITIONS. WHERE CUTTING, DRILLING OR ALTERATION TO THE WORK OF OTHERS IS NECESSARY FOR THE PROPER INSTALLATION OF ELECTRICAL EQUIPMENT, SUCH WORK SHALL BE PLANNED IN ADVANCE AND SHALL BE CAREFULLY DONE. ANY DAMAGE TO THE BUILDINGS OR EQUIPMENT SHALL BE REPAIRED BY PROPERLY TRAINED PERSONNEL TO THE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST TO THE OWNER.
8. DURING ROUGH–IN AND FINISHED STAGES OF CONSTRUCTION, THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT AND KEEP CLEAN ALL ELECTRICAL EQUIPMENT, PANELS, FIXTURES AND DEVICES AS WELL AS ALL EXISTING EQUIPMENT AND RELATED WORK AREAS.
9. THE CONTRACTOR SHALL PROVIDE ALL INFORMATION ABOUT EQUIPMENT WHICH HE/SHE IS FURNISHING TO THE ENGINEER/OWNER FOR REVIEW PURPOSES. THE CONTRACTOR SHALL PROVIDE ALL INSTALLATION DETAILS AND SUPPORT COMPONENTS SO THAT THESE MAY BE BUILT INTO THE CONSTRUCTION IN A TIMELY MANNER.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF THE FINAL LOCATIONS OF INSTRUMENTATION CONTROL AND POWER CONNECTION DETAILS SO THAT THE ASSOCIATED ELECTRICAL WORK WILL BE PROPERLY COORDINATED AND INSTALLED.
11. EQUIPMENT LAYOUT AND EXACT LAYOUT OF NEW ELECTRICAL EQUIPMENT AND INSTRUMENTATION SHALL BE COORDINATED WITH PROCESS AND MECHANICAL EQUIPMENT.
12. DRAWINGS SHOW A LAYOUT OF ELECTRICAL/INSTRUMENTATION SYSTEMS AND EQUIPMENT DIAGRAMMATICALLY. EXACT LOCATION OF EQUIPMENT AND ROUTING OF RACEWAYS SHALL BE DETERMINED BY FIELD CONDITIONS AND DIRECTION BY ENGINEER AND OWNER. BY SUBMITTING A BID, CONTRACTOR WARRANTS THAT HE HAS VISITED THE SITE WHERE WORK IS TO BE PERFORMED, AND HAS EXAMINED THE EXISTING CONDITIONS AND EXTENT OF LABOR AND MATERIALS TO BE PROVIDED. COORDINATION WITH ALL TRADES, UTILITIES, ETC. SHALL BE PROVIDED. THE ENGINEER SHOULD BE NOTIFIED OF ANY DISCREPANCIES, OMISSIONS, CONFLICTS OR INTERFERENCES WHICH OCCUR BETWEEN VARIOUS DRAWINGS AND SPECIFICATIONS. IF SUCH NOTIFICATION IS NOT RECEIVED THE INSTALLING CONTRACTOR(S) SHALL BE RESPONSIBLE FOR THEIR INTERPRETATIONS.

INSTRUMENTATION NOTES

1. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY POWER AND SIGNAL WIRING WITH CONDUITS AS SHOWN ON ELECTRICAL AND INSTRUMENTATION DRAWINGS BETWEEN POWER PANELS, PLC'S, CONTROL PANELS, AND FIELD INSTRUMENTS AS REQUIRED.
2. MINIMUM SIZE CONDUIT TO BE 3/4".
3. MINIMUM SIZE CONTROL WIRING TO BE #14 AWG. SHIELDED CABLE TO BE 2/C#16 FOR LOOP POWERED DEVICES. 4/C#16 FOR 4–WIRE DEVICES.
4. WIRING MAY BE COMBINED IN SINGLE RACEWAYS FOR EACH OF THE FOLLOWING CATEGORIES. DO NOT MIX CATEGORIES IN A SINGLE CONDUIT:
   - 4.1. 120v POWER WIRING
   - 4.2. CONTROL AND DISCRETE OUTPUT SIGNALS (24VAC)
   - 4.3. DISCRETE INPUT SIGNALS (24VDC)
   - 4.4. ANALOG SIGNAL WIRING
5. LOCATION OF PROCESS EQUIPMENT, MOTORS, VALVES, INSTRUMENTS, ETC. SHOWN ON THE DRAWINGS ARE APPROXIMATE. REFER TO PROCESS AND MECHANICAL DRAWINGS FOR EXACT LOCATIONS. FINAL LOCATIONS TO BE DETERMINED IN FIELD TO MATCH EQUIPMENT SUPPLIED BY CONTRACTOR.
6. REFER TO POWER PLANS FOR INSTRUMENTATION POWER REQUIREMENTS.
7. IT IS THE INTENT OF DRAWINGS AND SPECIFICATIONS TO OBTAIN A COMPLETE AND SATISFACTORY INSTALLATION. AN ATTEMPT HAS BEEN MADE TO SEPARATE AND COMPLETELY DEFINE THE WORK OF THE CONTRACTOR. DRAWINGS ARE DIAGRAMMATIC, BUT SHALL BE FOLLOWED AS CLOSELY AS ACTUAL CONSTRUCTION OF THE FACILITY AND THE WORK OF OTHER TRADES WILL PERMIT. THE DRAWINGS BY NECESSITY UTILIZE SYMBOLS AND SCHEMATIC DIAGRAMS TO INDICATE VARIOUS ITEMS OF WORK. THEREFORE, NO INTERPRETATION WILL BE MADE FROM THE LIMITATION OF SYMBOLS AND DIAGRAMS THAT ANY ELEMENTS NECESSARY FOR A COMPLETE INSTALLATION ARE EXCLUDED. THE ENGINEER SHOULD BE NOTIFIED OF ANY DISCREPANCIES, OMISSIONS, CONFLICTS OR INTERFERENCES WHICH OCCUR BETWEEN VARIOUS DRAWINGS AND SPECIFICATIONS. IF SUCH NOTIFICATION IS NOT RECEIVED, THE INSTALLING CONTRACTOR(S) SHALL BE RESPONSIBLE FOR THEIR INTERPRETATIONS.
8. DURING ROUGH IN AND FINISHED STAGES OF CONSTRUCTION, THE INSTRUMENTATION SUBCONTRACTOR SHALL BE RESPONSIBLE TO PROTECT AND KEEP CLEAN ALL INSTRUMENTATION EQUIPMENT, PANELS, FIXTURES AND DEVICES AS WELL AS ALL EXISTING EQUIPMENT AND RELATED WORK AREAS.
9. THE CONTRACTOR SHALL PROVIDE ALL INFORMATION ABOUT EQUIPMENT WHICH HE/SHE IS FURNISHING TO THE ENGINEER/OWNER FOR REVIEW PURPOSES. THE CONTRACTOR SHALL PROVIDE ALL INSTALLATION DETAILS AND SUPPORT COMPONENTS SO THAT THESE MAY BE BUILT INTO THE CONSTRUCTION IN A TIMELY MANNER.
10. ELECTRICAL CONTRACTOR AND/OR SUBCONTRACTOR TO OBTAIN ALL PERMITS AND INSPECTIONS.
11. CONTROL CIRCUITS SHALL BE ARRANGED TO USE SUPERVISED CONTACTS WHEREVER POSSIBLE. THIS MEANS THAT NORMALLY CLOSED CONTACTS WILL BE USED AND THE CONTACTS WILL OPEN WHEN A PROCESS TRANSITION OCCURS (E.G. HIGH LEVEL LOW LEVEL, HIGH PRESSURE, ETC.)
12. REFER TO ELECTRICAL SERIES DRAWINGS FOR ADDITIONAL DETAILS FOR CONDUIT, DEVICE LOCATIONS, AND POWER CIRCUITS.
13. DRAWINGS SHOW A LAYOUT OF SCADA/INSTRUMENTATION SYSTEMS AND EQUIPMENT DIAGRAMMATICALLY. EXACT LOCATION OF EQUIPMENT AND ROUTING OF RACEWAYS SHALL BE DETERMINED BY FIELD CONDITIONS AND DIRECTION BY ENGINEER AND OWNER. BY SUBMITTING A BID, CONTRACTOR WARRANTS THAT HE HAS VISITED THE SITE WHERE WORK IS TO BE PERFORMED, AND HAS EXAMINED THE EXISTING CONDITIONS AND EXTENT OF LABOR AND MATERIALS TO BE PROVIDED. COORDINATION WITH ALL TRADES, UTILITIES, ETC SHALL BE PROVIDED.

INSTRUMENTATION GROUNDING

1. SHIELDED CONDUCTORS SHALL HAVE THEIR SHIELD WIRE CONNECTED TO GROUND AT ONE END ONLY.
2. CONTROL CABINETS SHALL BE PROVIDED WITH AN ISOLATED INSTRUMENT GROUND BUS FOR INSTRUMENTATION GROUND WIRE. THIS BUS SHALL BE TIED TO FACILITY GROUND AT A SINGLE POINT (BONDED).
3. EQUIPMENT & INSTRUMENT GROUNDS SHALL NOT BE INTERMIXED.
4. WHERE ANALOG SIGNALS ARE LACED FROM ONE DEVICE TO ANOTHER, THE SHIELD/DRAIN WIRE SHALL BE CONTINUOUS AND ONLY TIED TO GROUND AT ONE POINT.

PROCESS SIGNAL SCALING AND CALIBRATION

1. ALL INSTRUMENTS SHALL BE PROPERLY CALIBRATED BY THE INSTALLING CONTRACTOR. A CALIBRATION STICKER SHALL BE ATTACHED INDICATING CALIBRATION DATE AND THE INITIALS OF THE INDIVIDUAL WHO PERFORMED THE CALIBRATION.
2. ALL PROCESS ANALOG LOOPS SHALL BE PROPERLY CALIBRATED AND SCALED TO THE EXTENT POSSIBLE AND PRACTICAL. ANALOG INSTRUMENTS SHALL BE CALIBRATED TO READ THE ENTIRE OPERATING RANGE FOR THE PARAMETER BEING MONITORED.

INSTRUMENTATION PIPING AND MOUNTING

1. DIRECT READING INSTRUMENTS SHALL BE MOUNTED AT EYE HEIGHT, ~5 FT ABOVE FINISHED FLOOR, UNLESS PROCESS RESTRAINTS NECESSITATE OTHER MOUNTING ARRANGEMENTS, OR UNLESS OTHERWISE NOTED.
2. INSTRUMENTS SHALL BE SECURELY ANCHORED TO THE STRUCTURES OR MONITORED EQUIPMENT. PROPER MOUNTING HARDWARE SHALL BE UTILIZED. (BOLTS, NUTS, UNISTRUT, ETC.)
3. ALL INSTRUMENT TUBING SHALL BE STAINLESS STEEL UNLESS OTHERWISE NOTED. TUBING INSTALLATION SHALL PROVIDE ADEQUATE PROTECTION AND SUPPORT WHERE APPROPRIATE. TUBING AND PIPING ARRANGEMENTS SHALL BE PROPERLY SLOPED AND INSTALLED FOR THE FLUID BEING MONITORED.
4. ALL INSTRUMENT TAPS INTO PROCESS PIPING SHALL BE PROVIDED WITH AN ISOLATION VALVE. (NOMINAL ½" OR ¾" BALL VALVE). ISOLATION VALVES SHALL BE CONSTRUCTED OF MATERIAL COMPATIBLE WITH THE MONITORED PROCESS FLUID.
5. ALL INSTRUMENTS WHICH REQUIRE PERIODIC CALIBRATION SHALL BE PROVIDED WITH MEANS TO CALIBRATE IN PLACE (E.G. CALIBRATION BLOCK AND/OR CALIBRATION VALVING.)
6. VENTS AND DRAINS SHALL BE PROVIDED ON PROCESS EQUIPMENT AND INSTRUMENTATION AS REQUIRED TO SUPPORT ROUTINE AND MAINTENANCE OPERATIONS.

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

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ELECTRICAL NOTES AND LEGEND

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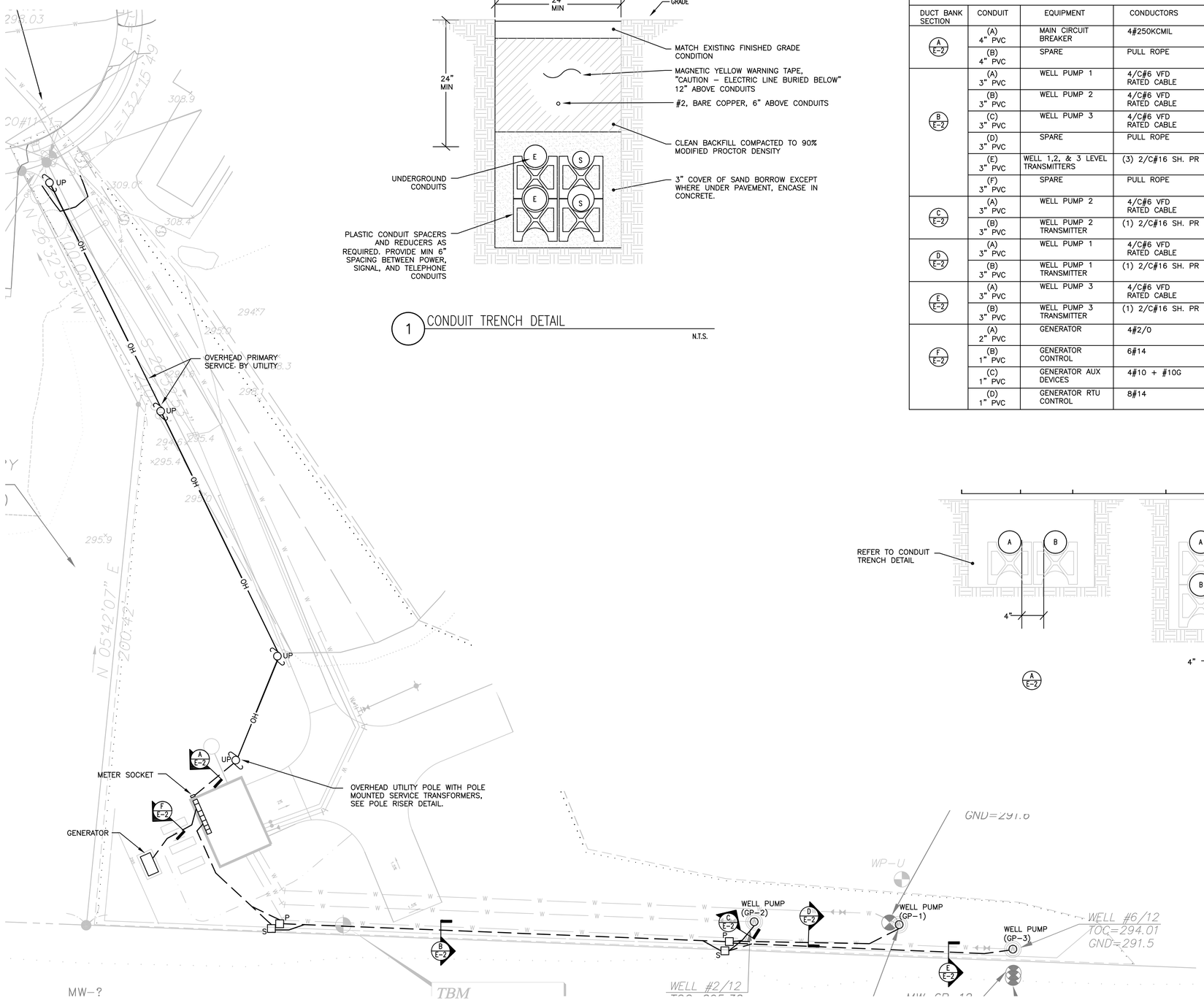
E-1



1 CONDUIT TRENCH DETAIL

N.T.S.

ELECTRICAL DUCT BANK SCHEDULE

DUCT BANK SECTION	CONDUIT	EQUIPMENT	CONDUCTORS	CONNECTION
A E-2	(A) 4" PVC	MAIN CIRCUIT BREAKER	4#250KCMIL	SERVICE CONDUIT FROM UTILITY TRANSFORMER POLE TO MCC MAIN CIRCUIT BREAKER
	(B) 4" PVC	SPARE	PULL ROPE	SPARE CONDUIT FROM UTILITY TRANSFORMER POLE TO 24" AFG UNDER SERVICE DISCONNECT SWITCH.
B E-2	(A) 3" PVC	WELL PUMP 1	4/C#6 VFD RATED CABLE	FEEDER CONDUIT FROM VFD IN MCC AT PUMPING STATION TO WELL 1.
	(B) 3" PVC	WELL PUMP 2	4/C#6 VFD RATED CABLE	FEEDER CONDUIT FROM VFD IN MCC AT PUMPING STATION TO WELL 2.
	(C) 3" PVC	WELL PUMP 3	4/C#6 VFD RATED CABLE	FEEDER CONDUIT FROM VFD IN MCC AT PUMPING STATION TO WELL 3.
	(D) 3" PVC	SPARE	PULL ROPE	SPARE
	(E) 3" PVC	WELL 1,2, & 3 LEVEL TRANSMITTERS	(3) 2/C#16 SH. PR	SIGNAL CONDUIT FROM WELL LEVEL TRANSMITTERS LOCATED IN WELLS 1, 2, & 3 TO RTU PANEL INSIDE PUMPING STATION
	(F) 3" PVC	SPARE	PULL ROPE	SPARE
C E-2	(A) 3" PVC	WELL PUMP 2	4/C#6 VFD RATED CABLE	FEEDER CONDUIT FROM VFD IN MCC AT PUMPING STATION TO WELL 2.
	(B) 3" PVC	WELL PUMP 2 TRANSMITTER	(1) 2/C#16 SH. PR	SIGNAL CONDUIT FROM WELL LEVEL TRANSMITTER LOCATED IN WELLS 2 TO RTU PANEL INSIDE PUMPING STATION
D E-2	(A) 3" PVC	WELL PUMP 1	4/C#6 VFD RATED CABLE	FEEDER CONDUIT FROM VFD IN MCC AT PUMPING STATION TO WELL 1.
	(B) 3" PVC	WELL PUMP 1 TRANSMITTER	(1) 2/C#16 SH. PR	SIGNAL CONDUIT FROM WELL LEVEL TRANSMITTER LOCATED IN WELLS 1 TO RTU PANEL INSIDE PUMPING STATION
E E-2	(A) 3" PVC	WELL PUMP 3	4/C#6 VFD RATED CABLE	FEEDER CONDUIT FROM VFD IN MCC AT PUMPING STATION TO WELL 3.
	(B) 3" PVC	WELL PUMP 3 TRANSMITTER	(1) 2/C#16 SH. PR	SIGNAL CONDUIT FROM WELL LEVEL TRANSMITTER LOCATED IN WELLS 3 TO RTU PANEL INSIDE PUMPING STATION
F E-2	(A) 2" PVC	GENERATOR	4#2/0	GENERATOR POWER TO ATS IN MCC
	(B) 1" PVC	GENERATOR CONTROL	6#14	GENERATOR CONTROL TO ATS IN MCC
	(C) 1" PVC	GENERATOR AUX DEVICES	4#10 + #10G	POWER TO GENERATOR JACKET HEATER AND TRICKLE CHARGER FROM PANEL LPA IN MCC.
	(D) 1" PVC	GENERATOR RTU CONTROL	8#14	RTU CONNECTION TO GENERATOR.

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

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ELECTRICAL POWER PLAN

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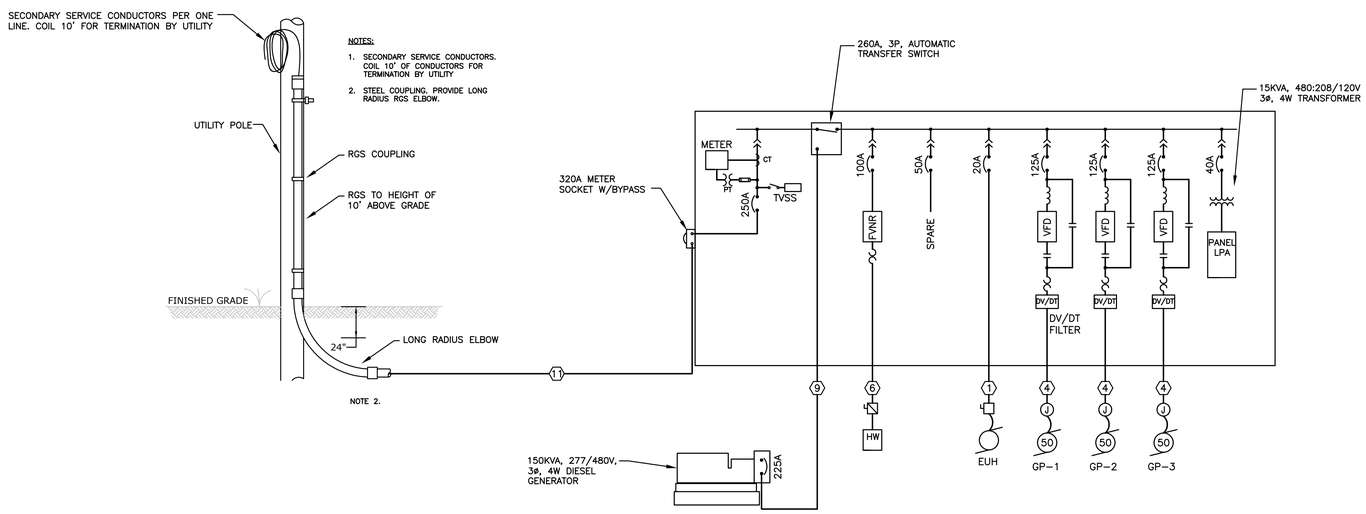
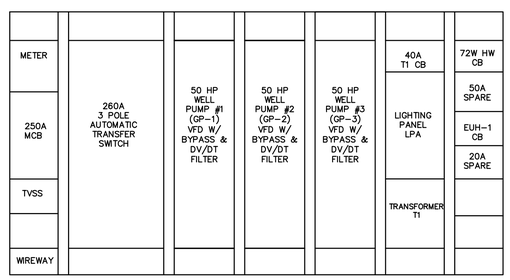
E-2





FEEDER SCHEDULE

COPPER CONDUCTORS – 75' RATING

FEEDER SYMBOL	CONDUCTORS (3-PHASE, 3 WIRE)	RACEWAY SIZE CONDUIT	CONDUCTORS (3-PHASE, 4 WIRE)	RACEWAY SIZE CONDUIT	NOMINAL AMPERE RATING
1	3#12 & 1#12G.	3/4"	–		20
2	3#10 & 1#10G.	3/4"	–		30
3	3#8 & 1#8G.	3/4"			50
4	4/C#6 VFD RATED CABLE	1"			60
5			4#6 & 1#8G.	1"	
6	3#2 & 1#8G.	1-1/2"			100
7			4#2 & 1#8G.	1-1/2"	
8	3#250 KCMIL & 1/0G.	3"			250
9			4#250 KCMIL & 1/0G.	3"	
10	3#600 KCMIL & 1#3G.	3-1/2"			400
11			4#600 KCMIL & 1#3G.	4"	
12	9#400 KCMIL & 3#2/0G.	(3) 3-1/2"			1000
13			12#400 KCMIL & 3#2/0G.	(3) 4"	

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

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ELECTRICAL ONE LINE WITH DIAGRAM EQUIPMENT ELEVATIONS

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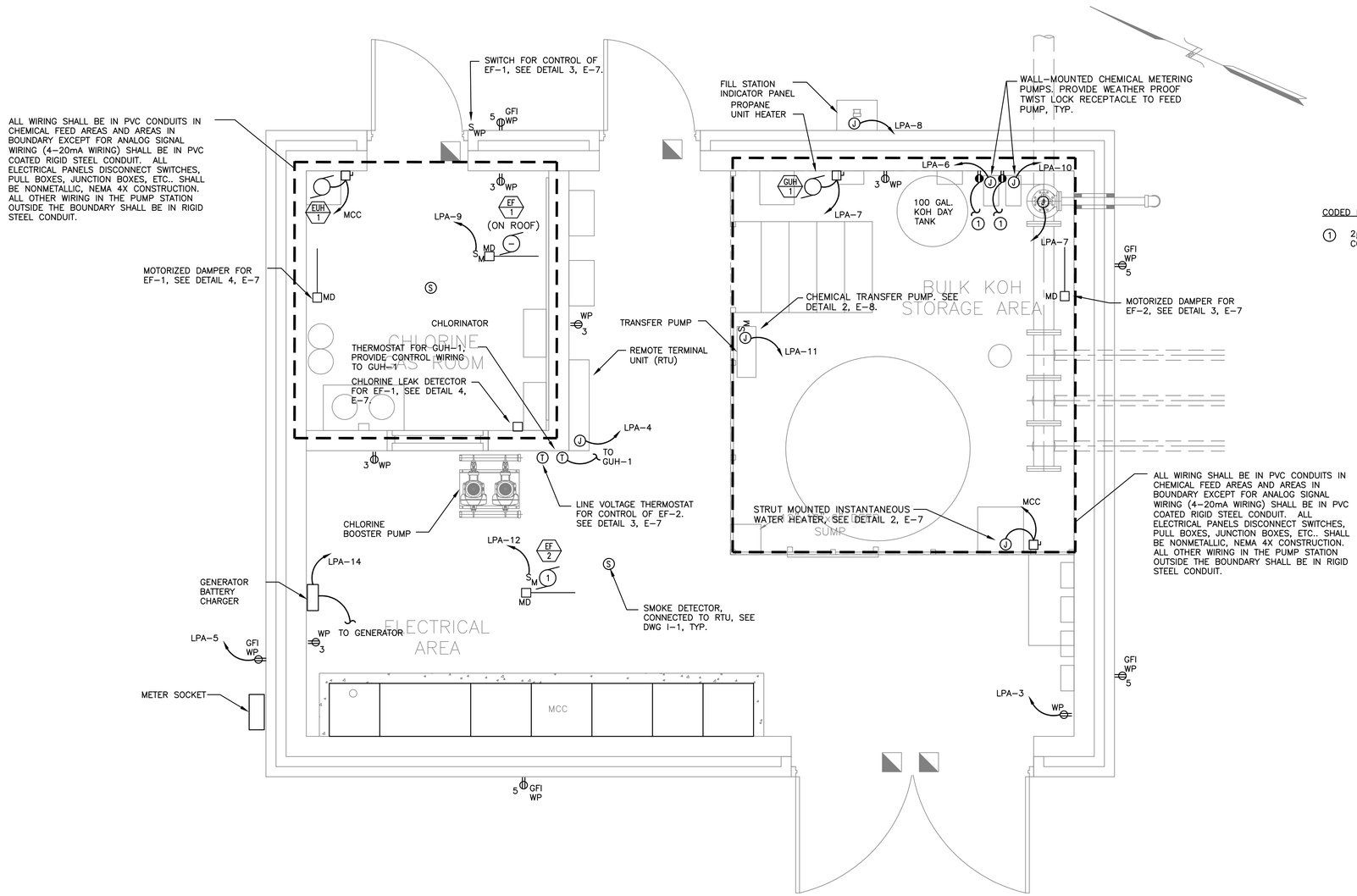
E-3



CODED NOTES:

1. 2#12 +#12G, 3/4"C TO RESPECTIVE CHEMICAL FEED CONTROL PANEL, SEE DETAIL 3, E–8

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

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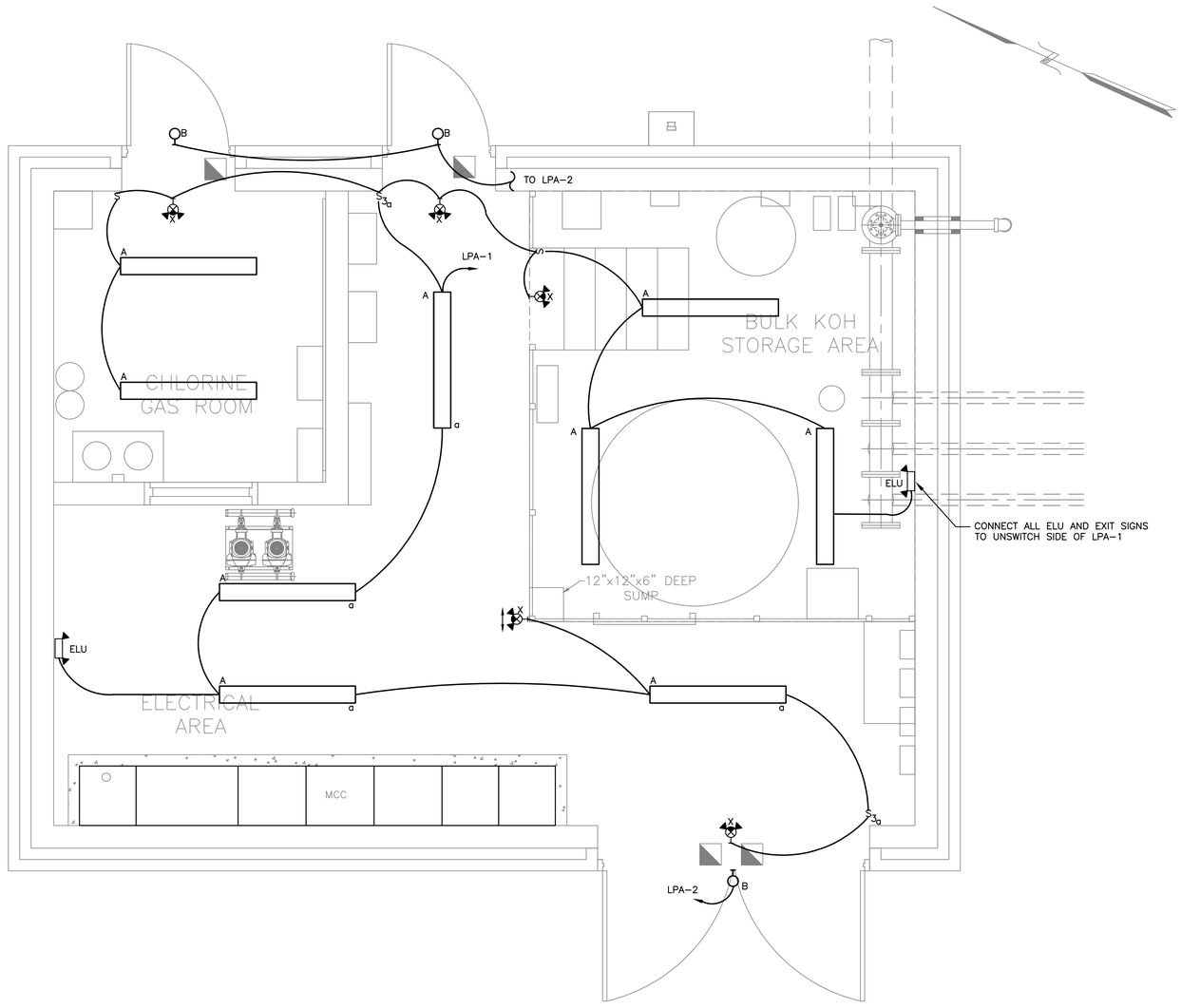
E-4



LIGHTING FIXTURE SCHEDULE

FIXTURE TYPE	MANUFACTURER	CATALOG	DESCRIPTION	MOUNTING	LAMP TYPE	VOLTS	NOTES
A	SIMKAR	EN2LED-4-RP-F-46-35-SSL-WLH	4' LINEAR LED FIXTURE, VAPOR TIGHT, FIBERGLASS HOUSING, IP67 RATED, RIBBED POLYCARBONATE LENS, 46W, 3600LM, 3500K LED PACKAGE, STAINLESS STEEL LATCHES	CEILING	LED	120	
B	SIMKAR	LPSW-40-40-U1-1B	LED EXTERIOR WALLPACK, CAST AL HOUSING, POLYCARBONATE LENS, 37W, 2700LM LED PACKAGE, WET LISTED, INTEGRAL PHOTOCELL CONTROL	WALL	LED	120	
X	SIMKAR	CSWLEDB-R-W	LED EXIT LIGHT, POLYCARBONATE HOUSING, EMERGENCY BATTERY, 2 LIGHTING HEADS, WET LISTED.	UNIV	LED	120	
ELU	SIMKAR	SWLEM-14-6	EMERGENCY LIGHTING UNIT, 2 LED HEADS, THERMOPLASTIC HOUSING, 6V EMERGENCY BATTERY, WET LISTED	WALL	LED	120	

LIGHTING FIXTURE SCHEDULE NOTES

1. FIXTURES WITH "-EX" DESIGNATION ARE EXISTING

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

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ELECTRICAL LIGHTING PLAN

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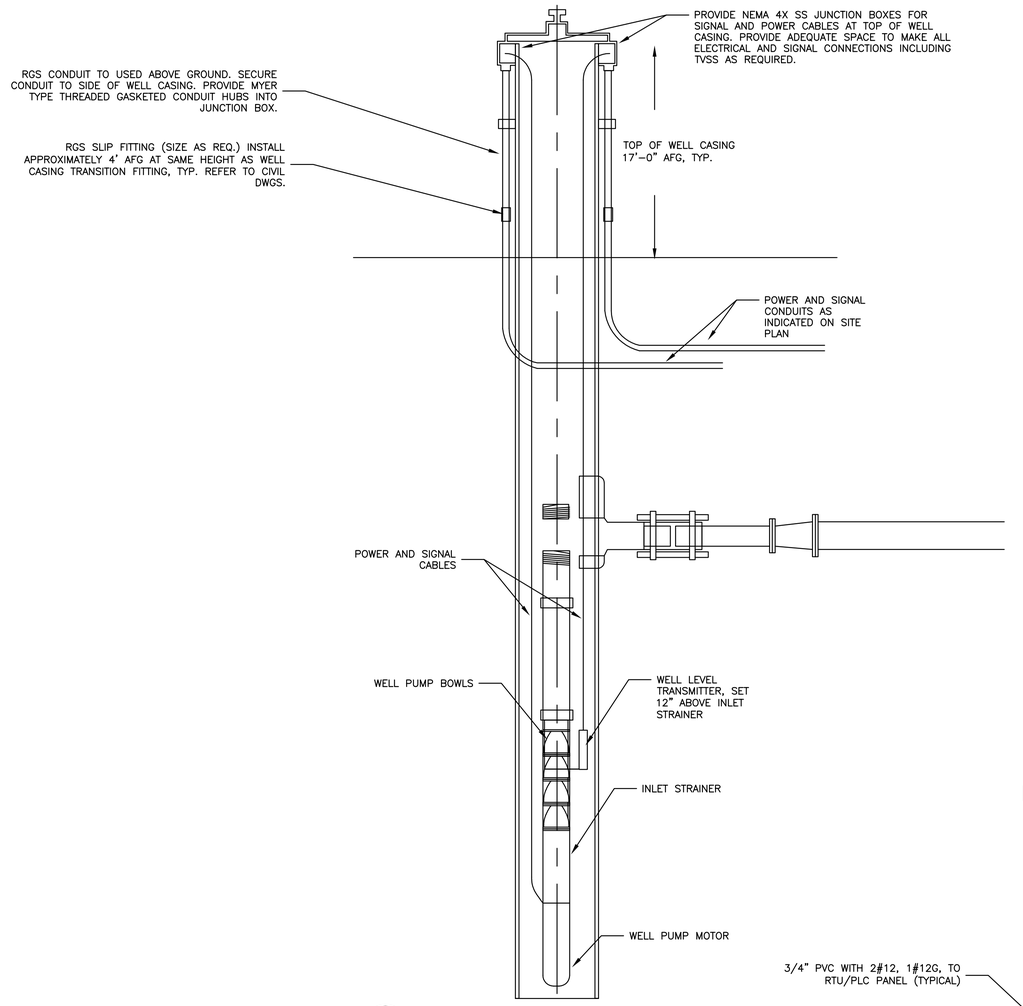
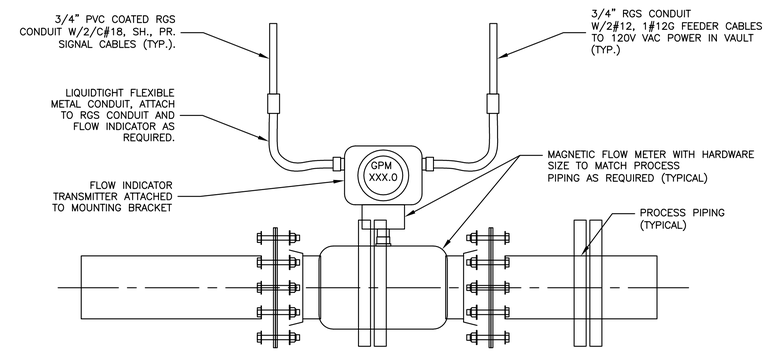
E-5



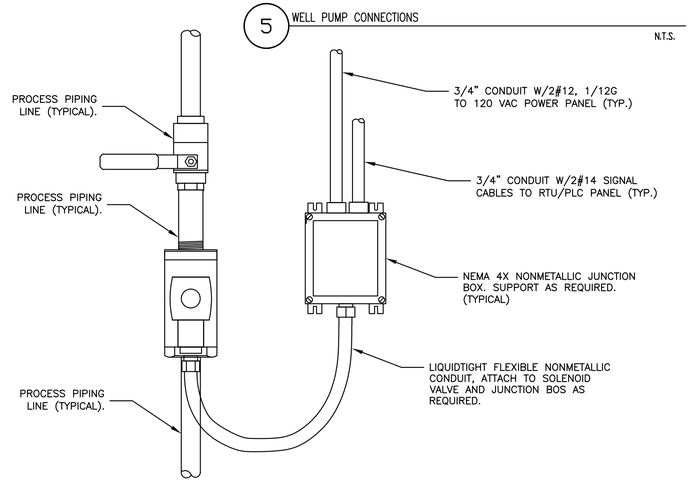
5 WELL PUMP CONNECTIONS

N.T.S.



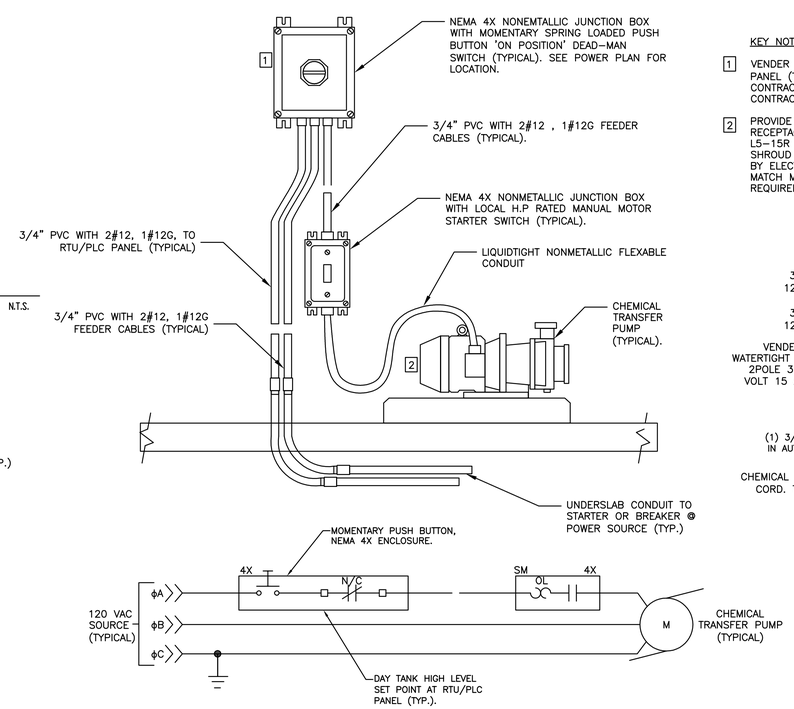
4 MAGNETIC FLOW METER DETAIL

N.T.S.



1 SAMPLE LINE SOLENOID VALVE POWER ANS SIGNAL DETAIL

N.T.S.

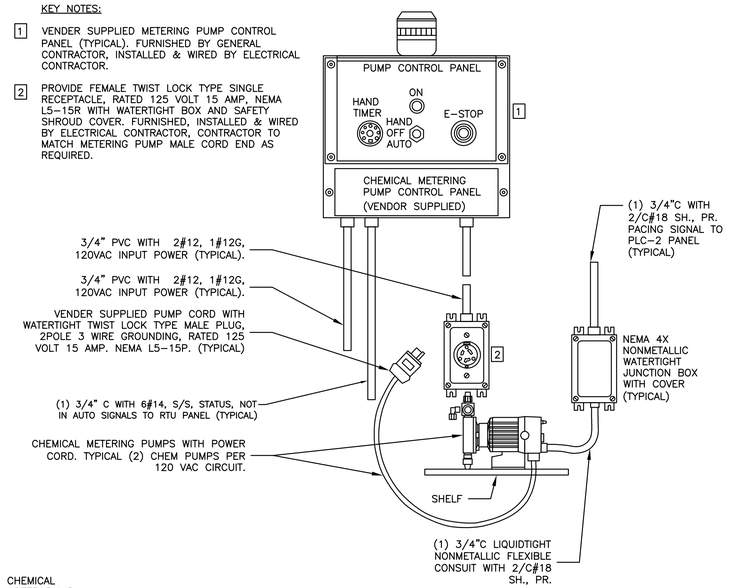


2 CHEMICAL TRANSFER PUMP CONTROL DETAIL

N.T.S.

KEY NOTES:

1. VENDER SUPPLIED METERING PUMP CONTROL PANEL (TYPICAL). FURNISHED BY GENERAL CONTRACTOR, INSTALLED & WIRED BY ELECTRICAL CONTRACTOR.
2. PROVIDE FEMALE TWIST LOCK TYPE SINGLE RECEPTACLE, RATED 125 VOLT 15 AMP, NEMA L5-15R WITH WATERTIGHT BOX AND SAFETY SHROUD COVER. FURNISHED, INSTALLED & WIRED BY ELECTRICAL CONTRACTOR, CONTRACTOR TO MATCH METERING PUMP MALE CORD END AS REQUIRED.



3 CHEMICAL METERING PUMP CONTROL DETAIL

N.T.S.

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

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ELECTRICAL WIRING AND DETAILS

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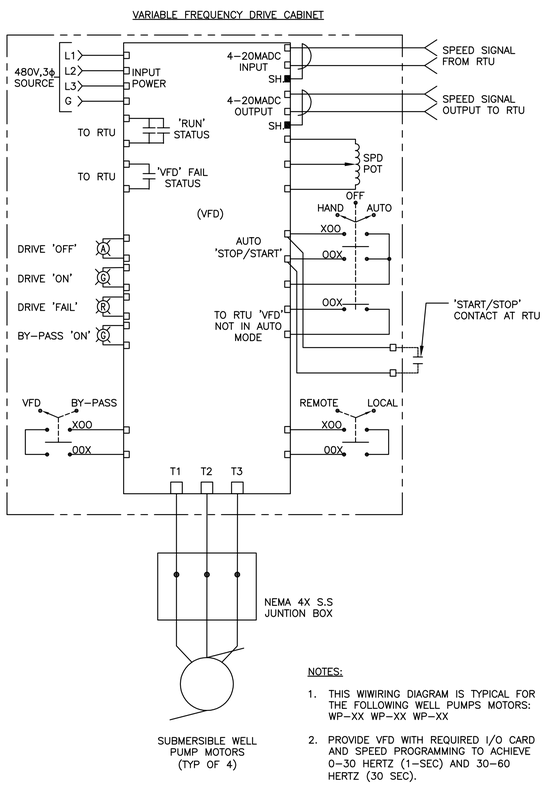
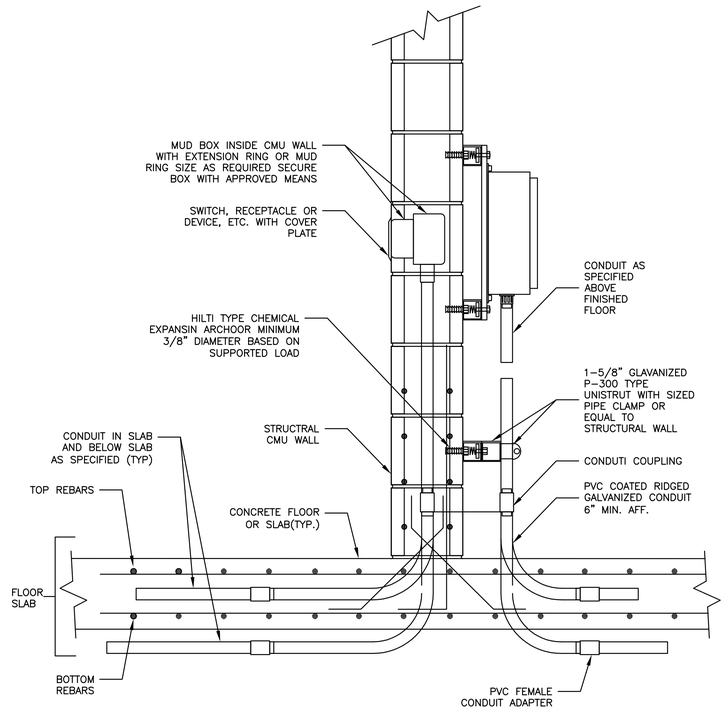


NOTES:

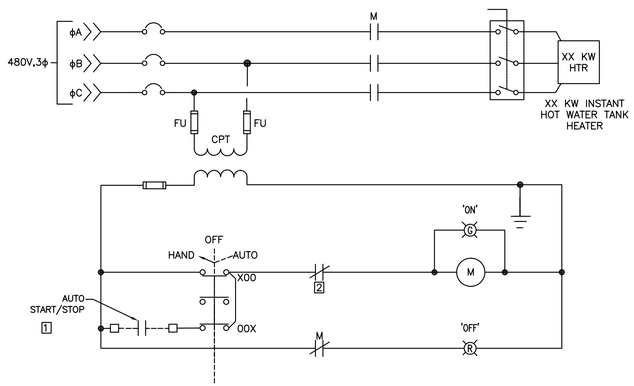
1. THIS WIWIRING DIAGRAM IS TYPICAL FOR THE FOLLOWING WELL PUMPS MOTORS: WP-XX WP-XX WP-XX
2. PROVIDE VFD WITH REQUIRED I/O CARD AND SPEED PROGRAMMING TO ACHIEVE 0-30 HERTZ (1-SEC) AND 30-60 HERTZ (30 SEC).

1 WELL PUMP MOTOR VFD CONTROL DETAIL

N.T.S.



5 CONDUIT IN AND BELOW SLAB



KEY NOTES:

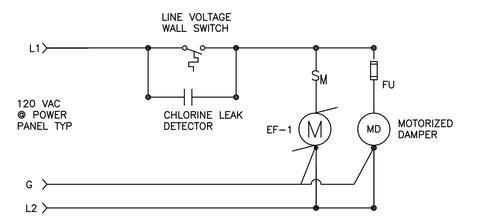
1. AUTOMATIC REMOTE START/STOP CONTACT.
2. LOAD SHED CONTACT AT ATS. 2#14 FROM ATS TO STARTER CONTROL WIRING AS REQUIRED

2 INSTANT HOT WATER HEATER CONTROL DETAIL

N.T.S.

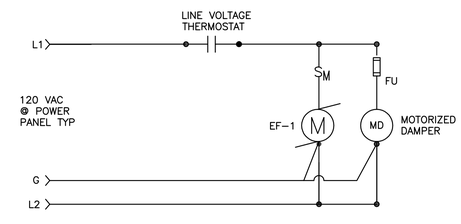
PANELBOARD SCHEDULE

PANEL# LPA		LOCATION:				MAINS 100A		ENCLOSURE			
						MAIN CIRCUIT BREAKER: 60 AMP 3 POLE					
SERVICE: VOLT: 120/208		PHASE: 3		WIRE: 4		MOUNTED IN MCC					
CKT	DESCRIPTION	BREAKER			KVA	CKT	DESCRIPTION	BREAKER			KVA
		TRIP	POLES	VOLTS				TRIP	POLES	VOLTS	
1	LIGHTING	20	1	120		2	EXTERIOR LIGHTING	20	1	120	
3	RECPTACLES	20	1	120		4	RTU PANEL	20	1	120	
5	EXTERIOR RECEP.	20	1	120		6	CHEM FEED PUMP	20	1	120	
7	GUH-1	20	1	120		8	FILL STATION PANEL	20	1	120	
9	EF-1	20	1	120		10	CHEM FEED PUMP	20	1	120	
11	CHEM TRNSF PUMP	20	1	120		12	EF-2	20	1	120	
13		20	1	120		14	BATTERY CHARGER	20	1	120	
15		20	1	120		16		20	1	120	
17		20	1	120		18		20	1	120	
19		20	1	120		20		20	1	120	
21		20	1	120		22		20	1	120	
23		20	1	120		24		20	1	120	
25		20	1	120		26		20	1	120	
27		20	1	120		28		20	1	120	
29		20	1	120		30		20	1	120	
31		20	1	120		32		20	1	120	
33		20	1	120		34		20	1	120	
35		20	1	120		36		20	1	120	
37		20	1	120		38		20	1	120	
39		20	1	120		40		20	1	120	
41		20	1	120		42		20	1	120	
TOTAL KVA - LEFT SIDE					### #	TOTAL KVA - RIGHT SIDE					##



4 EF-1 CONTROL DETAIL

N.T.S.



4 EF-2 CONTROL DETAIL

N.T.S.

GRAFTON WATER DISTRICT
GRAFTON, MASSACHUSETTS

TRININTY AVENUE PUMP STATION

ELECTRICAL WIRING AND DETAILS

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Rev.	Date	Description

Drawn By: | Designed By: | Checked By: | Approved By:

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TATA & HOWARD

T&H NO.: 3703
DATE: FEBRUARY 2016
SCALE: NTS

E-7