

NTUA Headquarters Complex Office Building

Fort Defiance, Arizona

Dyron Murphy Architects Project No. 2015.05



ADDENDUM No. 2

November 4, 2016

This addendum forms part of the Contract Documents and modifies the Bid Documents dated, October 6, 2016, as noted below. All Bidders must acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

BIDDER QUESTIONS:

1. Per Specification Section 01 6000-2, section 3.02 Owner-Supplied Products, Subsection B Contractors Responsibilities. Call for Contractor to receive and unload, inspect, handle, store, install and finish, repair or replace Owner Furnished Items. Please provide a list of Owner Provided Items to quantify? Section 01 1000 Summary, section 1.03 calls for movable cabinets, furnishings and small equipment. Please clarify and quantify?

Delete Section 01 6000, 3.02, B. Items included in Section 01 1000, 1.03, A, 1-3, will be by Owner.

2. Per Specification 03 3000-3, section 1.04 E. Calls for LEED Submittal. Is this a LEED Project? Please clarify.

Project is not going to be a LEED project. Disregard reference to LEED.

3. Please provide the Tax Rate for the Tribal Tax, 5%?

The current Navajo Nation Tribal Tax is 5%. Bidder is responsible to confirm the current tax rate at time of bid.

4. Will a soil report be provided?

Geotechnical Report has been provided as part of Addendum No. 01.

5. When will the 12" off-site water line be available? Is there water to the site for construction use?

The 12" water line upgrade is unknown at this time and will be determined by NTUA. It is anticipated that the line will be installed at the same time as the construction of the building. An existing 6" water line is available for connection for the new office building if the 12" has not been installed.

Water for construction use needs to be obtained from the Navajo Nation Water Code Administration.

Bidder/contractor is responsible to obtain and pay for required permits and associated costs.

Bidder/contractor needs to contact the Navajo Nation Water Code Administration for nearest water source to be used.

6. Reference sheet A002. Key Note 32 3100 C1 calls for steel fence. Please provide a detail showing steel fencing.

Ornamental steel fence details are to be per manufacturer noted in specification as basis of design. Refer to manufacturer for details and requirements for proper and correct installation.

7. Sheet A002, keynote 32 3100 C2 calls for a cantilever steel gate. Please provide details.

Cantilever steel gate to be per ornamental steel fence manufacturer noted in specifications as basis of design.

8. Is there a roof on the Mechanical Enclosure shown on sheet A005 details E1 thru E6?

The mechanical enclosure on the referenced details should not have a roof due to the air discharge by the mechanical equipment in the enclosure.

9. Reference Sheet A004 detail E5. On sheet A002 it shows a trellis. Please provide information?
Refer to structural plan A6/S151 for trellis information and additional references for additional information.

10. Specs for the Column Cladding calls for Petersen, Pac-Clad PAC-2000F. The Floor Plans indicate locations. I have not seen any elevations of the various column wraps, nor details for them. There appears to be both square wraps and rectangular wraps, but no sizes are given. Nor am I able to determine heights required, other than to go by RCP heights at the various rooms. Is there a column cladding schedule available? Or details showing overall depths, widths, and heights?

Column covers are to be installed and details are per manufacturer. Refer to attached manufacturer detail. Heights of the column covers are to be 6" above the finished ceiling. Refer to the ceiling plan for heights required at each location. Widths are to be provided per manufacturer standard sizes required to conceal the column at each location.

11. Is there any need for a Pre-action or any other type of gaseous suppression systems in the IT Server Room or any other rooms?

A dry-pipe fire sprinkler system is required at the exterior stairways and the I.T Server Room (1113).

12. Will any areas drop below 40 degrees and require a dry pipe system.

A dry-pipe fire sprinkler system is required at the exterior stairways and the I.T Server Room (1113).

13. There is not one manufacturer that meets the requirements that are on the specs for appliances. 1 manufacturer has 2 of the items and another has the other items that meet the descriptions. Please advise if they can be mixed. From what I read they should all be one manufacturer.

It is acceptable to have more than one manufacturer for appliances.

14. The spec 11 3100 is requiring 5 and 10 year manufacturer warranties on residential appliances. I can get an extended warranty for 4 years, from the supplier, but the manufacturer will only warrant their product for 1 year. Please confirm the warranty period.

Warranty period for residential appliances to be per manufacturer on various components, minimum one-year warranty period.

15. Please confirm that for the roller fabric shade system: F.S. = manual and F.S. 2 = motorized?

Roller Fabric Shades are to be manually operated as noted in specification section 12 2400. The FS and FS2 designation refers to two (2) different colors and "openness factor" to be selected by the Architect.

16. The landscape sheets reference additional allowances (No dollar value listed) that are in addition to the two allowances in the specifications. Plant allowances, Mainline Extension irrigation allowances. Please clarify.

The items noted in the landscape drawings are related and are to be included as part of the dollar amount listed for the Allowances noted in the specifications, drawings and Bid Form.

DRAWING + SPECIFICATION CLARIFICATIONS:

CIVIL:

1. Refer to civil addendum included herein.

- Revised sheets: C100, C101, C102, C103, C104, C150, C200, C201, C202, C500, C510, C513, C514, C515.
- Revised specification sections:
 - 09 9713 Coatings
 - 21 4123 Fire Protection Tank
 - 21 4123A Welded Steel Tanks
 - 21 4123B Bolted Steel Tanks

- Added specification section:
 - 26 4220 Cathodic Protection By Impressed Current

FOOD SERVICE:

1. Refer to food service addendum included herein.
 - Revised exhaust hood information.

MECHANICAL:

1. Refer to mechanical and plumbing addendum included herein.
 - Revised sheets: M003, M201a, M201c, M202a, M202b, M202c, M401.
 - Added Sheets: M501, M502

ELECTRICAL:

1. Refer to electrical addendum included herein.
 - Added specification section: 26 4113 Lightning Protection.
 - Added general note 9 on sheet E401.

END OF ADDENDUM NO.2

Oscar Tovar, Project Manager
Dyron Murphy Architects, P.C

Attachments:

1. Pac-Clad; PAC-2000F Column Cover manufacturer detail.
2. Civil addendum.
3. Food Service addendum.
4. Mechanical addendum.
5. Electrical addendum.

PAC-2000F COLUMN COVERS

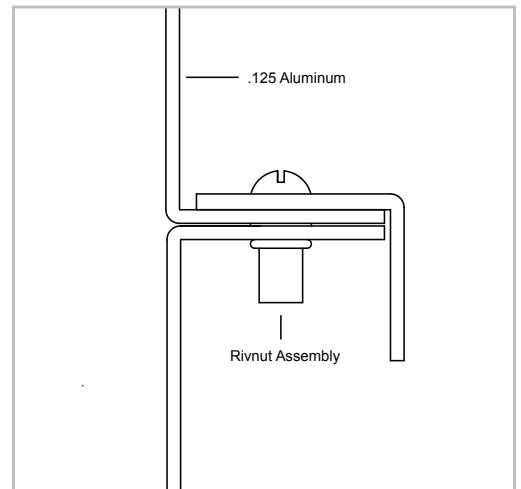
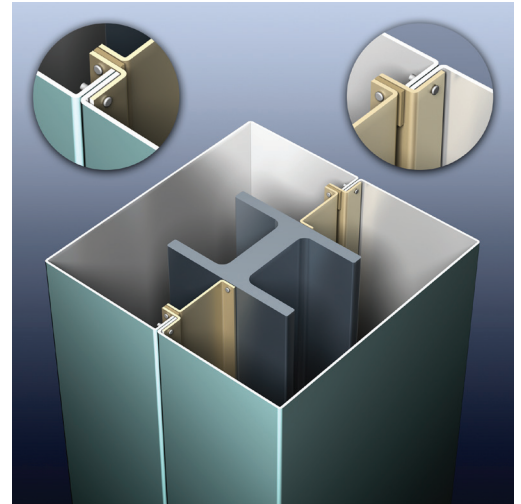
Petersen Aluminum's line of column covers offers architects superior design flexibility for structural beam applications, both interior and exterior. Utilizing a wide range of materials, including aluminum in an unmatched range of standard and custom colors, anodized aluminum, aluminum composite, stainless steel and copper, Petersen can custom fabricate to meet the most demanding specifications.

The design of the PAC-2000F Flush Joint column covers allows for a clean, precise installation, revealing only a hairline joint. The column sections are assembled using a rivnut/keyhole system to provide a tight inconspicuous vertical seam.

The PAC-2000F square column covers can be fabricated to various widths. Please contact Petersen Aluminum for complete details regarding our fabrication flexibility and capabilities.

MATERIALS

- ▶ .063 - .125 Aluminum
- ▶ 4mm Composite Aluminum
- ▶ 16 GA Stainless Steel



November 3, 2016

Oscar Tovar
Sr. Project Manager
Dyron Murphy Architects, P.C.
4505 Montbel Place NE
Albuquerque, NM 87107

Re: NTUA HQ – Addendum 02
Responses to Comments

CIVIL

1. C101 There is a storm drain inlet that is not traffic rated, but is in the parking lot. Junction of 6” roof drain line and 8” SD.
Response: The Keyed note has been changed from 2 to 4 to indicate that the inlet is to be traffic rated. (Refer to revised Sheet C101, Addendum 02).
2. C104 Match line, Above Left drawing has note 15 pointing to what appears to be flat work at the detention pond. Note 15 indicates it is a 24” inlet with pedestrian rated grate. Please clarify.
Response: Note 15 has been changed to note 12 and the overflow drainage structure has been relocated (Refer to revised Sheet C104, Addendum 02).
3. C202 keynote 20 indicates valves are to be installed on a 12” water main that is “proposed by others”. Please verify that the valves will not be included with the “others” installation.
Response: Confirmed, the valve will not be included with the “others” installation.

SPECIFICATIONS

Questions from D&R (5)

1. Specification (214123A-4, Sec. 3.03. 28) Cathodic Protection System: Per Section 16642 can you provide a copy of this section as we are unable to find it in the current bid documents?
Response: The reference to section 16642 has been changed to Section 26 4220 “Cathodic Protection”. The specification is also provided with Addendum 02.

2. Specification (214123-1, Sec. 2.01.H), Vent size base on inflow rate of 500GPM and equipped with a #16 stainless steel screen or finer. Specification (214123A-4, Sec. 3.03. 26), indicates vent to be design for air flow rate of 36 CFS. Specification (214123A-4, Sec. 3.03. 27), indicates roof vent to have a screen mesh of #24. Contract drawing C301 Fire storage tank volume note 2 indicates a fire flow volume of 1,500GPM. What should the vent be designed for inlet flow rate, outlet flow rate or the 36 CFS rate. What mesh size is acceptable #16 or finer or #24 mesh screen?

Response: Vent should be designed for 2000 gpm and #16 or finer stainless steel mesh screen.

3. Specification (09 9713-1, 2,01, A, 3,) Tank Exterior Finnish- Urethane Series 74. Tnemec paint company make a urethane paint series 1074 as the original Series 74 was discontinued several years ago. Is the 1074 an acceptable coating?

Response: Yes Specification (09 9713-1, 2,02, A,) Tank Interior. Paragraph following this heading indicate a coating system for the tank exterior and (09 9713-1, 2,02, A, e) show a paint system per AWWA 0102 OCS -5-S. Response: Is this a typo as spec section (09 9713-1, 2.02, B,) reads as tank interior also but show and interior system components and a paint system per AWWA D1021CS -2-W?

Response: 09 9713 Coatings, 2.02.A, change "Interior" to "Exterior"

- 4.a Specification (214123-1, Sec. 1.01. A) This section provides for the furnishing and installing of the water storage tank for Fire Protection for the Chinle Justice Center. Is this a typo or is this spec section incorrect for this project?

Response: It is a typographical error; it should read NTUA Headquarters Complex.

Questions from DMA

4. Specification section 09 9713 Coatings. Section 2.02 Paint Systems, both A and B call for painting Tank Interior! Which system do you want us to use?

Response: 09 9713 Coatings, 2.02.A, change "Interior" to "Exterior"

Questions from Superior Tank

1. Superior Tank Company Inc. would like to formally request an addendum to include a Factory Powder Coated steel tank as an approved alternative for the 180,000-gallon fire suppression tank which is specified in the Navajo Tribal Utility Authority Head Quarters project in Fort Defiance, Arizona.

Response: Denied. We do not have any experience with powder coated steel tanks.

Questions from Engineering America

The following comments are:

1. 1.03 Qualifications item D. and E. to be removed and replaced with: The tank manufacturer shall submit with bid that it is compliant with EPA AIS; steel sheets made from American steel.

Response: Denied. This is not required by the funding and would restrict the number of qualified bidders.

2. 1.06 Submittals item C. to be removed and replaced with: Tank Installer qualification including listing/references of 3 similar installations within the last 5 years in the state of Arizona.

Response: Denied. This is not required by the funding and would restrict the number of qualified bidders.

3. 1.07 Coatings item 4.a. and 5.a.b. remove and replace CST Storage with: Tank Manufacture.

Response: Approved. Replace CST Storage with Tank Manufacturer. OK

4. 1.09 Erection item A. Foundation 1. The tank foundation shall be Type 6, Concrete-bottom with embedded steel base setting per AWWA D 103: the drawings and Welded Steel Tank Spec shows steel floor with concrete ring Foundation. Please allow the Glass Fused to Steel manufacturer to also being able to provide a Glass Steel Bolted Floor with concrete ring wall.

Response: Approved, change specification section 1.09.A.1, to "The tank foundation shall be either:

Type 1, Steel-bottom tanks supported on ringwalls or

Type 6, Concrete bottom with embedded steel base setting per AWWA D103."

5. 1.09 Erection item F. Tank Manufacturer's Warranty: Question, why does the Glass Fused to Steel Manufacture have to provide a 10-year warranty and the Welded Steel Installer only provides a 1 year? They both should be 10 years.

Response: Glass Fused bolted steel specification is changed to a 1-year warranty.

NTUA HQ COMPLEX OFFICE BUILDING

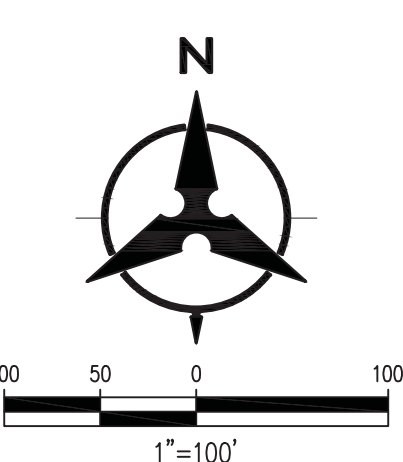
FT. DEFIANCE, ARIZONA

100% CONSTRUCTION DOCUMENTS

OCTOBER 6, 2016

LEGEND

- PROPERTY LINE
- PROJECT LIMITS OF GRADING
- - - - - 4925 EXISTING INDEX CONTOUR
- - - - - 4924 EXISTING INTERMEDIATE CONTOUR
- ⊕ 4925.25 EXISTING GROUND SPOT ELEVATION
- ⊕ 26.75 PROPOSED FINISHED GRADE SPOT ELEVATION
- FLOW LINE, TO=TOP OF CURB
- TS=TOP OF SIDEWALK, TO=TOP OF GRATE
- FSH=FINISH GROUND HIGH SIDE
- FGL=FINISH GROUND LOW SIDE
- S=2.0% DIRECTION OF FLOW
- WATER BLOCK
- 4925 PROPOSED INDEX CONTOUR
- 4924 PROPOSED INTERMEDIATE CONTOUR
- PROPOSED CURB & GUTTER
- SD PROPOSED STORM DRAIN LINE
- ⊕ PROPOSED STORM DRAIN MANHOLE
- ⊕ PROPOSED STORM DRAIN INLET
- PROPOSED STORM DRAIN INLETS
- PROPOSED RETAINING WALL
- ⊕ R0 ROOF DRAIN



GENERAL PLAN NOTES

1. ALL WORK DETAILED ON THESE PLANS AND PERFORMED UNDER THIS CONTRACT SHALL BE CONSTRUCTED IN ACCORDANCE WITH PROJECT GEOTECHNICAL REPORT, NTUA STANDARD DETAILS AND SPECIFICATIONS (1ST PRIORITY), AND PROJECT SPECIFICATIONS (2ND PRIORITY.) WHERE APPLICABLE, NEW MEXICO ASSOCIATES OF PUBLIC WORKS (NMAPWA) STANDARD DETAILS AND SPECIFICATIONS SHALL APPLY.
2. THE CONTRACTOR SHALL COMPLY WITH ALL LOCAL, NAVAJO NATION, STATE, AND FEDERAL LAWS/RULES AND REGULATIONS WHICH APPLY TO THE CONSTRUCTION OF THESE IMPROVEMENTS.
3. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL POTENTIAL OBSTRUCTIONS INCLUDING ALL UNDERGROUND UTILITIES. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION INSPECTOR OR ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
4. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL CONTACT LINE LOCATING SERVICE FOR LOCATION OF EXISTING UTILITIES. CONTACT GREGORY BAHE, NTUA, 928-728-5721 EXT 2332..
5. ALL ELECTRICAL, TELEPHONE, CABLE TV, GAS AND OTHER UTILITY LINES, CABLES, AND APPURTENANCES ENCOUNTERED DURING CONSTRUCTION THAT REQUIRE RELOCATION, SHALL BE COORDINATED WITH THAT UTILITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF ALL NECESSARY UTILITY ADJUSTMENTS. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR DELAYS OR INCONVENIENCES CAUSED BY UTILITY COMPANY WORK CREWS. THE CONTRACTOR MAY BE REQUIRED TO RESCHEDULE HIS ACTIVITIES TO ALLOW UTILITY CREWS TO PERFORM THEIR REQUIRED WORK.
6. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITY LINES WITHIN THE CONSTRUCTION AREA. ANY DAMAGE TO EXISTING FACILITIES CAUSED BY CONSTRUCTION ACTIVITY SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE AND APPROVED BY THE CONSTRUCTION INSPECTOR.
7. CONSTRUCTION ACTIVITY SHALL BE LIMITED TO THE PROPERTY AND/OR PROJECT LIMITS. ANY DAMAGE TO ADJACENT PROPERTIES RESULTING FROM THE CONSTRUCTION PROCESS SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE.
8. OVERNIGHT PARKING OF CONSTRUCTION EQUIPMENT SHALL NOT OBSTRUCT DRIVEWAYS OR DESIGNATED TRAFFIC LANES. THE CONTRACTOR SHALL NOT STORE ANY EQUIPMENT OR MATERIAL WITHIN THE PUBLIC RIGHT-OF-WAY.
9. THE CONTRACTOR SHALL OBTAIN ALL THE NECESSARY PERMITS FOR THE PROJECT PRIOR TO COMMENCING CONSTRUCTION (I.E., BARRICADING, TOPSOIL DISTURBANCE, EXCAVATION PERMITS, EPA STORM WATER PERMITS, ETC.).
10. ALL PROPERTY CORNERS DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. ALL PROPERTY CORNERS MUST BE RESET BY A REGISTERED LAND SURVEYOR.
11. THE CONTRACTOR SHALL PREPARE A CONSTRUCTION TRAFFIC CONTROL AND SIGNING PLAN AND OBTAIN APPROVAL OF SUCH PLAN FROM THE BIA TRAFFIC ENGINEERING DEPARTMENT, PRIOR TO BEGINNING ANY CONSTRUCTION WORK ON OR ADJACENT TO EXISTING STREETS.
12. ALL BARRICADES AND CONSTRUCTION SIGNING SHALL CONFORM TO APPLICABLE SECTIONS OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD), US DEPARTMENT OF TRANSPORTATION, LATEST EDITION.
13. THE CONTRACTOR SHALL MAINTAIN ALL CONSTRUCTION BARRICADES AND SIGNING AT ALL TIMES. THE CONTRACTOR SHALL VERIFY THE PROPER LOCATION OF ALL BARRICADING AT THE END AND BEGINNING OF EACH DAY.
14. THE CONTRACTOR SHALL COMPLY WITH ALL NNEPA RULES AND REGULATIONS WHICH REGULATE THE DISCHARGE OF POLLUTANTS IN STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY AS DEFINED IN THE NPDES STORM WATER REGULATIONS. THE CONTRACTOR IS RESPONSIBLE FOR SWPPP IMPLEMENTATION, INSPECTION, AND MAINTENANCE. THE CONTRACTOR WILL POST THE SWPPP ON SITE AS REQUIRED, AS WELL AS SUBMIT COPIES OF SWPPP INSPECTION REPORTS TO OWNER. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER TO ENSURE N.O.I.S. AND N.O.T.S. ARE COMPLETED IN A TIMELY FASHION.
15. CONTRACTOR TO PROVIDE LANDSCAPING OR OTHER MEASURES AS REQUIRED FOR FINAL STABILIZATION PER REQUIREMENTS OF THE ENVIRONMENTAL PROTECTION AGENCY (EPA) AND NAVAJO NATION ENVIRONMENTAL PROTECTION AGENCY (NNEPA). PROVIDE DRAWINGS INDICATING PROPOSED APPROACH AND OBTAIN ARCHITECTS / ENGINEERS APPROVAL PRIOR TO INSTALLATION.
16. ALL EXISTING APPURTENANCES TO REMAIN INCLUDING, BUT NOT LIMITED TO, VALVES, MANHOLES, TRANSFORMERS, & UTILITY POLES SHALL BE ADJUSTED TO FINISHED GRADE.

GRADING PLAN NOTES

1. EXCEPT AS PROVIDED HEREIN, GRADING SHALL BE PERFORMED AT THE ELEVATIONS AND IN ACCORDANCE WITH THE DETAILS SHOWN ON THIS PLAN.
2. THE COST FOR REQUIRED CONSTRUCTION DUST AND EROSION CONTROL MEASURES SHALL BE INCIDENTAL TO THE PROJECT COST, AND INCLUDED IN THE GMP.
3. EARTH SLOPES SHALL NOT EXCEED 3 HORIZONTAL TO 1 VERTICAL UNLESS SHOWN OTHERWISE.
4. IT IS THE INTENT OF THESE PLANS THAT THIS CONTRACTOR SHALL NOT PERFORM ANY WORK OUTSIDE OF THE PROPERTY BOUNDARIES EXCEPT AS REQUIRED BY THIS PLAN.
5. THE CONTRACTOR SHALL ENSURE THAT NO SOIL ERODES FROM THE SITE ONTO ADJACENT PROPERTY OR PUBLIC RIGHT-OF-WAY.
6. A DISPOSAL SITE FOR ANY & ALL EXCESS EXCAVATION MATERIAL, AND UNSUITABLE MATERIAL AND/OR A BORROW SITE CONTAINING ACCEPTABLE FILL MATERIAL SHALL BE OBTAINED BY THE CONTRACTOR IN COMPLIANCE WITH APPLICABLE ENVIRONMENTAL REGULATIONS AND APPROVED BY THE INSPECTOR. ALL COSTS INCURRED IN OBTAINING A DISPOSAL OR BORROW SITE AND HAUL TO OR FROM SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT AND NO SEPARATE MEASUREMENT OR PAYMENT SHALL BE MADE.
7. PAVING AND ROADWAY GRADES SHALL BE +/-0.1' FROM PLAN ELEVATIONS. PAD ELEVATION SHALL BE +/-0.05' FROM BUILDING PLAN ELEVATION.
8. ALL PROPOSED CONTOURS REFLECT TOP OF PAVEMENT ELEVATIONS IN THE PARKING AREA AND MUST BE ADJUSTED FOR MEDIANS AND ISLANDS.
9. VERIFY ALL ELEVATIONS SHOWN ON PLAN FROM BASIS OF ELEVATION CONTROL STATION PRIOR TO BEGINNING CONSTRUCTION.
10. THE CONTRACTOR SHALL PROVIDE AS-BUILTS SURVEY DATA TO ENSURE COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS. THE SURVEY SHALL BE PERFORMED BY A PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF ARIZONA. THE AS-BUILT DRAWING SHALL BE CERTIFIED BY THE SURVEYOR OF RECORD. THE AS-BUILT SHOULD INCLUDE, AT A MINIMUM, ALL TOP OF GRATES, INVERTS, DOORS, AND 75% OF SPOT ELEVATIONS. COORDINATE WITH ENGINEER PRIOR TO SURVEY.

Bohannon & Huston
www.bhinc.com 800.877.5332

DYRON MURPHY ARCHITECTS, P.C.

4505 Montbel Place NE, Albuquerque, New Mexico 87107



ENGINEER

Revision Schedule		
Revision Number	Revision Date	Revision Description
1	11/3/16	ADD.02

PROJECT NUMBER 2011.021 DRAWN BY PROJ MGR

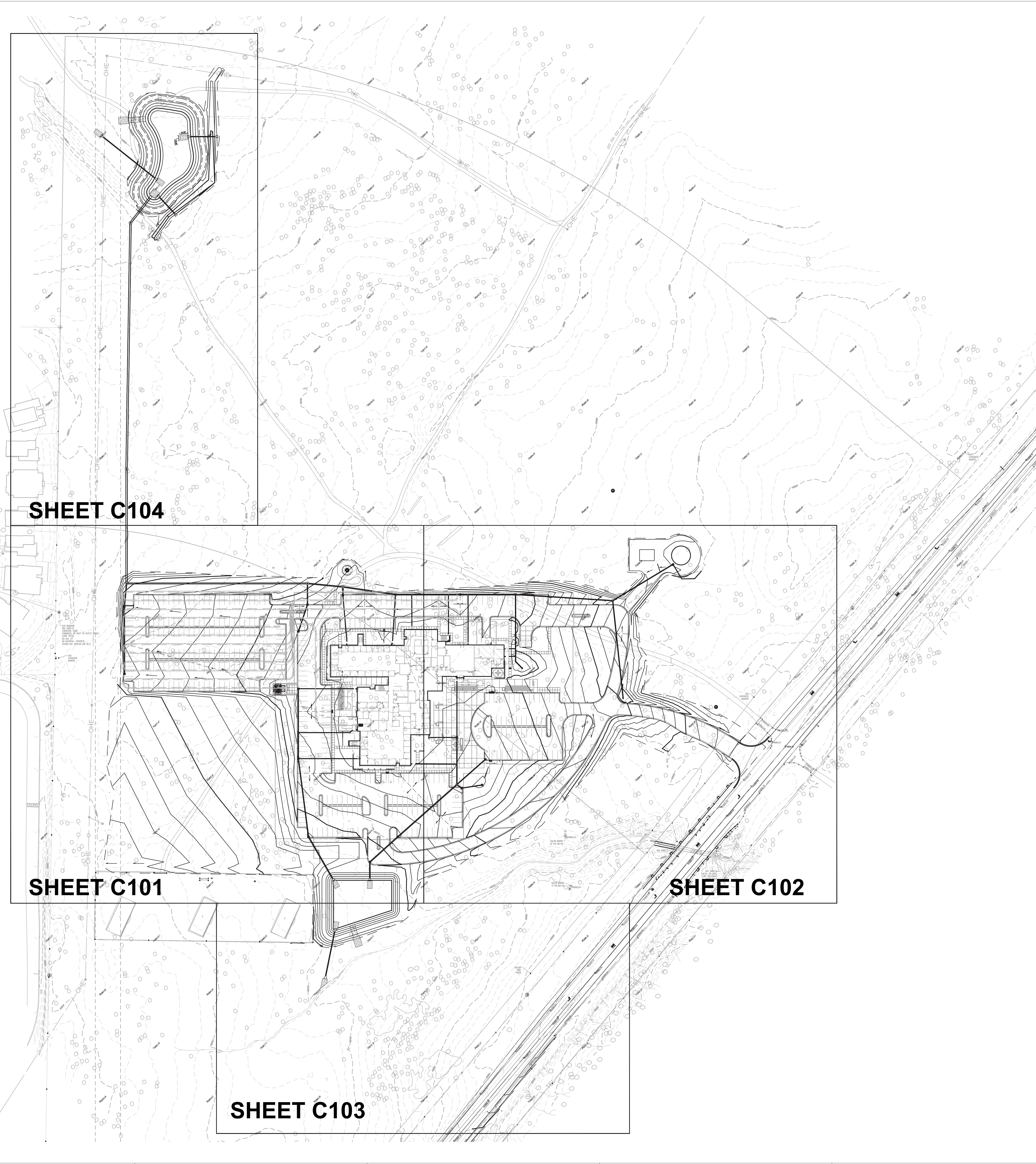
Sheet Number

C100

Sequence of

OVERALL GRADING PLAN

Sheet Title



SHEET C104

SHEET C101

SHEET C102

SHEET C103

DYRON MURPHY ARCHITECTS, P.C.
P:\2016\100% Construction Documents\100% Grading
11-2-16

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E
D
C
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**NTUA HQ COMPLEX
OFFICE BUILDING**

FT. DEFIANCE, ARIZONA

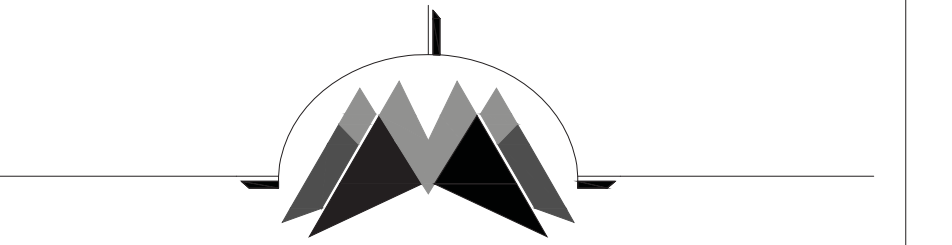
100% CONSTRUCTION DOCUMENTS
OCTOBER 6, 2016

SHEET KEYNOTES*

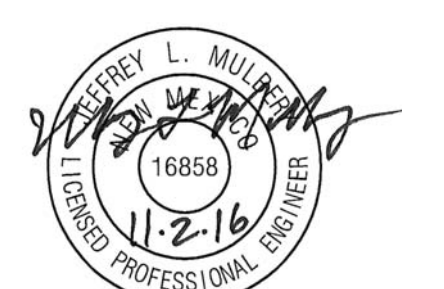
1. INSTALL HDPE (N12 WT. OR APPROVED EQUAL) STORM DRAIN PIPE, SIZE PER PLANS.
2. INSTALL 24" STORM INLET STRUCTURE (NYLOPLAST OR APPROVED EQUAL) w/STANDARD GRATE. (H25 LOADING)
3. INSTALL 30" STORM INLET STRUCTURE (NYLOPLAST OR APPROVED EQUAL) WITH DOME GRATE.
4. INSTALL NYLOPLAST ROAD AND HIGHWAY DRAINAGE INLET STRUCTURE W/ 2"x3" STEEL BAR H-25 RATED GRATE (OR APPROVED EQUAL).
5. INSTALL STORM DRAIN MANHOLE. PER NMAPWA STD DWG 2102.
6. INSTALL CMP END SECTION (CONTECH OR APPROVED EQUAL), SEE PLAN FOR SIZE.
7. INSTALL PRE-FABRICATED STORM DRAIN FITTING, SEE PLANS FOR SIZE.
8. INSTALL 24" SIDEWALK CULVERT. PER NMAPWA STD DWG 2236.
9. INSTALL CURB OPENING PER DETAIL B2, SHEET C104.
10. INSTALL CONCRETE RUNDOWN PER DETAIL A2, SHEET C104.
11. INSTALL RIP RAP BLANKET PER DETAIL C2, SHEET C104.
12. INSTALL EMERGENCY OVERFLOW DRAINAGE STRUCTURE. PER DETAIL A6, SHEET C104.
13. TURN BLOCK AT GRADE EVERY 5' FOR DRAINAGE.
14. INSTALL STORM DRAIN TO WITHIN 5' OF BUILDING. CONNECT TO ROOF DRAIN OUTLET BELOW GRADE.
15. INSTALL 24" STORM DRAIN INLET STRUCTURE (NYLOPLAST OR APPROVED EQUAL) WITH PEDESTRIAN RATED GRATE.
16. IF ALTERNATE IS NOT ACCEPTED PLEASE COORDINATE WITH ENGINEER FOR REVISED GRADING IN THIS AREA.
17. INSTALL EMERGENCY OVERFLOW DRAINAGE STRUCTURE. PER DETAIL A5, SHEET C103.
18. COORDINATE REQUIRED STEPS WITH ARCHITECTURAL PLANS.
19. CONSTRUCT BERM PER DETAIL D2, SHEET C104.
20. INSTALL 4" CLEANOUTS PER WWS-12 SHEET C254.
21. SEE SHEET C202 FOR CONTINUATION.

Bohannon & Huston
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ENGINEER

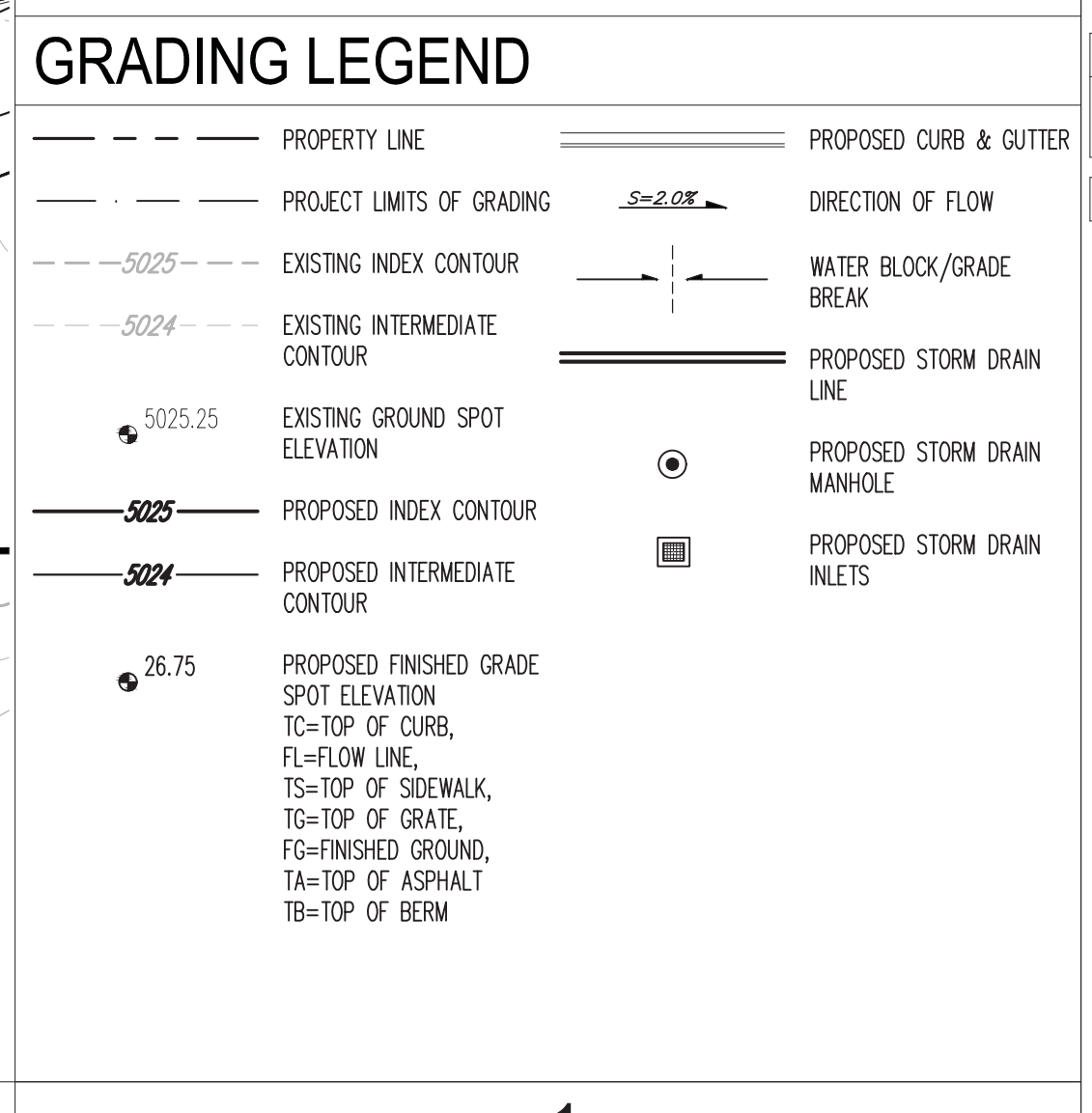
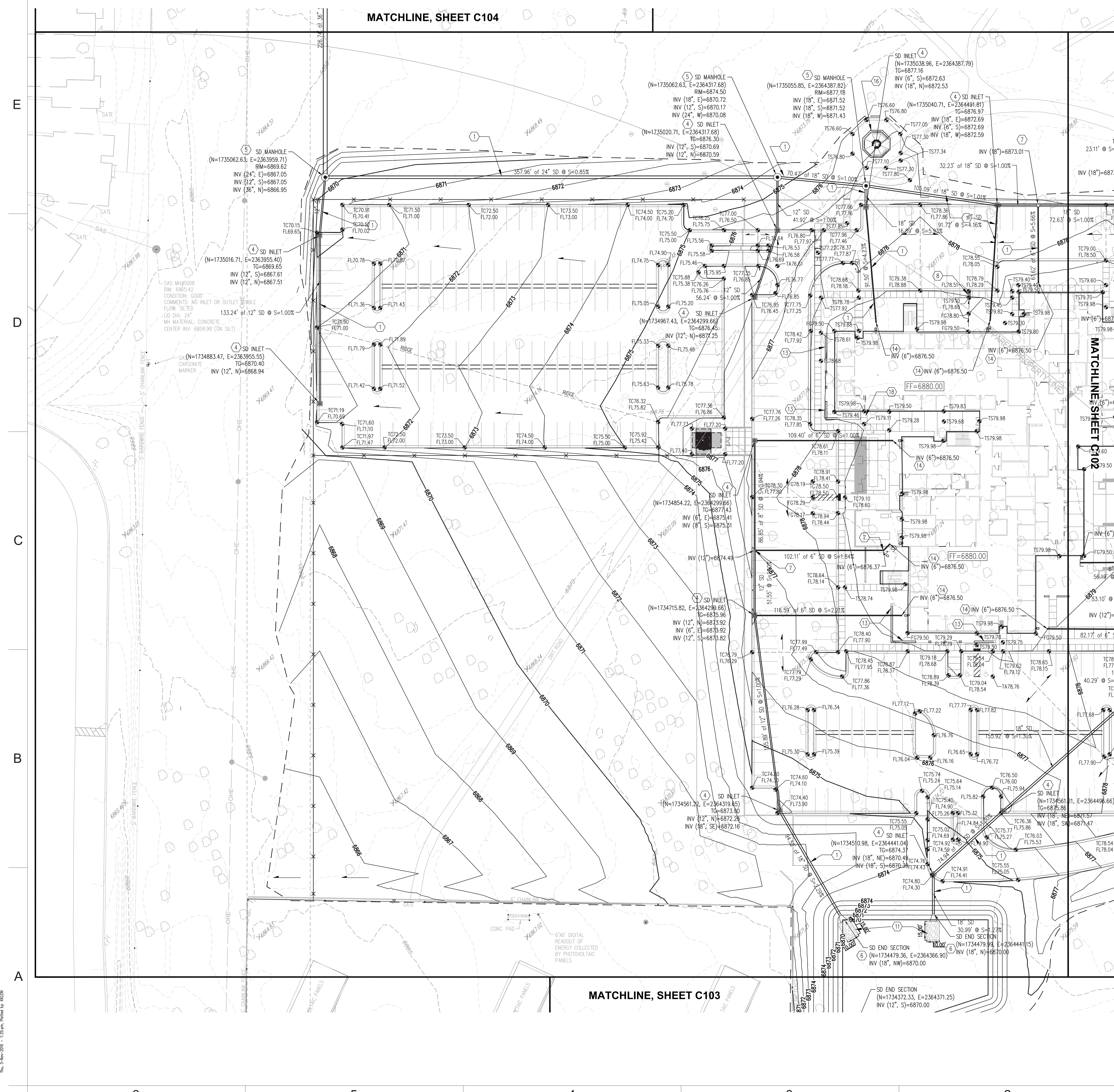
Revision Schedule		
Revision Number	Revision Date	Revision Description
1	11/3/16	ADD.02

PROJECT NUMBER	DRAWN BY	PROJ MGR
2011.021		

Sheet Number

C101
Sequence of

GRADING & DRAINAGE PLAN



DYRON MURPHY ARCHITECTS, P.C.
P:\Projects\2011\2011021\2011021.dwg
10/6/16 10:58:00 AM L. Murphy

Sheet Title

E
D
C
B
A

6 5 4 3 2 1

MATCHLINE, SHEET C104

MATCHLINE, SHEET C103

MATCHLINE SHEET C102

NTUA HQ COMPLEX
OFFICE BUILDING

FT. DEFIANCE, ARIZONA

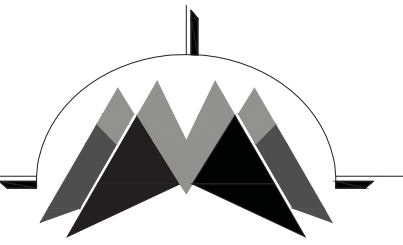
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12. INSTALL EMERGENCY OVERFLOW DRAINAGE STRUCTURE. PER DETAIL A6, SHEET C104.
13. TURN BLOCK AT GRADE EVERY 5' FOR DRAINAGE.
14. INSTALL STORM DRAIN TO WITHIN 5' OF BUILDING. CONNECT TO ROOF DRAIN OUTLET BELOW GRADE.
15. INSTALL 24" STORM DRAIN INLET STRUCTURE (NYLOPLAST OR APPROVED EQUAL) WITH PEDESTRIAN RATED GRATE.
16. IF ALTERNATE IS NOT ACCEPTED PLEASE COORDINATE WITH ENGINEER FOR REVISED GRADING IN THIS AREA.
17. INSTALL EMERGENCY OVERFLOW DRAINAGE STRUCTURE. PER DETAIL A5, SHEET C103.
18. COORDINATE REQUIRED STEPS WITH ARCHITECTURAL PLANS.
19. CONSTRUCT BERM PER DETAIL D2, SHEET C104.
20. INSTALL 4" CLEANOUTS PER WWS-12 SHEET C254.
21. SEE SHEET C202 FOR CONTINUATION.

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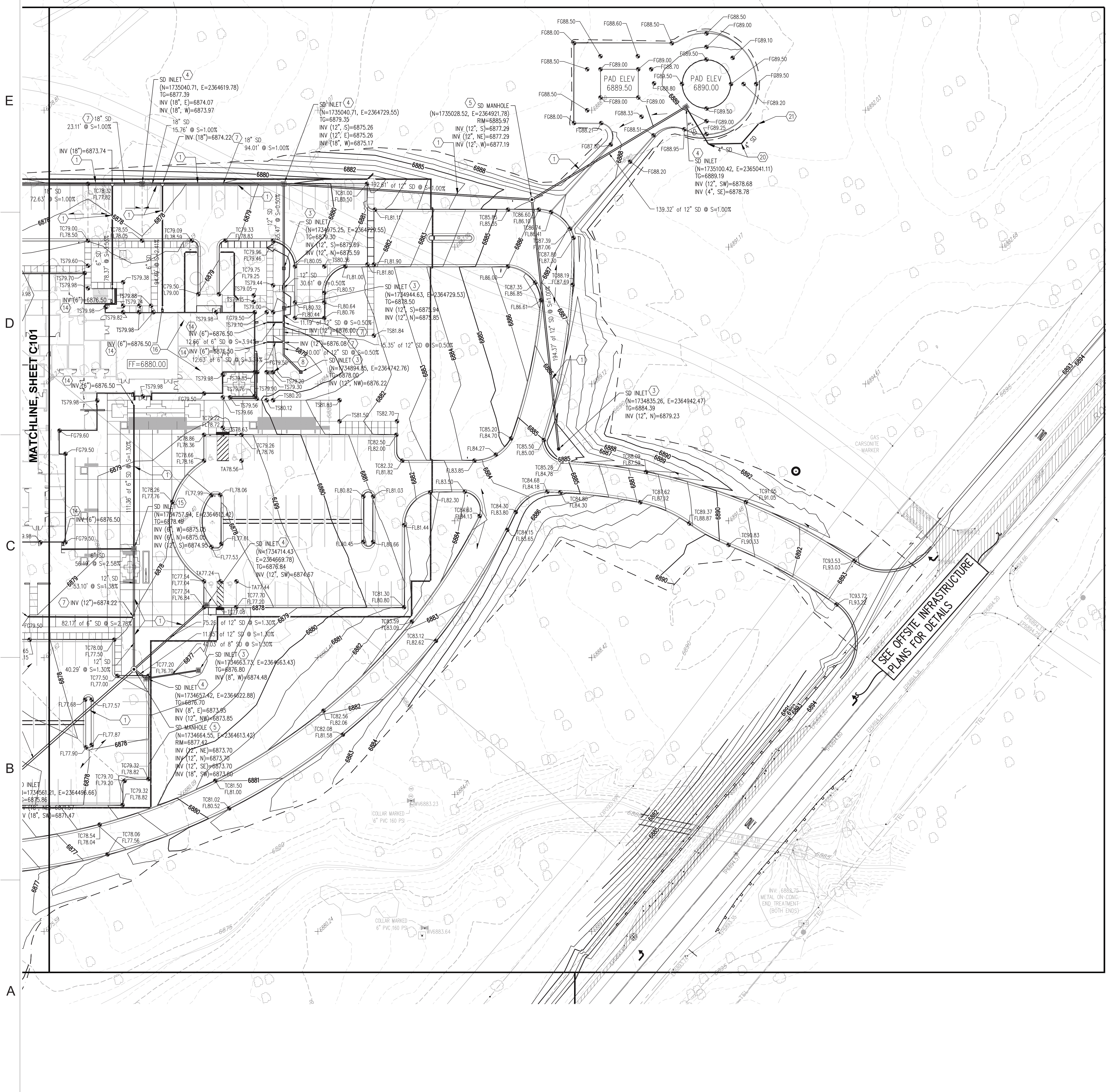
Revision Schedule		
Revision Number	Revision Date	Revision Description
1	11/3/16	ADD.02

PROJECT NUMBER: 2011.021
DRAWN BY: PROJ MGR

Sheet Number

C102
Sequence of

GRADING & DRAINAGE PLAN



GRADING LEGEND

- PROPERTY LINE
 - PROJECT LIMITS OF GRADING
 - - - - - EXISTING INDEX CONTOUR
 - - - - - EXISTING INTERMEDIATE CONTOUR
 - 5025.25 EXISTING GROUND SPOT ELEVATION
 - 5025 PROPOSED INDEX CONTOUR
 - 5024 PROPOSED INTERMEDIATE CONTOUR
 - 26.75 PROPOSED FINISHED GRADE SPOT ELEVATION
 - PROPOSED CURB & GUTTER
 - DIRECTION OF FLOW
 - WATER BLOCK/GRADE BREAK
 - PROPOSED STORM DRAIN LINE
 - PROPOSED STORM DRAIN MANHOLE
 - PROPOSED STORM DRAIN INLETS
- TC=TOP OF CURB, FL=FLOW LINE, TS=TOP OF SIDEWALK, TG=TOP OF GRATE, FG=FINISHED GROUND, TA=TOP OF ASPHALT, TB=TOP OF BERM

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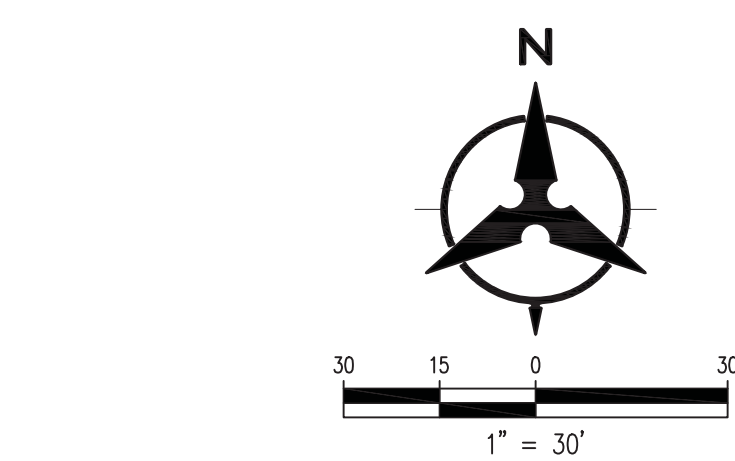
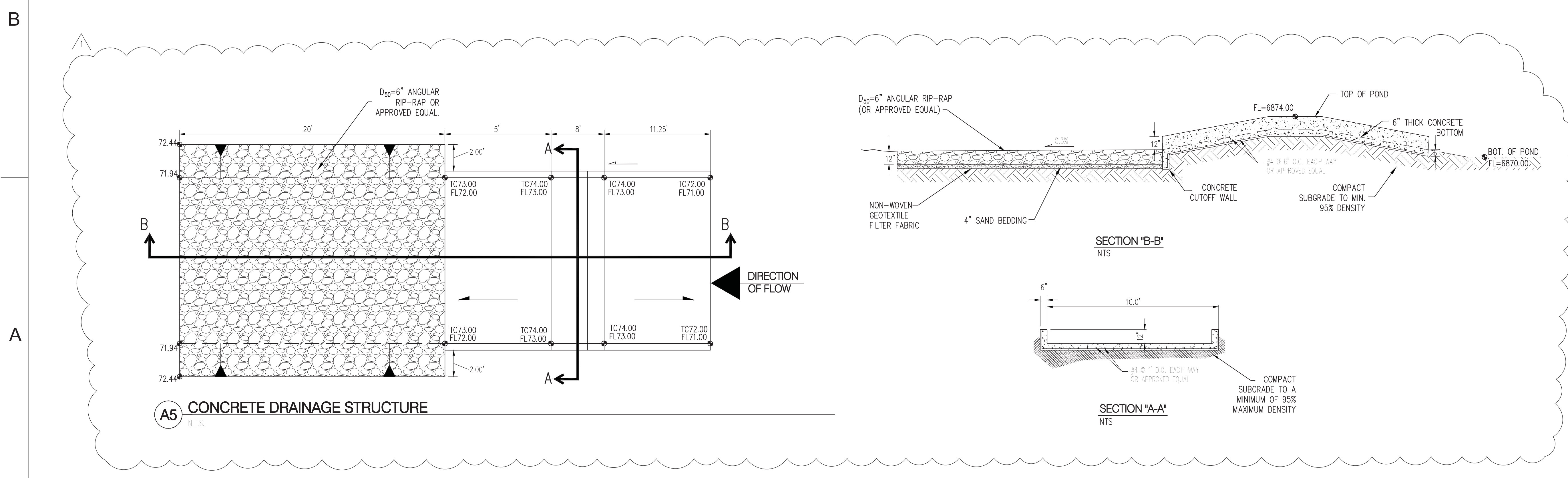
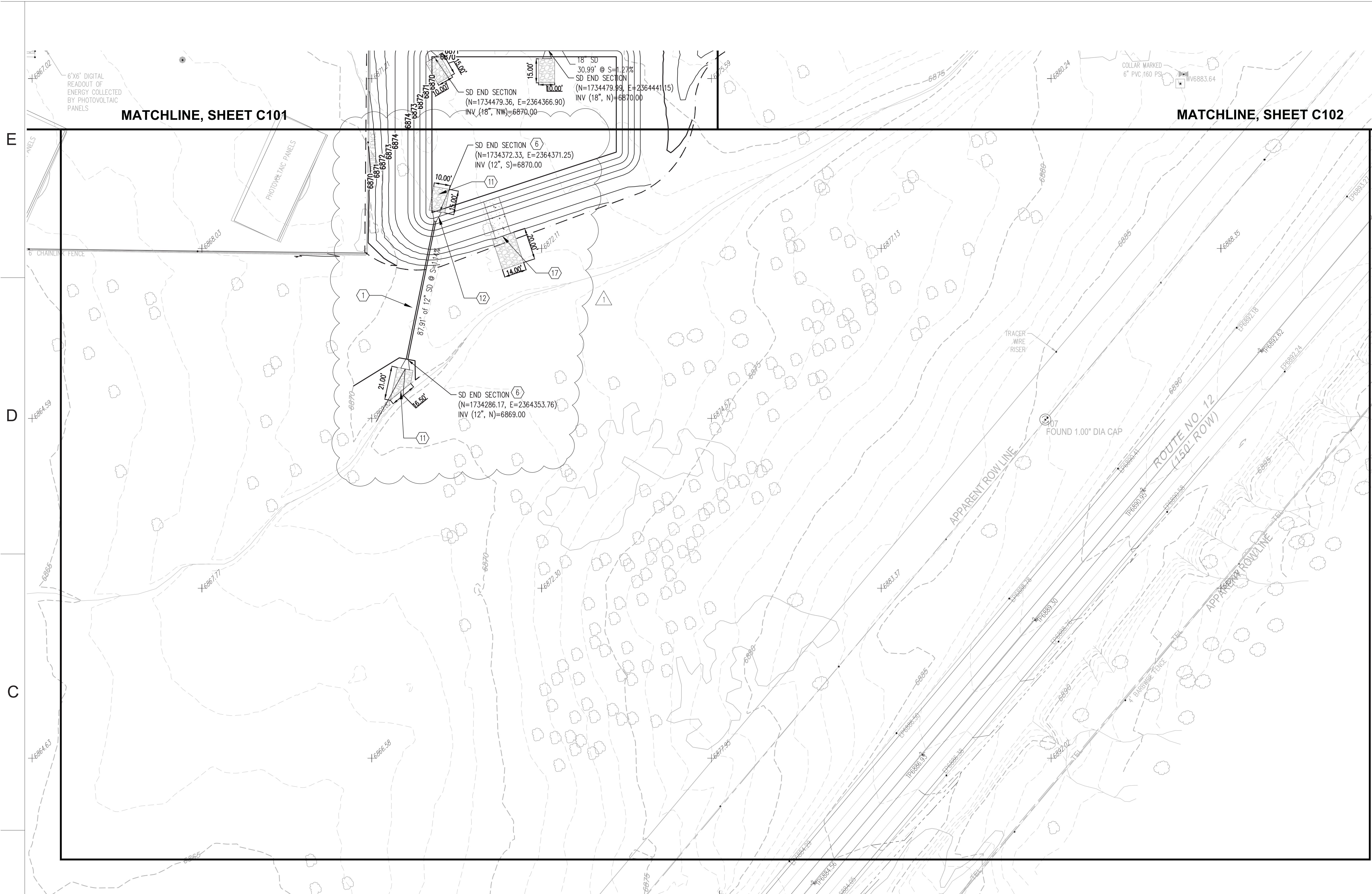
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OCTOBER 6, 2016

SHEET KEYNOTES*

1. INSTALL HDPE (N12 WT. OR APPROVED EQUAL) STORM DRAIN PIPE, SIZE PER PLANS.
2. INSTALL 24" STORM INLET STRUCTURE (NYLOPLAST OR APPROVED EQUAL) w/STANDARD GRATE. (H25 LOADING)
3. INSTALL 30" STORM INLET STRUCTURE (NYLOPLAST OR APPROVED EQUAL) WITH DOME GRATE.
4. INSTALL NYLOPLAST ROAD AND HIGHWAY DRAINAGE INLET STRUCTURE W/ 2'X3' STEEL BAR H-25 RATED GRATE (OR APPROVED EQUAL).
5. INSTALL STORM DRAIN MANHOLE. PER NMAPWA STD DWG 2102.
6. INSTALL CMP END SECTION (CONTECH OR APPROVED EQUAL), SEE PLAN FOR SIZE.
7. INSTALL PRE-FABRICATED STORM DRAIN FITTING. SEE PLANS FOR SIZE.
8. INSTALL 24" SIDEWALK CULVERT. PER NMAPWA STD DWG 2236.
9. INSTALL CURB OPENING PER DETAIL B2, SHEET C104.
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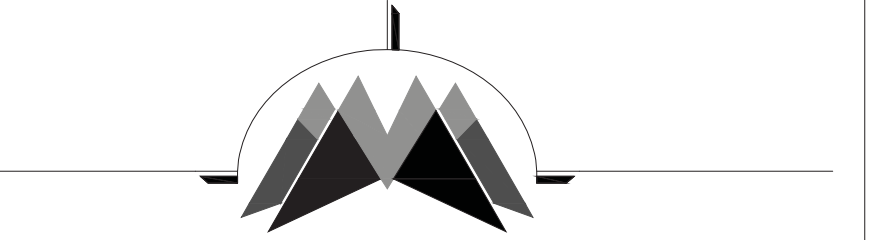


GRADING LEGEND

---	PROPERTY LINE	---	PROPOSED CURB & GUTTER
---	PROJECT LIMITS OF GRADING	---	DIRECTION OF FLOW
---	EXISTING INDEX CONTOUR	---	WATER BLOCK/GRADE BREAK
---	EXISTING INTERMEDIATE CONTOUR	---	PROPOSED STORM DRAIN LINE
5025.25	EXISTING GROUND SPOT ELEVATION	○	PROPOSED STORM DRAIN MANHOLE
5025	PROPOSED INDEX CONTOUR	□	PROPOSED STORM DRAIN INLETS
5024	PROPOSED INTERMEDIATE CONTOUR		
26.75	PROPOSED FINISHED GRADE SPOT ELEVATION		

TC=TOP OF CURB, FL=FLOW LINE, TS=TOP OF SIDEWALK, TG=TOP OF GRATE, FG=FINISHED GROUND, TA=TOP OF ASPHALT, TB=TOP OF BERM

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Revision Schedule		
Revision Number	Revision Date	Revision Description
1	11/3/16	ADD.02

PROJECT NUMBER: 2011.021
DRAWN BY: PROJ MGR

Sheet Number

C103

Sequence of

GRADING & DRAINAGE PLAN

Sheet Title

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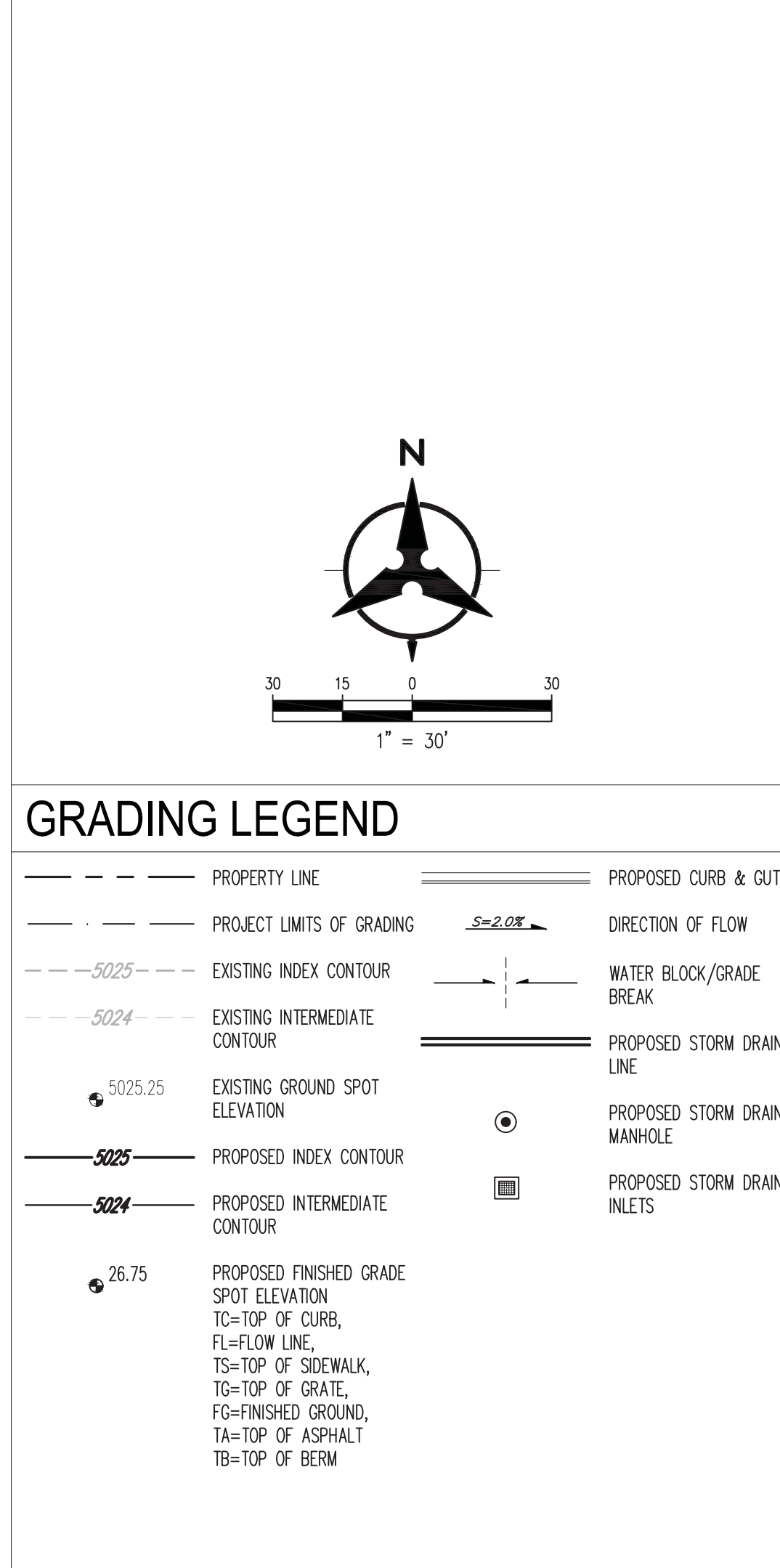
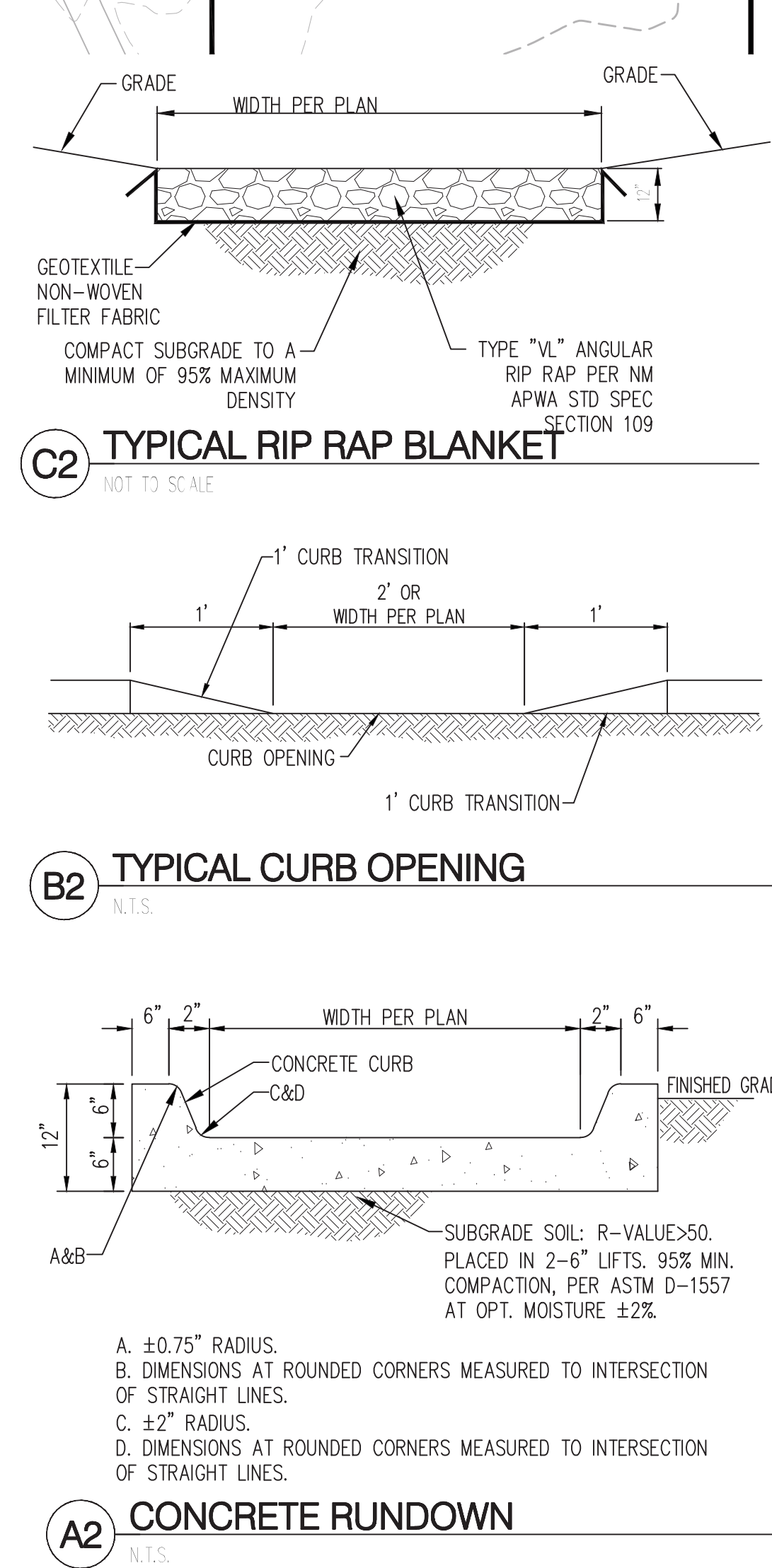
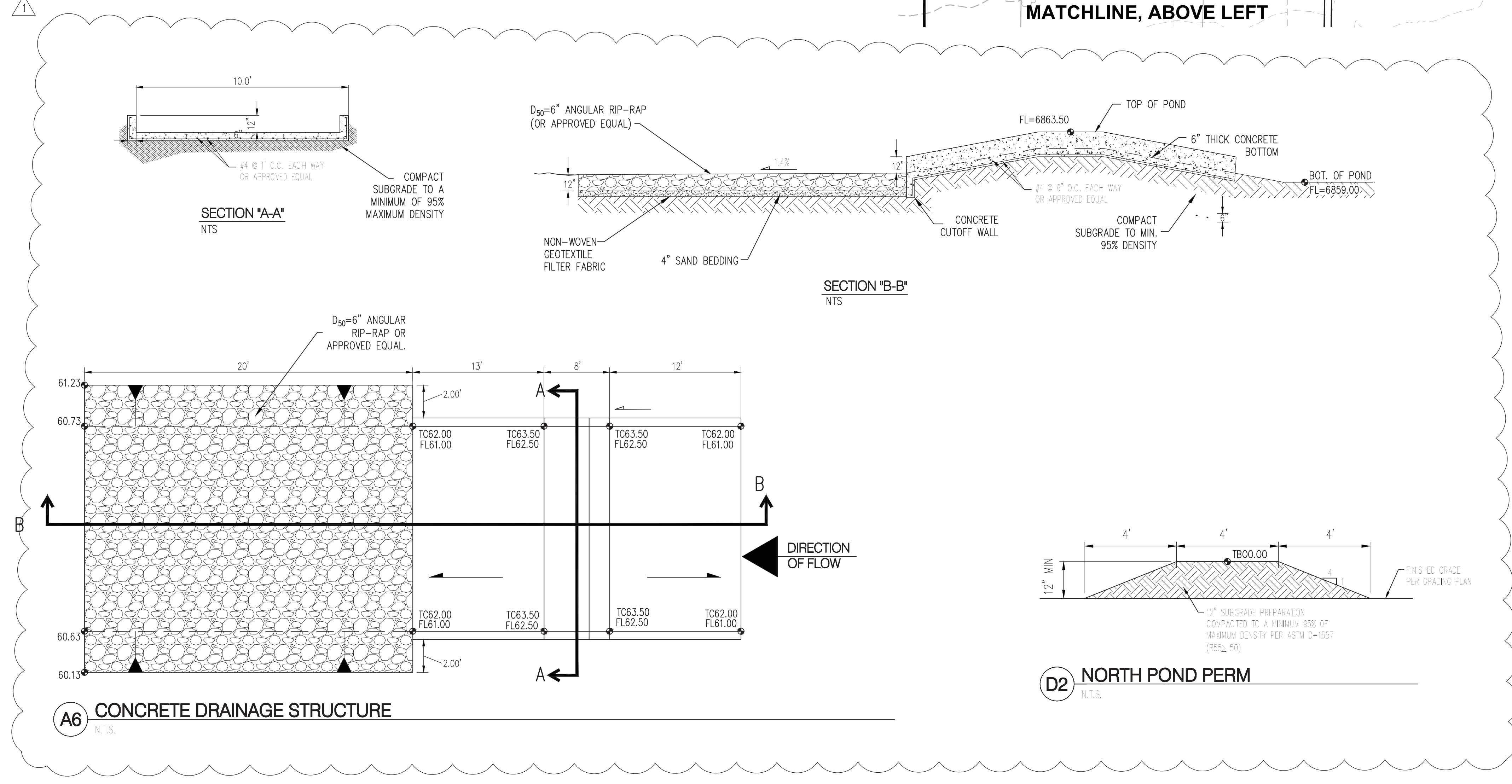
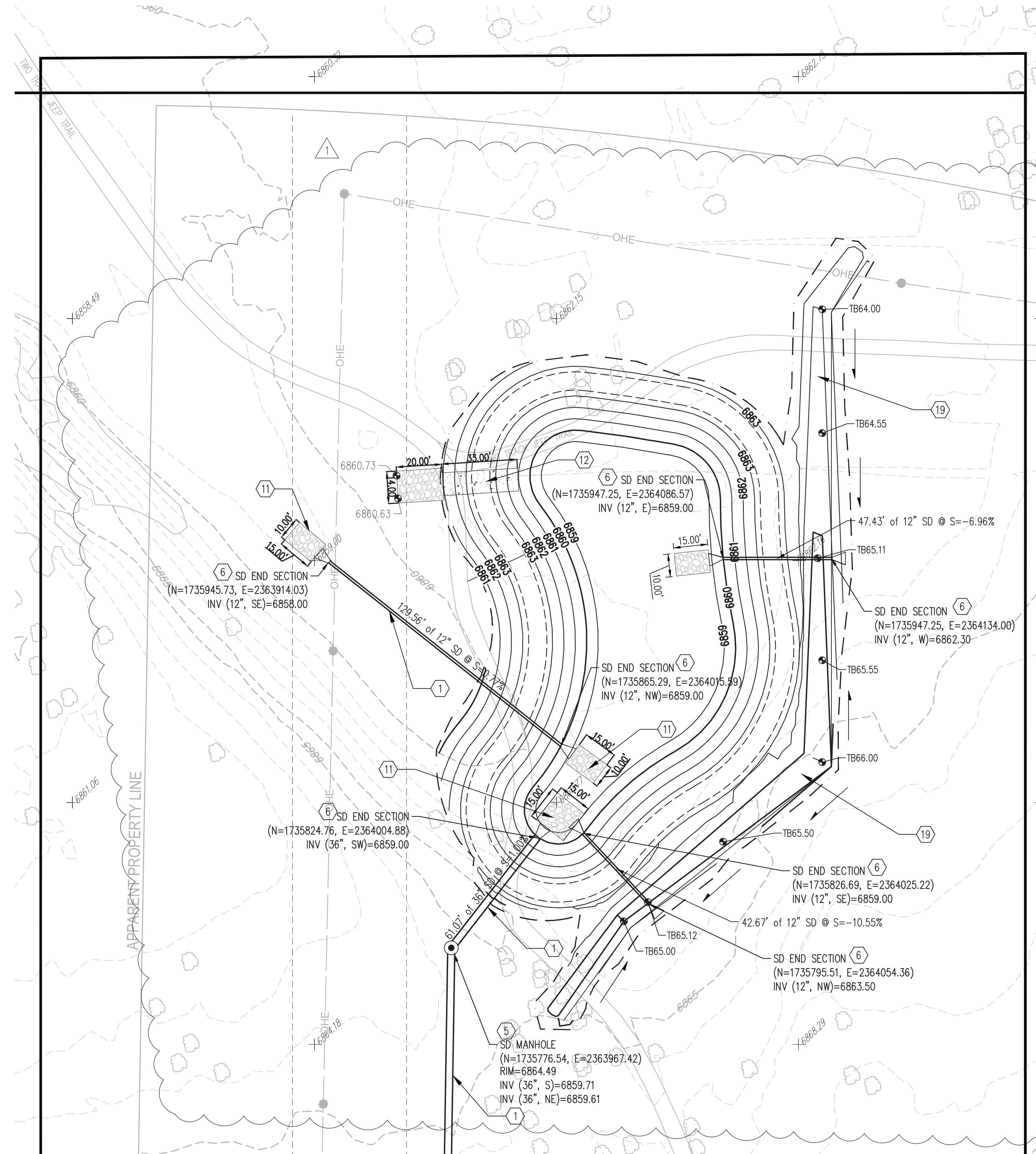
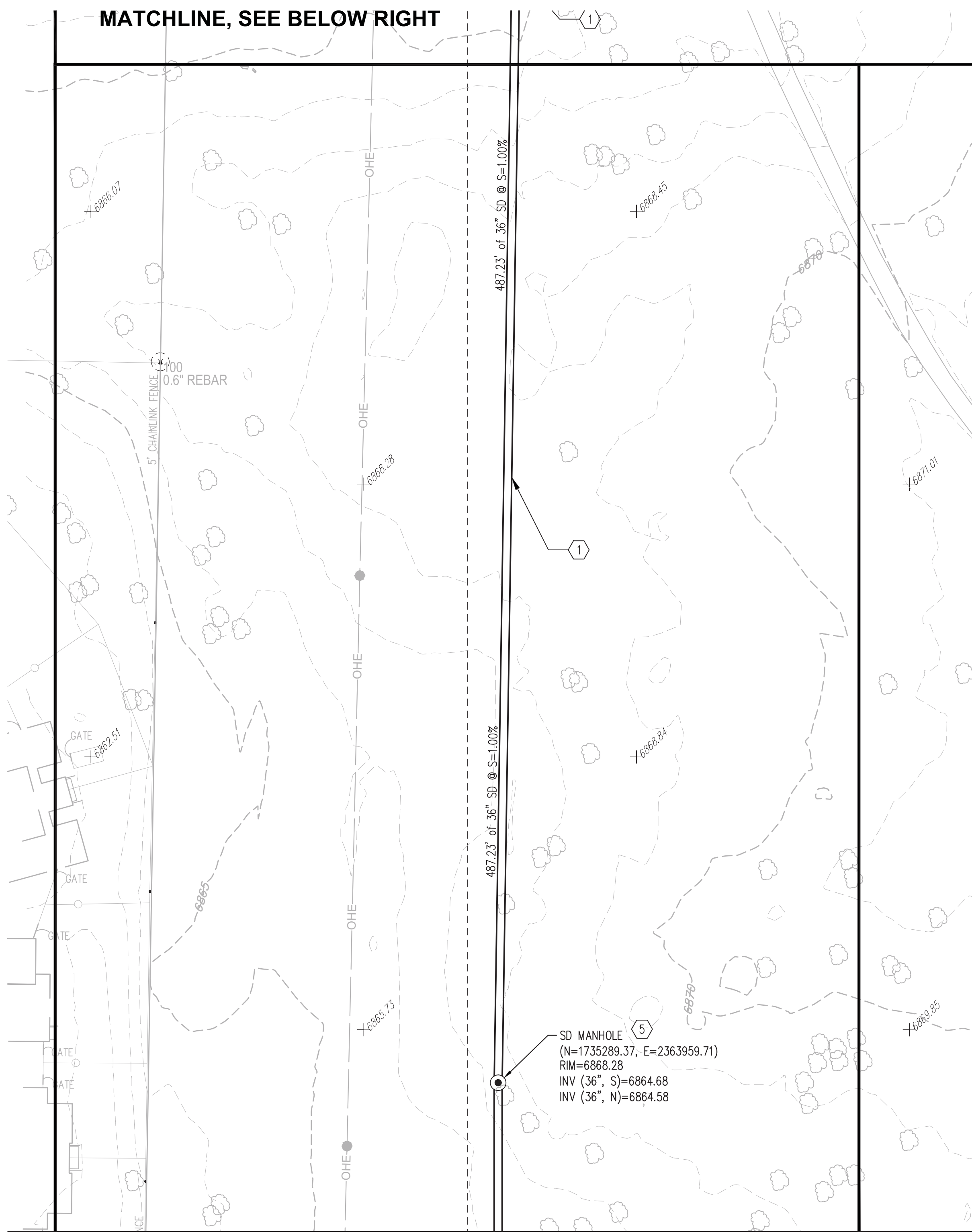
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GRADING & DRAINAGE PLAN

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11-2-16

REVISION SCHEDULE

Revision Number	Revision Date	Revision Description
1	11/3/16	ADD.02

PROJECT NUMBER: 2011.021

DRAWN BY: PROJ MGR

Sheet Number: **C104**

Sequence of

DYRON MURPHY ARCHITECTS, P.C.
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SHEET KEYNOTES

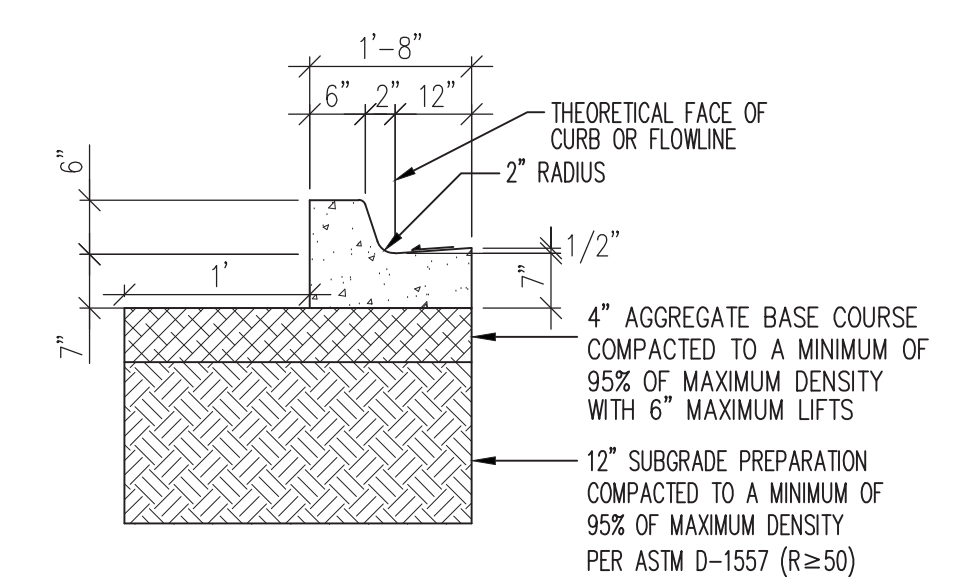
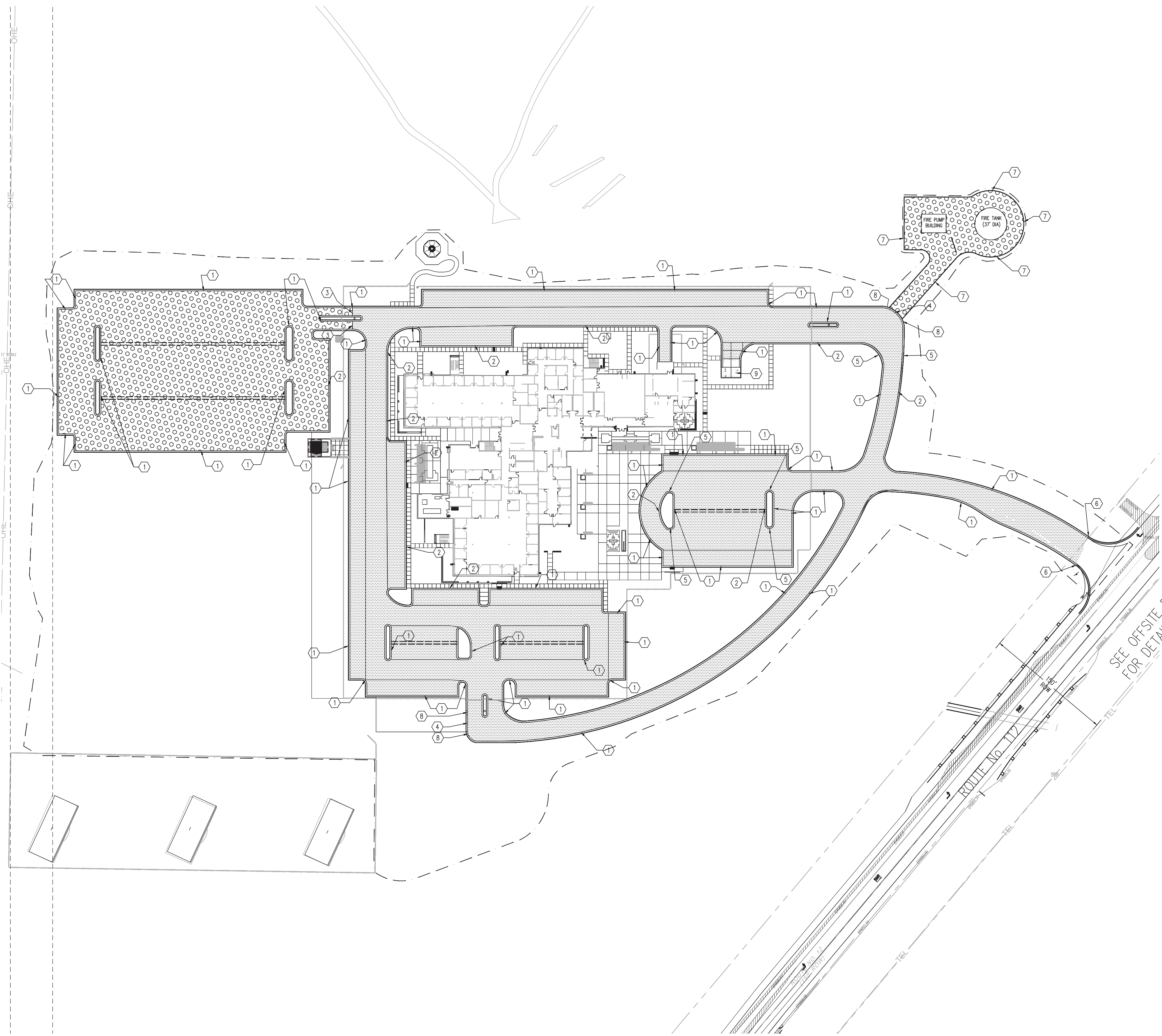
1. INSTALL 6" STANDARD CONCRETE CURB & GUTTER PER DETAIL 1, THIS SHEET.
2. INSTALL 6" DEPRESSED CONCRETE CURB & GUTTER PER DETAIL 2, THIS SHEET.
3. INSTALL CUT-OFF WALL PER NMAPWA STD DWG 2415B.
4. INSTALL ROLL CURB PER DETAIL 4, THIS SHEET.
5. 5' TRANSITION FROM 6" STANDARD CURB & GUTTER TO 6" DEPRESSED CURB AND GUTTER.
6. 5' TRANSITION FROM 6" CURB & GUTTER TO OFFSITE PLANS DETAILS.
7. INSTALL HEADER CURB PER NMAPWA STD DWG 2415B.
8. 5' TRANSITION FROM ROLL CURB TO 6" CURB & GUTTER.
9. INSTALL CONCRETE PAVEMENT PER DETAIL THIS SHEET.

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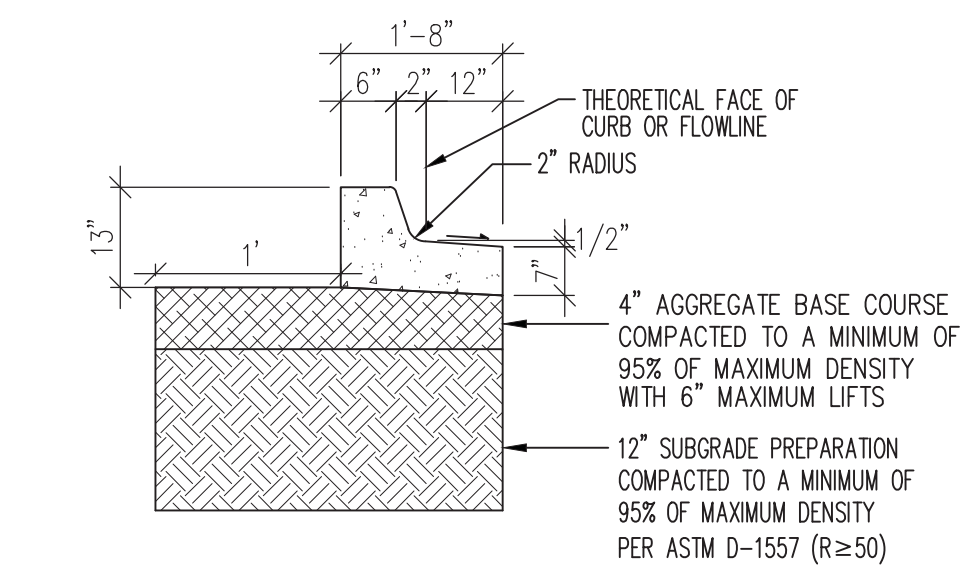
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GENERAL CURB & GUTTER NOTES:

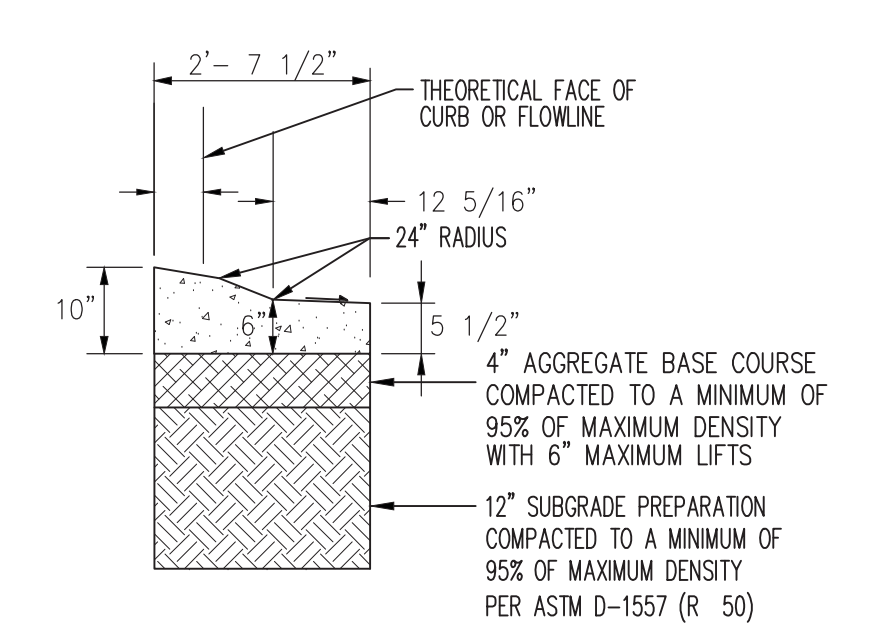
1. CURBS, GUTTERS AND CUT-OFF WALL WILL BE CONSTRUCTED OF PORTLAND CEMENT CONCRETE.
2. FOR STANDARD AND MEDIAN C & G ADJACENT TO ASPHALT CONCRETE PAVEMENT, PROVIDE CONTRACTION JTS. 12" MAX. SPACING. 1/2" EXP. JTS. AT CURB RETURNS & AT A MAXIMUM SPACING OF 120' BETWEEN CURB RETURNS & EACH SIDE OF SEPARATELY CONSTRUCTED DRIVEWAYS. CONTRACTION JTS. SHALL BE EITHER SAWED OR TOOLED A MINIMUM OF 1" DEEP AT FINISHED FACES.
3. FOR ALL OTHER C & G & CUT-OFF WALL PROVIDE CONTRACTION JTS. AT 10' MAX. SPACING. 1/2" EXP. JTS. AT CURB RETURNS & AT A MAXIMUM SPACING OF 100' BETWEEN CURB RETURNS & EACH SIDE OF SEPARATELY CONSTRUCTED DRIVEWAYS. CONTRACTION JTS. SHALL BE EITHER SAWED OR TOOLED A MINIMUM OF 1" DEEP AT ALL FINISHED FACES. REINFORCEMENT SHALL NOT BE USED IN CUT-OFF WALLS.
4. FOR C & G CONSTRUCTED WITH PORTLAND CEMENT CONCRETE PAVEMENT, CONTRACTION JTS. AND EXPANSION JTS. SHALL BE THE SAME AS THE PAVEMENT JOINTS.
5. ALL EDGES SHALL BE EDGED WITH A 3/8" RADIUS EDGING TOOL.
6. REMOVE & REPLACE PAVEMENT 1" WIDE ADJACENT TO LIP OF GUTTER WHEN CONSTRUCTING C & G ADJACENT TO EXISTING ASPHALT CONCRETE PAVEMENT.
7. 1/4" ISOLATION JOINT SHALL BE PLACED BETWEEN SIDEWALK AND C & G WHEN CAST ADJACENT TO EACH OTHER.
8. ADA = AMERICANS WITH DISABILITIES ACT.



1 6" STANDARD CURB & GUTTER
NTS

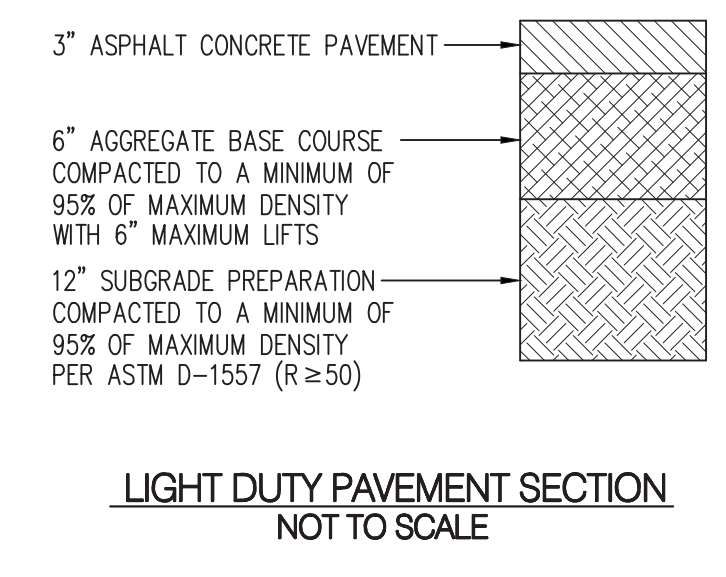


2 6" DEPRESSED CURB & GUTTER
NTS

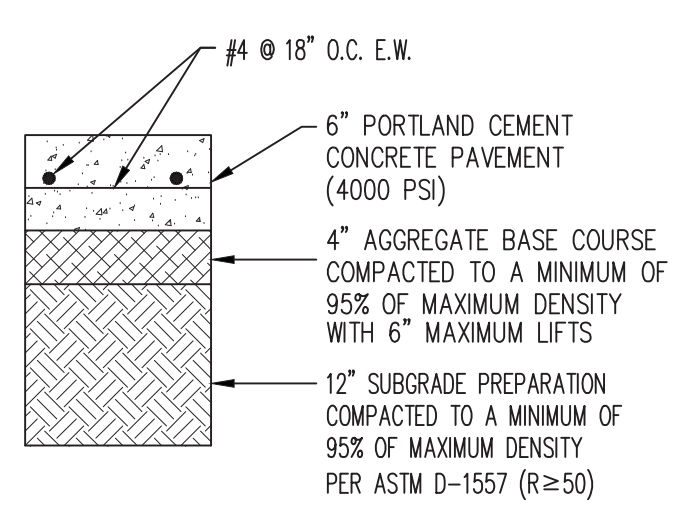


4 MOUNTABLE ROLL CURB & GUTTER
NTS

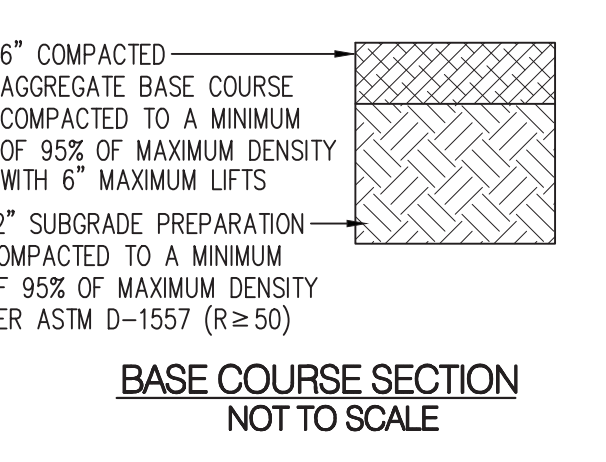
NOTE:
ALL CURB AND GUTTER, VALLEY GUTTER, ETC. IN DRIVING AREAS SHALL BE POURED ON 4" ABC/12" SUBGRADE PER CONCRETE PAVEMENT SECTION DETAIL.



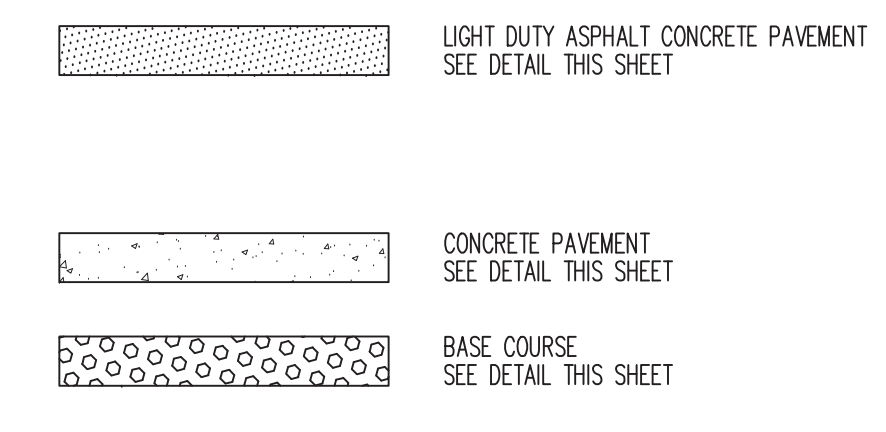
LIGHT DUTY PAVEMENT SECTION
NOT TO SCALE



CONCRETE PAVEMENT SECTION
NOT TO SCALE



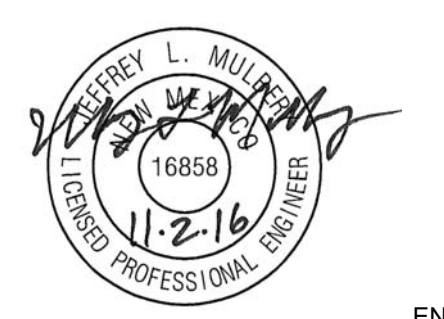
BASE COURSE SECTION
NOT TO SCALE



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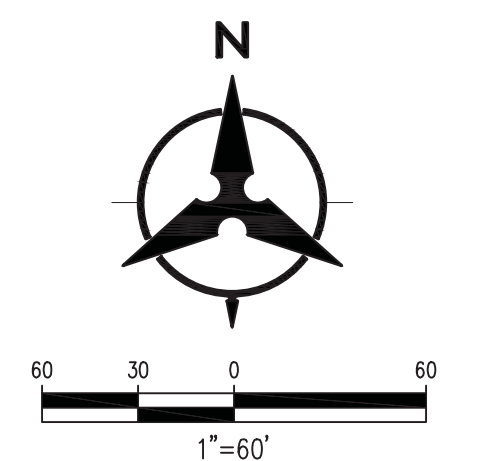
Revision Schedule		
Revision Number	Revision Date	Revision Description
1	11/3/16	ADD.02

PROJECT NUMBER: 2011.021
DRAWN BY: PROJ MGR

Sheet Number

C150
Sequence of

OVERALL
PAVING PLAN



DYRON MURPHY ARCHITECTS, P.C.
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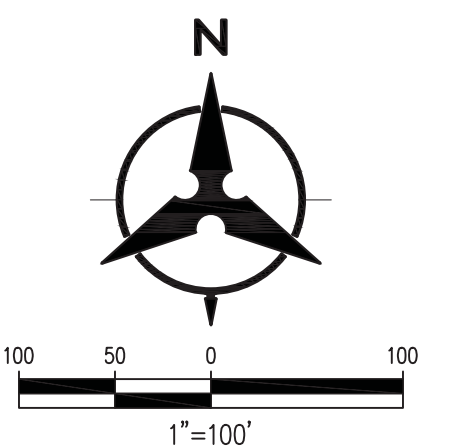
LEGEND

- - - - -	PROPERTY LINE
- - - - -	EXISTING EASEMENT
- - - - -	EXISTING SANITARY SEWER
- - - - -	EXISTING WATER LINE
□	EXISTING WATER METER
○	EXISTING CAP
+	EXISTING VALVE
⊕	EXISTING FIRE HYDRANT
⊙	EXISTING SANITARY SEWER MANHOLE
- - - - -	PROPOSED EASEMENT
— SAS	PROPOSED SANITARY SEWER LINE
●	PROPOSED SANITARY SEWER MANHOLE
●	PROPOSED CLEANOUT
— W	PROPOSED WATER LINE
+	PROPOSED VALVE
+	PROPOSED FIRE WATER LINE
+	PROPOSED HYDRANT
○	PROPOSED CAP
■	PROPOSED WATER METER
+	PROPOSED PIV
+	REMOTE FIRE DEPARTMENT CONNECTION

UTILITY NOTES

- THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLETE INSTALLATION OF ALL WORK RELATED TO MECHANICAL UTILITIES AS SHOWN ON THIS PLAN INCLUDING: TRENCHING, BACKFILL, SUPPORTS, CLEANOUT PADS, SERVICE STOPS AND BOXES, SERVICE LINES, TESTING, CLEANING, AND STERILIZING. ANY WORK NOT ACCEPTED BY THE ARCHITECT OR ENGINEER DUE TO IMPROPER WORKMANSHIP OR LACK OF PROPER COORDINATION SHALL BE REMOVED AND CORRECTLY INSTALLED AT THE CONTRACTOR'S EXPENSE, AS DIRECTED.
- MINIMUM DEPTHS OF COVER SHALL BE: 42" FOR WATER LINES AND 48" FOR SEWER, EXCEPT AT BUILDING CONNECTION.
- ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED UNDER CONTRACT SHALL, EXCEPT AS OTHERWISE STATED OR PROVIDED OF HEREON, BE CONSTRUCTED IN ACCORDANCE WITH THE IAPMO UNIFORM PLUMBING CODE (2012 EDITION) & NFPA 24 (2010 EDITION).
- UTILITY LINES SHALL BE INSTALLED PRIOR TO PAVEMENT, CURB AND GUTTER, AND/OR SIDEWALK, AS APPLICABLE.
- ROUGH GRADING OF SITE (+0.5') SHALL BE COMPLETED PRIOR TO INSTALLATION OF UTILITY LINES.
- CONTRACTOR WILL BE RESPONSIBLE FOR CONNECTIONS TO BUILDING DRAIN LINES AND ALL NECESSARY FITTINGS.
- ALL VALVES SHALL BE ANCHORED PER NTUA STANDARD DWG. WS-19.
- FIRE WATER LINES SHALL USE PIPE MATERIALS UNDERWRITERS LABORATORIES LISTED AND APPROVED FOR FIRE SERVICE.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WATER METER, FIRE WATER LINE, AND SEWER HOOKUP FEES FOR INSTALLATIONS. OWNER SHALL BE RESPONSIBLE FOR UTILITY EXPANSION CHARGES, PRORATA AND OTHER SPECIAL ASSESSMENTS.
- CONTRACTOR SHALL VERIFY INVERTS AND LOCATIONS OF EXISTING WATER/SAS LINES PRIOR TO BEGINNING WORK. ALL CONFLICTS SHALL BE BROUGHT TO ATTENTION OF THE ENGINEER AND RESOLVED PRIOR TO BEGINNING WORK.
- MINIMUM HORIZONTAL AND VERTICAL SEPARATIONS PER NTUA STANDARDS.
- ALL WATER AND SANITARY SEWER WORK DETAILED SHALL BE CONSTRUCTED PER NTUA STANDARDS AND SPECIFICATIONS.
- UTILITIES WITHIN BIA RIGHT-OF-WAY SHALL REQUIRE A BIA PERMIT AND CONSTRUCTION SHALL ADHERE TO ALL APPLICABLE PERMIT REQUIREMENTS.
- THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITY LINES WITHIN THE CONSTRUCTION AREA. ANY DAMAGE TO EXISTING FACILITIES CAUSED BY CONSTRUCTION ACTIVITY SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE AND APPROVED BY THE CONSTRUCTION INSPECTOR.
- CONTRACTOR SHALL NOTIFY THE AUTHORITY HAVING JURISDICTION (NTUA) PRIOR TO INSTALLATION OF FIRE SERVICE LINES, AND PRIOR TO TESTING AND INSPECTION OF ALL WATER & WASTEWATER LINES. CONTRACTOR SHALL COMPLETE, SIGN, AND SUBMIT THE "CONTRACTOR'S MATERIAL & TEST CERTIFICATE FOR UNDERGROUND PIPING" IN ACCORDANCE WITH NFPA 24.
- THE CONTRACTOR SHALL OBTAIN ALL THE NECESSARY PERMITS FOR THE PROJECT PRIOR TO COMMENCING CONSTRUCTION, INCLUDING A NTUA PERMISSION TO TAP FORM (SUBMITTED TO NTUA HEADQUARTERS) TO CONNECT TO EXISTING WATER & WASTEWATER LINES.

NOTE: THE FIRELINE WILL BE FROM A NON POTABLE SOURCE. ALL PIPING AND APPURTENANCES FOR THE FIRELINE SHALL BE "PURPLE" PIPE AND FITTINGS TO BE CLEARLY NOTED AS NON POTABLE.



RESTRAINED JOINT TABLE

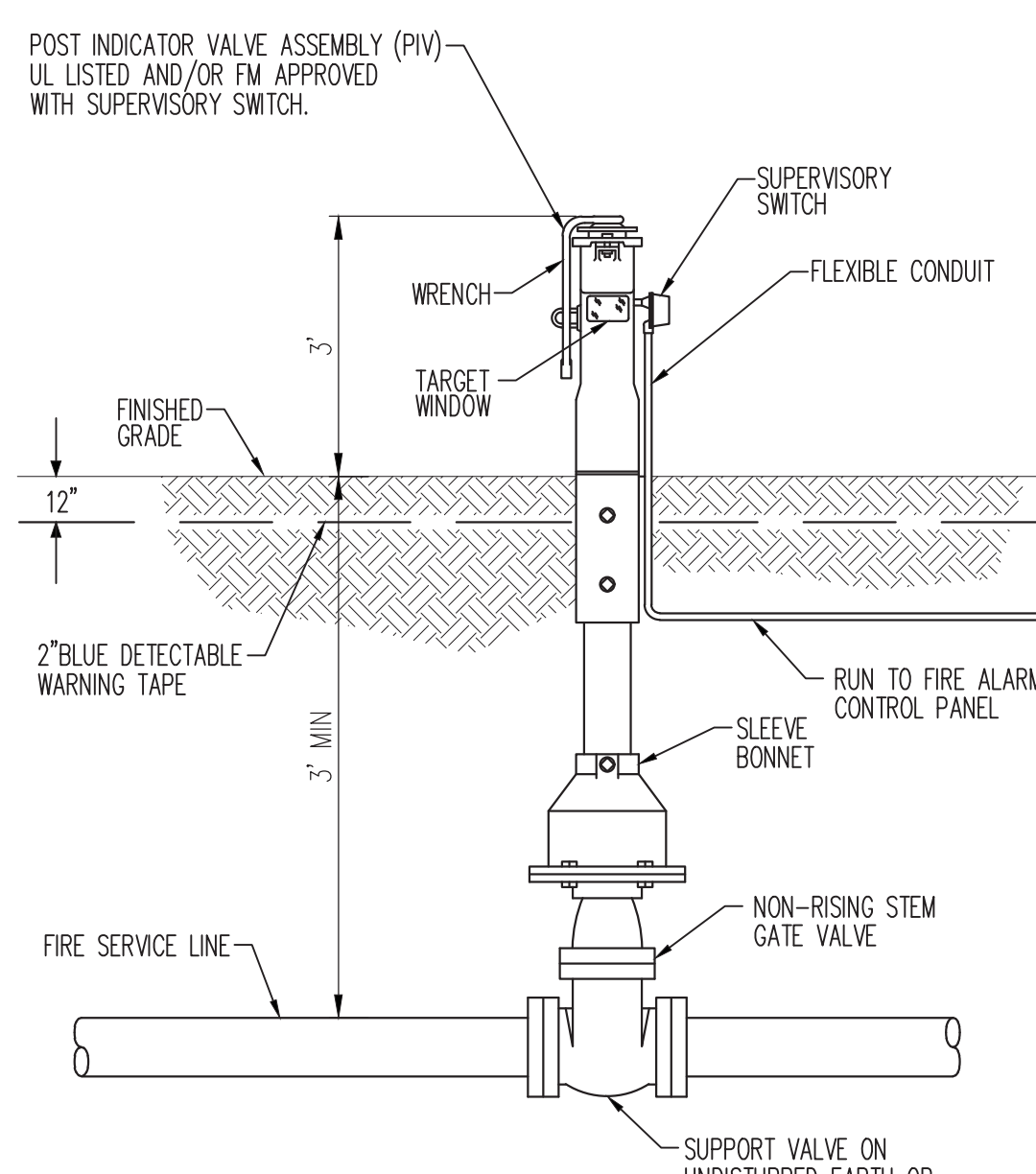
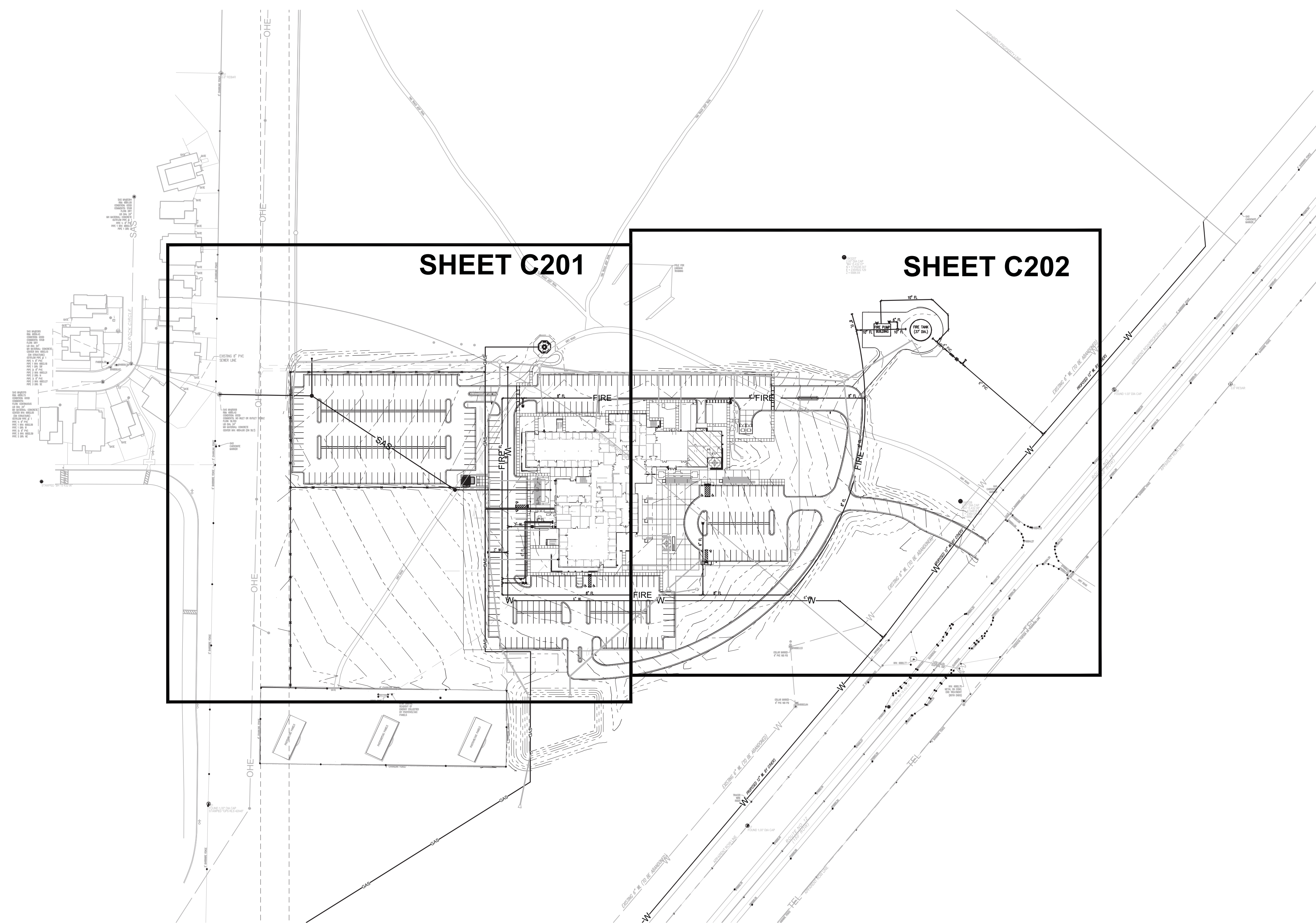
MECHANICAL JOINTS (CS90-PVC)	LENGTH OF RESTRAINED JOINTS
3" GATEVALVE/CAP	36"
4" GATEVALVE/CAP	39"
4" 45° BEND	6'
4" 90° BEND	15'
4" x 4" x 4" TEE	39"
6" GATEVALVE/CAP	55'
6" 45° BEND	9'
6" 90° BEND	20'
6" x 6" x 3" TEE	36"
6" x 6" x 4" TEE	39"
6" x 6" x 6" TEE	55'
8" GATEVALVE/CAP	72'
8" 45° BEND	11'
8" 90° BEND	27'
8" x 8" x 4" TEE	39"
8" x 8" x 6" TEE	55'
8" x 8" x 8" TEE	72'
10" x 8" REDUCER	29'
10" x 10" x 6" TEE	55'
12" GATEVALVE/CAP	102'
12" x 12" x 6" TEE	55'
6" - 4" REDUCER	29'
10" - 4" REDUCER	61'

MATERIALS:

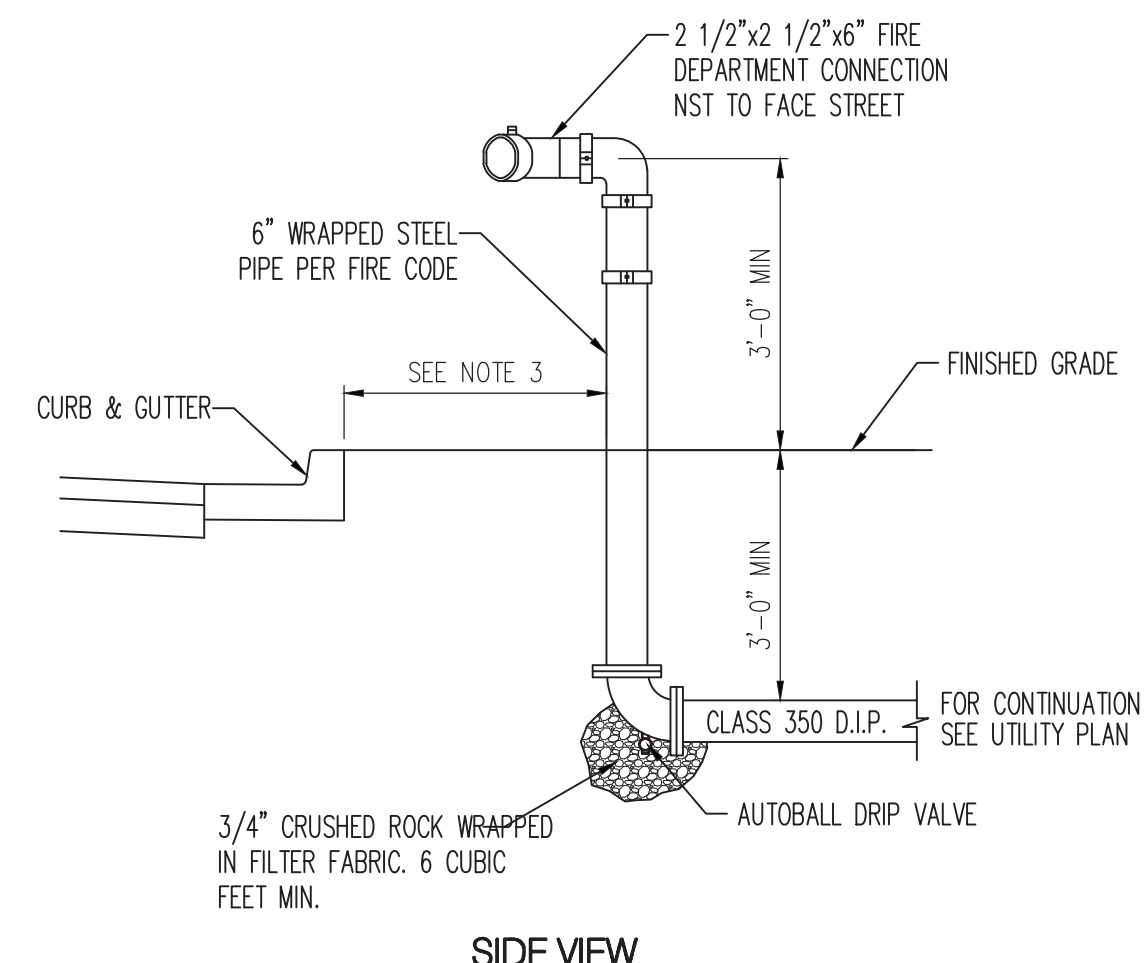
SAS LINE: SDR-35 PVC
WATER LINE: CS90-PVC DR18

NOTE:

- RESTRAINED JOINTS ANALYZED WITH TYPE SM SOIL, 1.5 SAFETY FACTOR, 42" MIN BURY, TRENCH TYPE 4, AND WITH 150 PSI MAX PRESSURE.
- ALL MECHANICAL JOINTS SHALL BE RESTRAINED AT THE FITTING.
- ALL SERVICE/FIRE LINES SHALL BE RESTRAINED THE ENTIRE DISTANCE FROM THE FITTING TO THE CAP WITHIN THE PUBLIC EASEMENT.
- THE CONTRACTOR SHALL PROVIDE A MINIMUM PIPE LENGTH OF 20 LF FROM ALL MECHANICAL JOINTS, UNLESS SPECIFIED DIFFERENTLY IN THE PLANS. ALL PIPE JOINTS WITHIN 20 LF OF A MJ SHALL BE RESTRAINED.
- THE CONTRACTOR SHALL RESTRAIN ALL PIPE JOINTS TO THE SPECIFIED DISTANCE LISTED IN THE RESTRAINED JOINT TABLE (THIS SHEET).
- THE CONTRACTOR SHALL TREAT CONNECTIONS TO EXISTING LINES AS A CAP WHEN CALCULATING RESTRAINING LENGTH.



A1 TYPICAL POST INDICATOR VALVE
N.T.S.

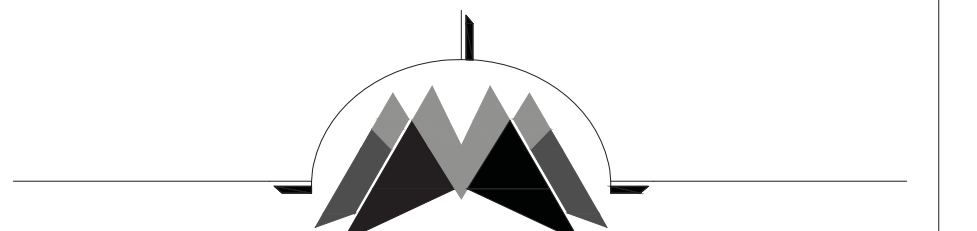


D6 REMOTE FIRE DEPARTMENT CONNECTION
N.T.S.

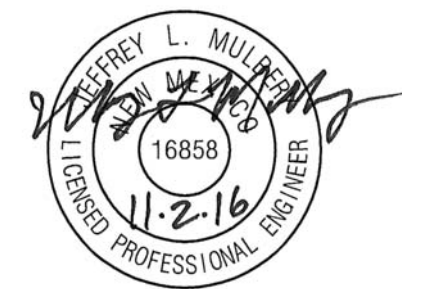
DYRON MURPHY ARCHITECTS, P.C.
15050 North Central Expressway, Suite 1000, Dallas, TX 75244
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DYRON MURPHY ARCHITECTS, P.C.



4505 Montbel Place NE, Albuquerque, New Mexico 87107



ENGINEER

Revision Schedule		
Revision Number	Revision Date	Revision Description
1	11/3/16	ADD.02

PROJECT NUMBER	DRAWN BY	PROJ MGR
2011.021		

Sheet Number

C200
Sequence of

**OVERALL
UTILITY PLAN**

Sheet Title

**NTUA HQ COMPLEX
OFFICE BUILDING**

FT. DEFIANCE, ARIZONA

100% CONSTRUCTION DOCUMENTS

OCTOBER 6, 2016

WATERLINE KEYNOTES

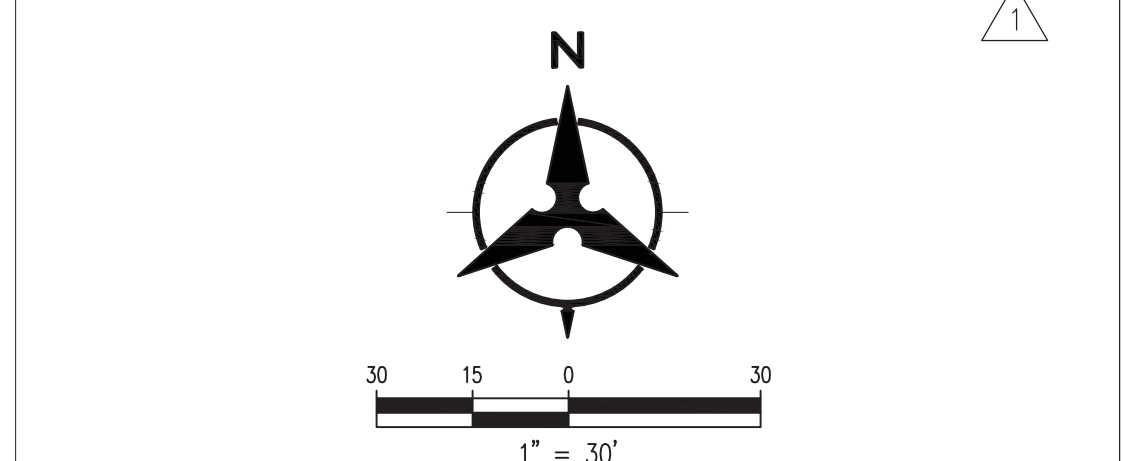
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- INSTALL 1-6"x6"x3" TEE, 1-3" GATE VALVE, 1-3" WATER SERVICE, 1-2" WATER METER. INSTALL 3" DOMESTIC SERVICE TO WITHIN 5' OF BUILDING. SEE PLUMBING PLAN FOR CONTINUATION.
- NOT USED.
- INSTALL 1-8"x8"x8" MJ, DI, TEE, SSB 350 WITH MEGA-LUGS AND THRUST BLOCKS PER WS-19, SHEET C-251. INSTALL GATE VALVES PER WS-14, SHEET C-251; 1-8" GV ON THE MAIN AND 1-6" GV ON THE 6" BRANCH.
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- INSTALL 6" FIRE PROTECTION LINE TO WITHIN 5' OF BUILDING. SEE PLUMBING PLANS FOR CONTINUATION.
- INSTALL POST INDICATOR VALVE PER DETAIL A1, SHEET C-200.
- NOT USED.
- INSTALL 90° MJ, DI, BEND SSB 350 WITH MEGA LUGS AND THRUST BLOCKS PER WS-19, SHEET C-251, SIZE PER PLAN.
- INSTALL 45° MJ, DI, BEND SSB 350 WITH MEGA LUGS AND THRUST BLOCKS PER WS-19, SHEET C-251, SIZE PER PLAN.
- NOT USED.
- INSTALL 8"x8"x10" TEE WITH RESTRAINED JOINTS.
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- INSTALL REMOTE FIRE DEPARTMENT CONNECTION TO WITHIN 5' OF BUILDING PER DETAIL D6, SHEET C-200. SEE PLUMBING PLANS FOR CONTINUATION.
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- DIP DOMESTIC LINE UNDER FIRE LINE/SANITARY SEWER.
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- INSTALL 10"x10"x6" TEE W/ RESTRAINED JOINTS.
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- INSTALL 1-6"x6"x3" TEE, 1-3" GATE VALVE, 1-3" WATER SERVICE.
- INSTALL VERTICAL 45° BENDS WITH RESTRAINED JOINTS TO DIP WATER LINE / FIRE LINE UNDER STORM DRAIN TO MAINTAIN A 2' VERTICAL CLEARANCE BETWEEN WATER AND STORM.
- SEE SHEET C301 FOR CONTINUATION.
- INSTALL 8"x8"x6" TEE W/ RESTRAINED JOINTS.

SANITARY SEWER KEYNOTES

- CONNECT TO EXISTING SANITARY SEWER MANHOLE PER WWS-3, SHEET C-253. CONTRACTOR SHALL CHECK INVERTS AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
- INSTALL 4" SANITARY MANHOLE PER WWS-4, SHEET C-253, TRAFFIC RATED FOR H-20 LOADING.
- NOT USED.
- NOT USED.
- INSTALL 6" SANITARY SERVICE TO WITHIN 5' OF BUILDING. SEE PLUMBING PLANS FOR CONTINUATION.
- CAP SANITARY LINE FOR FUTURE CONNECTION.
- INSTALL 6" SANITARY DOUBLE CLEANOUT PER WWS-12, SHEET C-254.

FIRE TANK KEYNOTES

- FIRE STORAGE TANK PER SHEETS C-301 AND C-302.
- FIRE PUMP STATION PER SHEETS C-303 AND C-304.
- INSTALL 4" RPP BACKFLOW PREVENTER WITH HOT BOX ENCLOSURE PER WS-26 AND WS-26a, SHEET C-252. COORDINATE WITH ELECTRICAL FOR POWER.
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- INSTALL 10" PRESSURE RELIEF LINE FROM DISCHARGE SIDE OF PUMP (CONNECT TO FIRE PUMP BUILDING CONNECTION) TO INLET LINE OF TANK WITH 4" X 4" TEE AND 10"X4" REDUCER.
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- INSTALL 6"x4" REDUCER WITH RESTRAINED JOINTS AND THRUST BLOCKS PER WS-19, SHEET C-251.
- INSTALL 10"x8" REDUCER WITH RESTRAINED JOINTS AND THRUST BLOCKS PER WS-19, SHEET C-251.

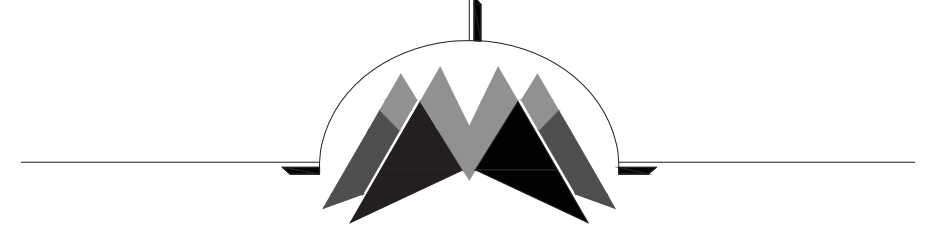


UTILITY LEGEND

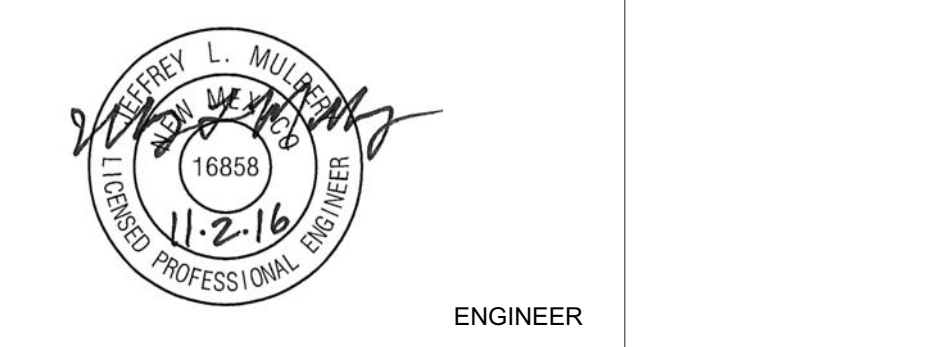
---	PROPERTY LINE	---	PROPOSED EASEMENT
---	EXISTING EASEMENT	SAS	PROPOSED SANITARY SEWER LINE
SAS	EXISTING SANITARY SEWER	●	PROPOSED SANITARY SEWER MANHOLE
W	EXISTING WATER LINE	●	PROPOSED CLEANOUT
□	EXISTING WATER METER	●	PROPOSED WATER LINE
—	EXISTING CAP	+	PROPOSED VALVE
+	EXISTING VALVE	FL	PROPOSED FIRE WATER LINE
⊕	EXISTING FIRE HYDRANT	▼	PROPOSED HYDRANT
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□	EXISTING INLET	▲	PROPOSED PIV
		▼	REMOTE FIRE DEPARTMENT CONNECTION



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ENGINEER

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1	11/3/16	ADD.02

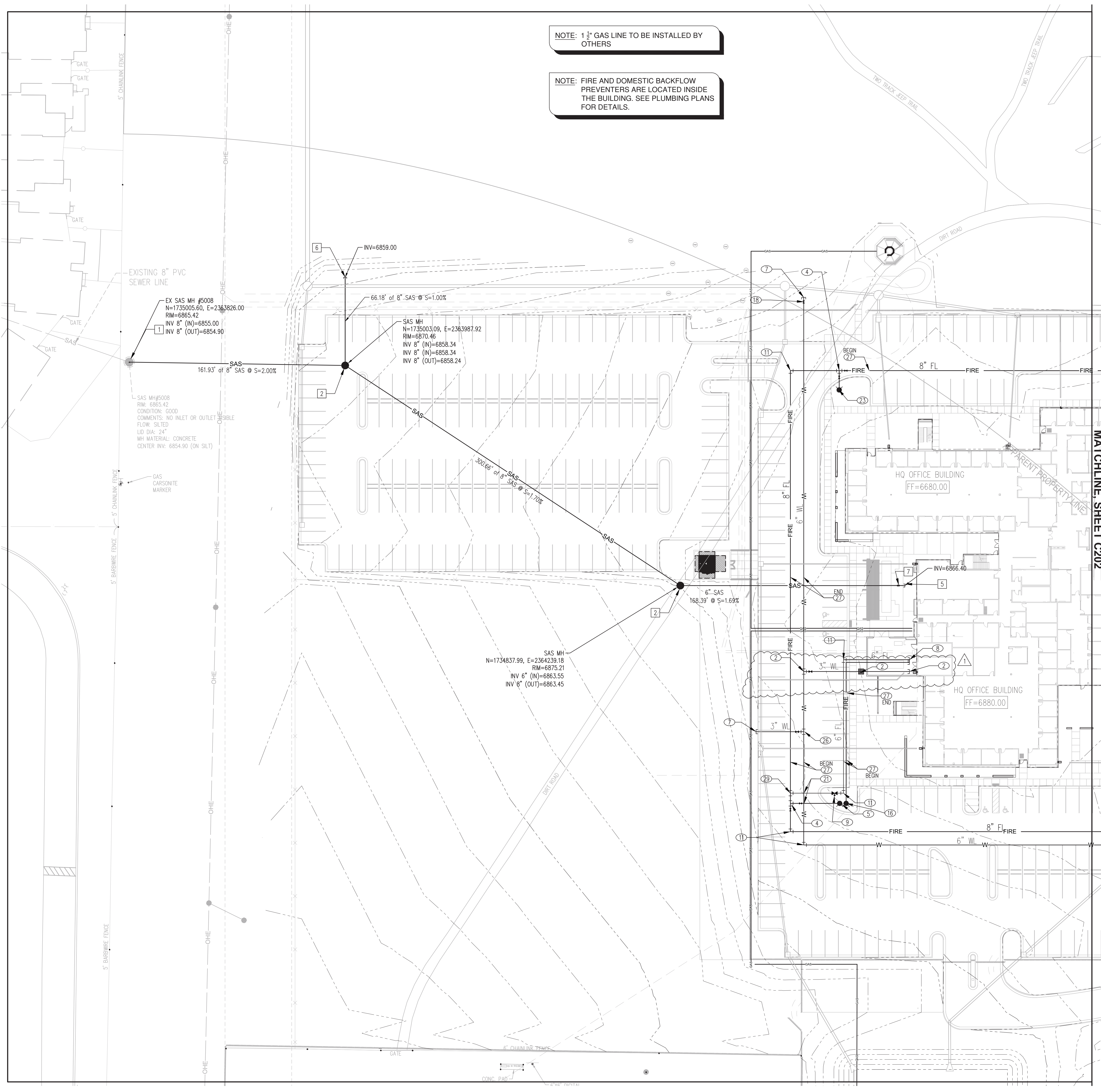
PROJECT NUMBER	DRAWN BY	PROJ MGR
2011.021		
Sheet Number		

C201
Sequence of

UTILITY PLAN

NOTE: 1 1/2" GAS LINE TO BE INSTALLED BY OTHERS

NOTE: FIRE AND DOMESTIC BACKFLOW PREVENTERS ARE LOCATED INSIDE THE BUILDING. SEE PLUMBING PLANS FOR DETAILS.



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11/2/16
Steph L. Mulvaney, P.E.

**NTUA HQ COMPLEX
OFFICE BUILDING**

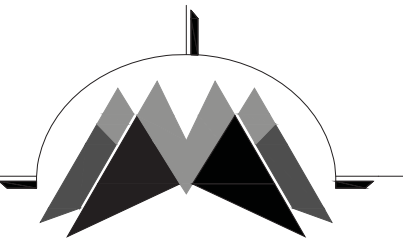
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100% CONSTRUCTION DOCUMENTS

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2011.021		

Sheet Number

C202

Sequence of

UTILITY PLAN

WATERLINE KEYNOTES

- CONNECT TO EXISTING WATERLINE. INSTALL 1-12"x12"x8" MJ, DI, TEE, SSB350 WITH MEGA-LUGS AND THRUST BLOCKS PER WS-19, SHEET C-251. INSTALL A MIN OF 2- MJ GATE VALVES PER WS-14, SHEET C-251; 1-12" GV ON THE MAIN AND 1-6" GV ON THE BRANCH.
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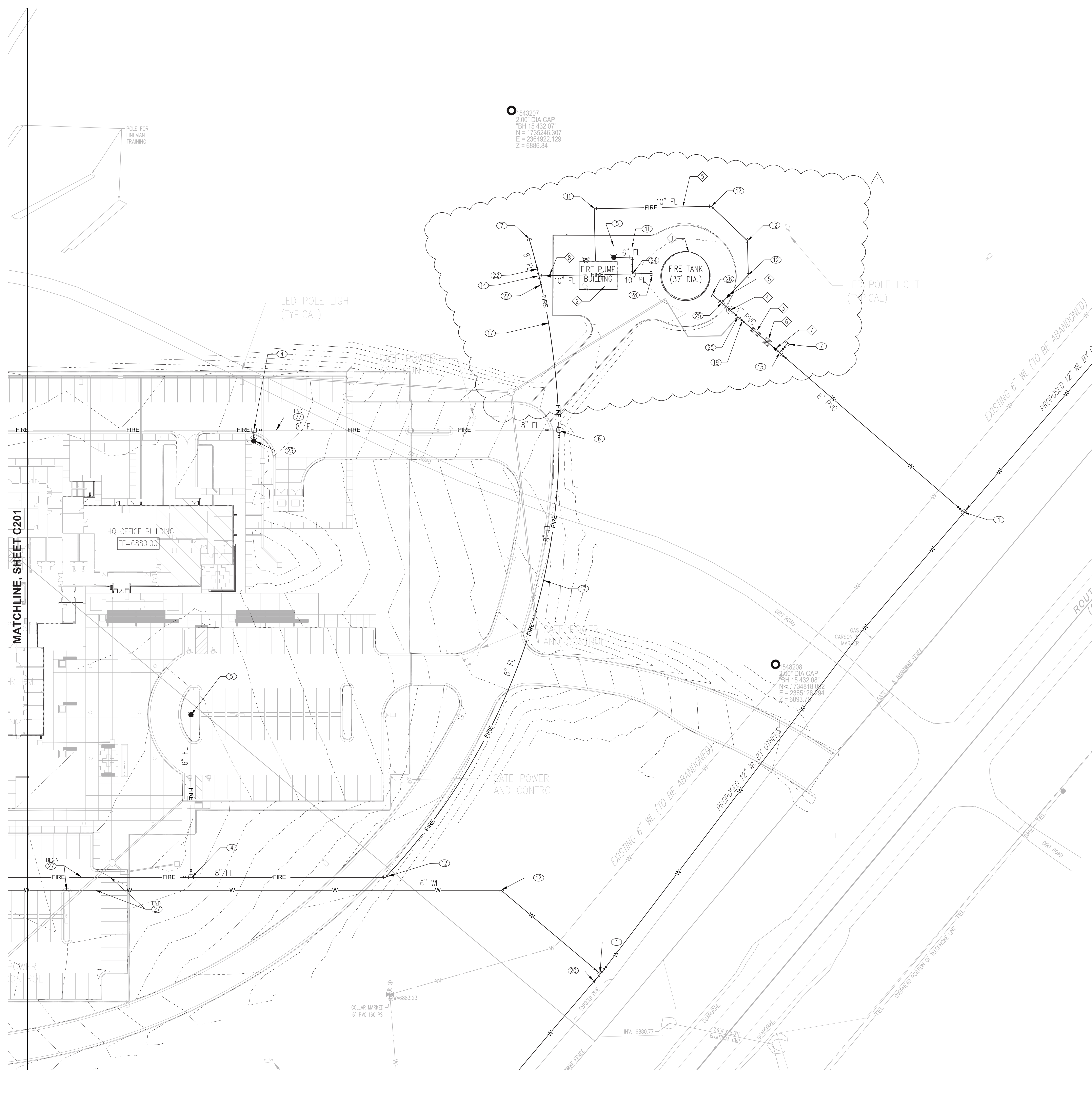
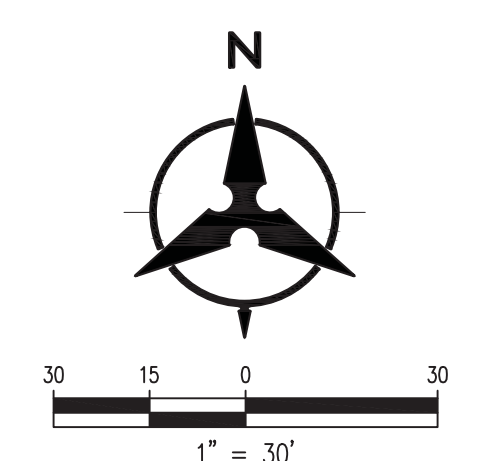
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UTILITY LEGEND

---	PROPERTY LINE	---	PROPOSED EASEMENT
---	EXISTING EASEMENT	---	PROPOSED SANITARY SEWER LINE
---	EXISTING SANITARY SEWER	●	PROPOSED SANITARY SEWER MANHOLE
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DYRON MURPHY ARCHITECTS, P.C.
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11/2/16

CONSTRUCTION PLANS FOR NAVAJO TRIBAL UTILITY AUTHORITY HEADQUARTERS ROUTE NO. 12 OFF-SITE IMPROVEMENTS FORT DEFIANCE, ARIZONA



VICINITY MAP

**NTUA HQ COMPLEX
OFFICE BUILDING**

FT. DEFIANCE, ARIZONA

100% CONSTRUCTION DOCUMENTS
OCTOBER 6, 2016

INDEX

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C501	SURVEY CONTROL SHEET	
C502	NTUA OFFICE SITE PLAN (FOR INFORMATION ONLY)	
C503	OVERALL PAVING PLAN	
C504	TYPICAL SECTIONS	
C505	DEMOLITION PLAN	BOP - STA. 19+50
C506	DEMOLITION PLAN	STA 19+50 - STA 29+50
C507	DEMOLITION PLAN	STA 29+50 - STA 39+50
C508	DEMOLITION PLAN	STA 39+50 - EOP
C509	PAVING PLAN	BOP - STA 19+50
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C511	PAVING PLAN	STA 29+50 - STA 39+50
C512	PAVING PLAN	STA 39+50 - EOP
C513	STRIPING AND SIGNING PLAN	BOP - STA 19+50
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C516	STRIPING AND SIGNING PLAN	STA 39+50 - EOP

GENERAL NOTES

- ALL WORK DETAILED ON THESE PLANS AND PERFORMED UNDER THIS CONTRACT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE NMDOT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION LATEST EDITION.
- ALL WORK SHALL FOLLOW THE CURRENT EDITION STATE ACCESS MANAGEMENT MANUAL INCLUDING NMAC 18.31.6.14 PERMITTING PROCESS, INCLUDING BUT NOT LIMITED TO, PART J - CONSTRUCTION OF ACCESS BY OWNER ITEMS (3), (7) AND (12).
- THE CONTRACTOR SHALL ABIDE BY ALL LOCAL, STATE, AND FEDERAL LAWS, RULES AND REGULATIONS WHICH APPLY TO THE CONSTRUCTION OF THESE IMPROVEMENTS, INCLUDING EPA REQUIREMENTS WITH RESPECT TO STORM WATER DISCHARGE.
- PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL POTENTIAL OBSTRUCTIONS INCLUDING ALL UNDERGROUND UTILITIES. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION OBSERVER OR ENGINEER IMMEDIATELY SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
- TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL CONTACT LINE LOCATING SERVICE FOR LOCATION OF EXISTING UTILITIES.
- ALL ELECTRICAL, TELEPHONE, CABLE TV, GAS AND OTHER UTILITY LINES, CABLES, AND APPURTENANCES ENCOUNTERED DURING CONSTRUCTION THAT REQUIRE RELOCATION, SHALL BE COORDINATED WITH THAT UTILITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF ALL NECESSARY UTILITY ADJUSTMENTS. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR DELAYS OR INCONVENIENCES CAUSED BY UTILITY COMPANY WORK CREWS. THE CONTRACTOR MAY BE REQUIRED TO RESCHEDULE HIS ACTIVITIES TO ALLOW UTILITY CREWS TO PERFORM THEIR REQUIRED WORK.
- THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITY LINES WITHIN THE CONSTRUCTION AREA. ANY DAMAGE TO EXISTING FACILITIES CAUSED BY CONSTRUCTION ACTIVITY SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE AND APPROVED BY THE CONSTRUCTION OBSERVER.
- CONSTRUCTION ACTIVITY SHALL BE LIMITED TO THE PROPERTY AND/OR PROJECT LIMITS. ANY DAMAGE TO ADJACENT PROPERTIES RESULTING FROM THE CONSTRUCTION PROCESS SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE.

- OVERNIGHT PARKING OF CONSTRUCTION EQUIPMENT SHALL NOT OBSTRUCT DRIVEWAYS OR DESIGNATED TRAFFIC LANES. THE CONTRACTOR SHALL NOT STORE ANY EQUIPMENT OR MATERIAL WITHIN THE PUBLIC RIGHT-OF-WAY.
- THE CONTRACTOR SHALL OBTAIN ALL THE NECESSARY PERMITS FOR THE PROJECT PRIOR TO COMMENCING CONSTRUCTION (I.E., BARRICADEING, EXCAVATION PERMITS, EPA STORM WATER PERMITS, COUNTY DUST CONTROL, BIA ETC.).
- ALL PROPERTY CORNERS DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. ALL PROPERTY CORNERS MUST BE RESET BY A REGISTERED NEW MEXICO LAND SURVEYOR.
- ALL BARRICADES AND CONSTRUCTION SIGNING SHALL CONFORM TO APPLICABLE SECTIONS OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD), US DEPARTMENT OF TRANSPORTATION, LATEST EDITION.
- THE CONTRACTOR SHALL MAINTAIN ALL CONSTRUCTION BARRICADES AND SIGNING AT ALL TIMES. THE CONTRACTOR SHALL VERIFY THE PROPER LOCATION OF ALL BARRICADEING AT THE END AND BEGINNING OF EACH DAY.
- THE CONTRACTOR SHALL TAKE ALL STEPS NECESSARY TO CONFORM WITH EPA AND LOCAL REQUIREMENTS, INCLUDING PREPARATION AND IMPLEMENTATION OF A STORMWATER POLLUTION PREVENTION PLAN AND DUST CONTROL PLAN.

- ALL STRIPING AND SIGNING SHALL CONFORM TO THE MUTCD LATEST EDITION.
- CONTRACTOR SHALL PROVIDE COMMERCIAL GENERAL LIABILITY PER THE GENERAL CONDITIONS WITH BIA NAMED AS ALSO INSURED FOR EACH OCCURRENCE.
- PRIOR TO WORKING IN THE BIA RIGHT-OF-WAY THE CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY EROSION CONTROL MEASURES.
- THE PROJECT SEED LIST SHALL CONFORM TO THE NMDOT REVEGETATION ZONE AND SEED LIST MAPS AS PUBLISHED ON THE NMDOT WEBSITE AT [HTTP://ARCHIS/BIH/FKJ](http://ARCHIS/BIH/FKJ)
- THE CONTRACTOR SHALL WARRANTY THE NEW PAVEMENT AND STRIPING FOR A 2 YEAR PERIOD AS SPECIFIED ON THE ACCESS PERMIT.
- ALL MATERIAL TESTING SHALL BE IN ACCORDANCE WITH NMDOT STANDARD SPECIFICATIONS (CURRENT EDITION).

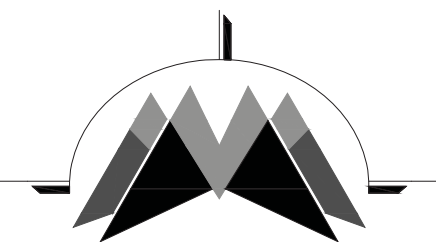
NOTE:
OFFSITE IMPROVEMENT PLANS SHOWN FOR INFORMATION AND INCLUDED FOR BIDDING PURPOSES ONLY.
THIS PLANSET REQUIRES APPROVAL FROM THE BIA AND CONSTRUCTION OF INFRASTRUCTURE SHOWN HEREIN
MUST BE PERFORMED UNDER A BIA PERMIT.

BUREAU OF INDIAN AFFAIRS

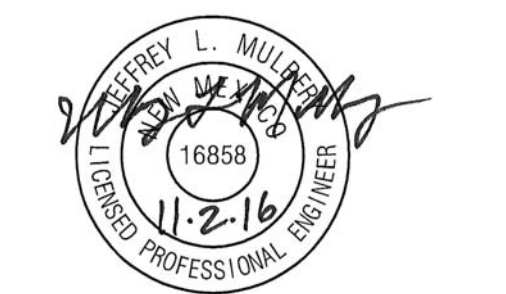
Date

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△	11-01-2016	ADD.02

PROJECT NUMBER 20150432	DRAWN BY YPM/EGN	PROJ MGR JM
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Sheet Number

C500
Sequence of

TITLE SHEET

Sheet Title

6

5

4

3

2

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**NTUA HQ COMPLEX
OFFICE BUILDING**

FT. DEFIANCE, ARIZONA

100% CONSTRUCTION DOCUMENTS
OCTOBER 6, 2016

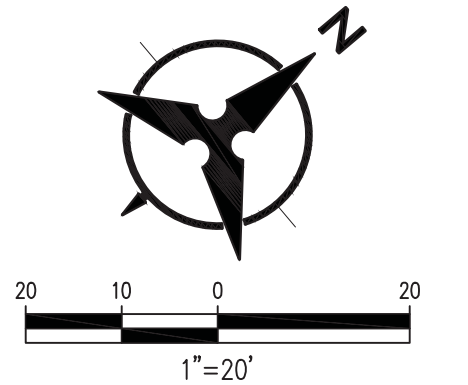
GENERAL NOTES

1. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING UTILITY LOCATIONS AND NOTIFY THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
2. ALL CURVE DATA AND DIMENSIONS REFER TO EDGE OF PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS, UNLESS OTHERWISE SPECIFIED.
3. GRADE ELEVATIONS, WHERE NOTED, ARE ALONG EDGE OF PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS UNLESS OTHERWISE SPECIFIED.
4. CONTRACTOR IS RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ALL UTILITY CONDUITS AND EXISTING LINES DAMAGED DURING CONSTRUCTION.
5. ANY ADDITIONAL GRADING REQUIRED TO MATCH PROPOSED STREET GRADES SHALL BE INCIDENTAL TO PAVING ITEMS.
6. CONTRACTOR SHALL PARK EQUIPMENT AND VEHICLES AS NOT TO INTERFERE WITH NORMAL ACTIVITIES OF RESIDENTS OR OTHER CONTRACTORS ON SITE.
7. CONTRACTOR SHALL NOT PARK EQUIPMENT WITHIN 40' OF DRIVING LANE.
8. ANY DAMAGE TO THE EXISTING FACILITIES (CURB & GUTTER, PAVEMENT, CONDUITS, LANDSCAPING, UTILITY LINES, ETC.) DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTORS' EXPENSE.
9. ALL EXCAVATION, TRENCHING AND SHORING ACTIVITIES MUST BE CARRIED-OUT IN ACCORDANCE WITH OSHA 29 CFR 1926.650 SUBPART P.

KEYED NOTES

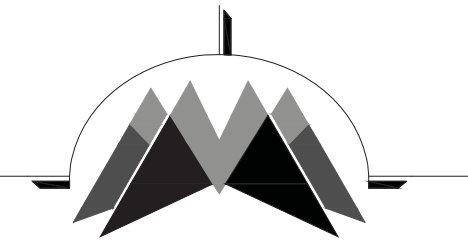
1. INSTALL ASPHALT PAVEMENT SECTION PER DETAIL ON SHEET C503.
2. NOT USED.
3. EXTEND 91"X 100" CMP STORM DRAIN CULVERT WITH SLOPE PROTECTION BLANKETS PER NMDOT STD DWG SERIALS: 511-11-1/2, 511-11-2/2, 206-02-1/1, 206-04-1/1, 206-06-1/1, 206-07-1/1.
4. EDGE OF 8' SHOULDER.
5. INSTALL W-BEAM GUARD RAIL PER NMDOT STD DWG SERIALS: 606-GR31-1/20, 3/20, 4/20, 5A/20, 6/20, 7/20, 9/20, 11/20, 16/20, 20/20. FACE OF GUARD RAIL SHALL BE 2' FROM EDGE OF SHOULDER.
6. INSTALL TL-3 END TERMINAL PER NMDOT STD DWG 606-GR31-7/20.
7. INSTALL W-BEAM END ANCHOR PER NMDOT STD DWGS 606-GR31-9/20, 11/20, 20/20.
8. MATCH EXISTING.
9. EXTEND 36" CMP STORM DRAIN CULVERT WITH END SECTIONS PER NMDOT STD DWG SERIALS: 511-11-1/2, 511-11-2/2, 206-02-1/1, 206-04-1/1, 206-06-1/1, 206-07-1/1.
10. BEGIN 5' TRANSITION FROM FULL CURB TO NO CURB.
11. BEGIN 5' TRANSITION FROM NO CURB TO FULL CURB.
12. INSTALL CONCRETE BARRIER CURB AND GUTTER TYPE "B" PER NMDOT STD DWG SERIAL 609-01-1/1.

* NOT ALL KEYED NOTES MAY APPLY TO THIS SHEET.



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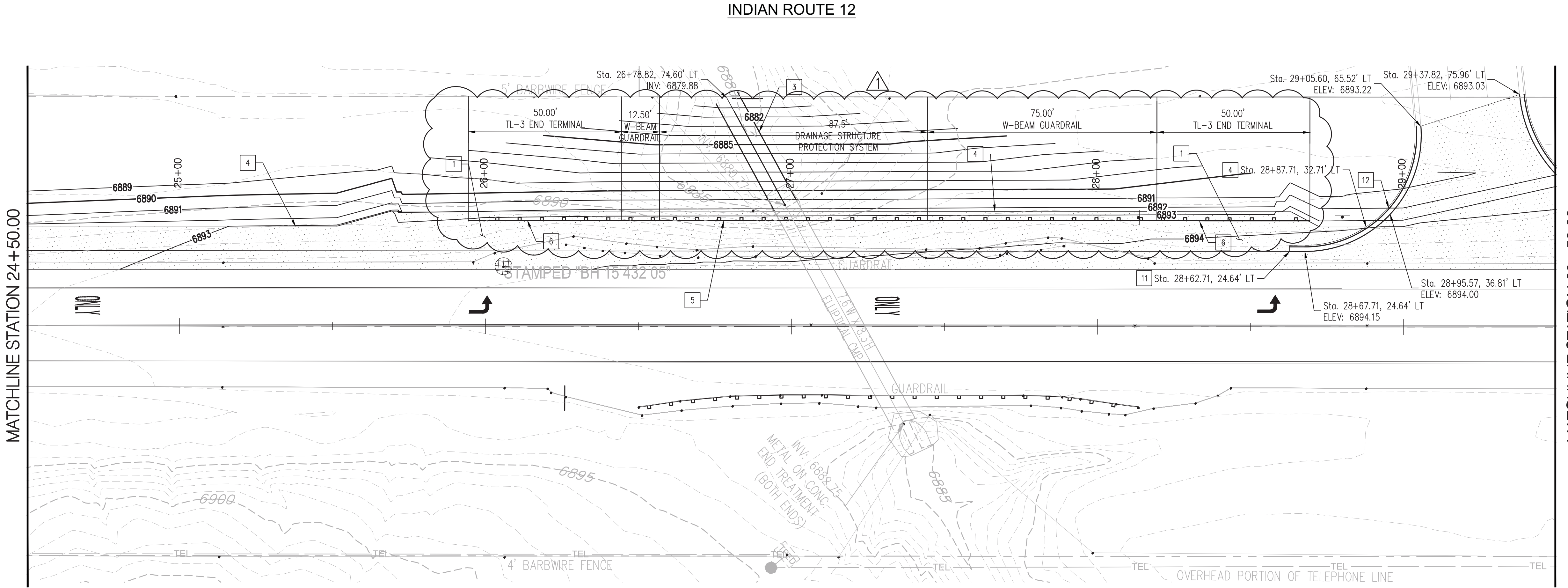
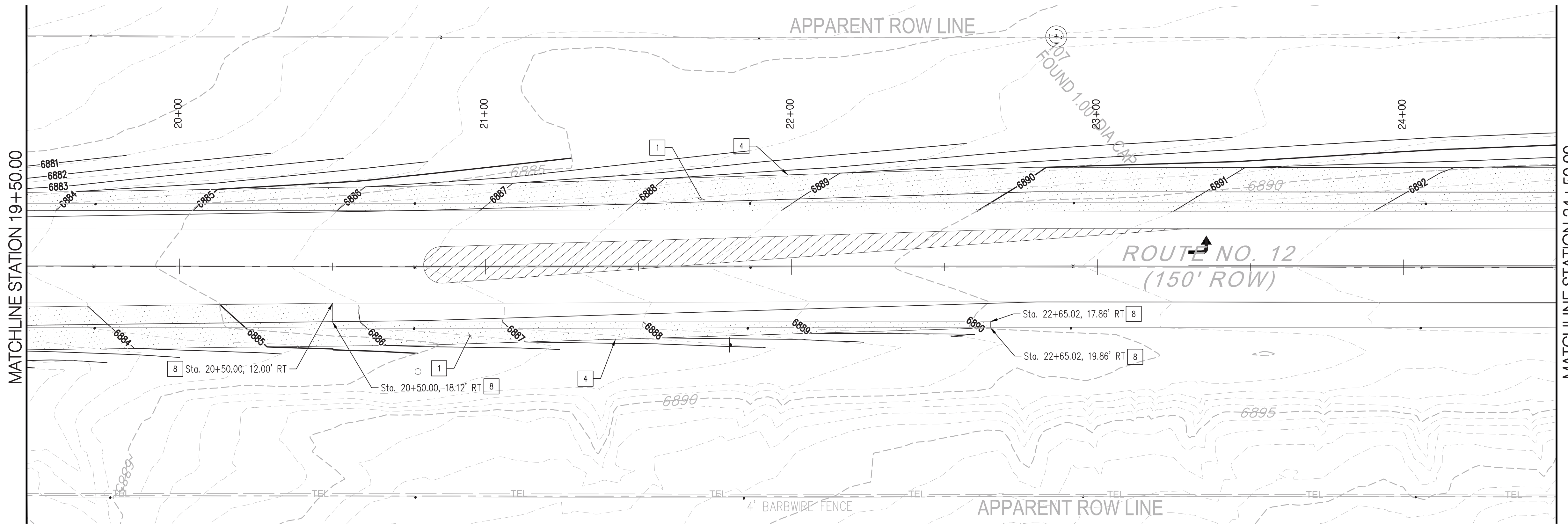
Revision Schedule		
Revision Number	Revision Date	Revision Description
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PROJ MGR: JM

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PAVING PLAN
STA 19+50 - STA 29+50



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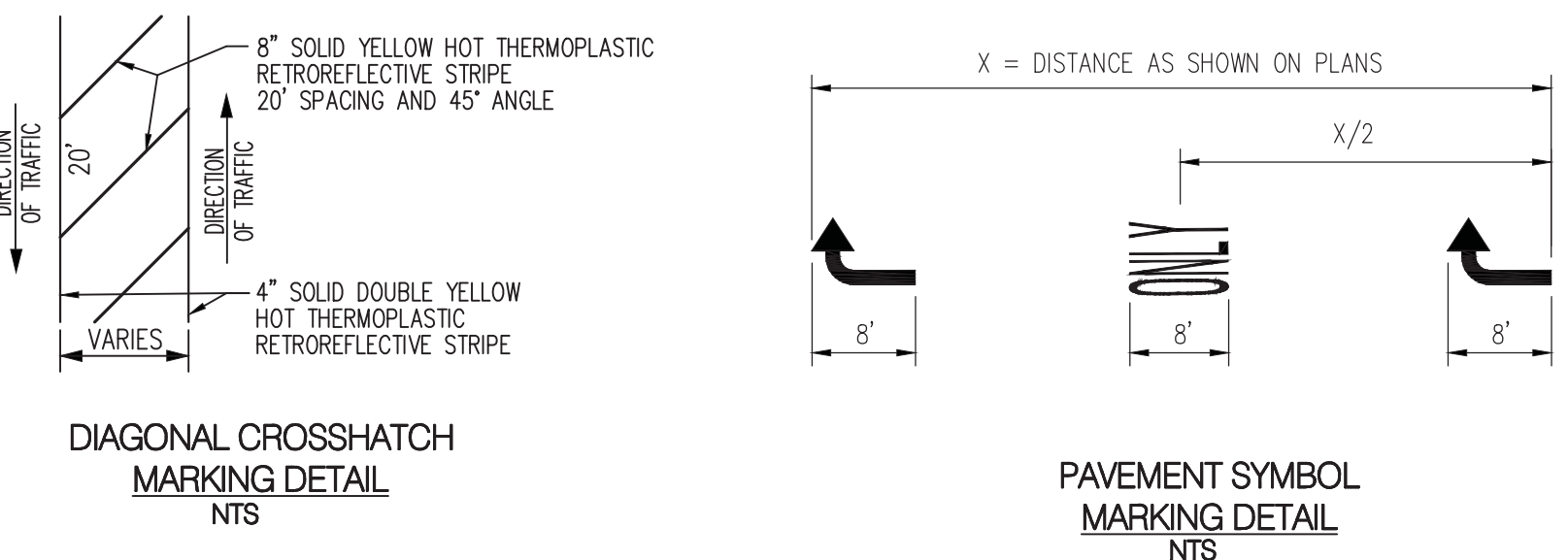
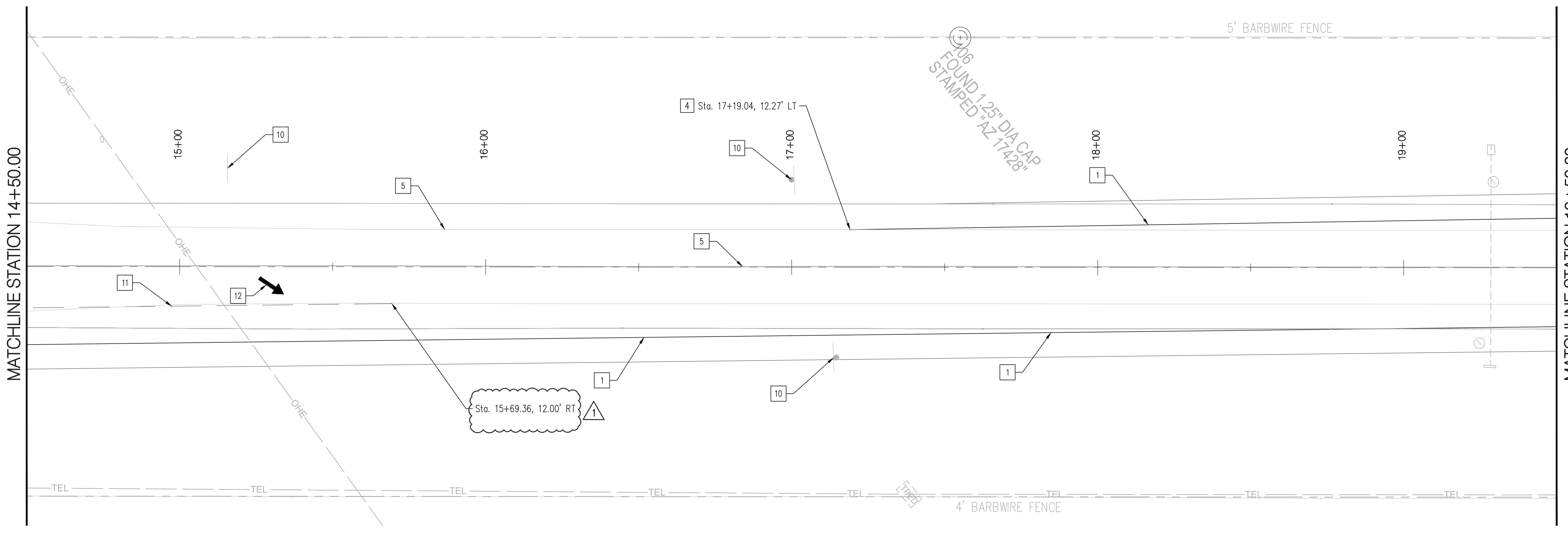
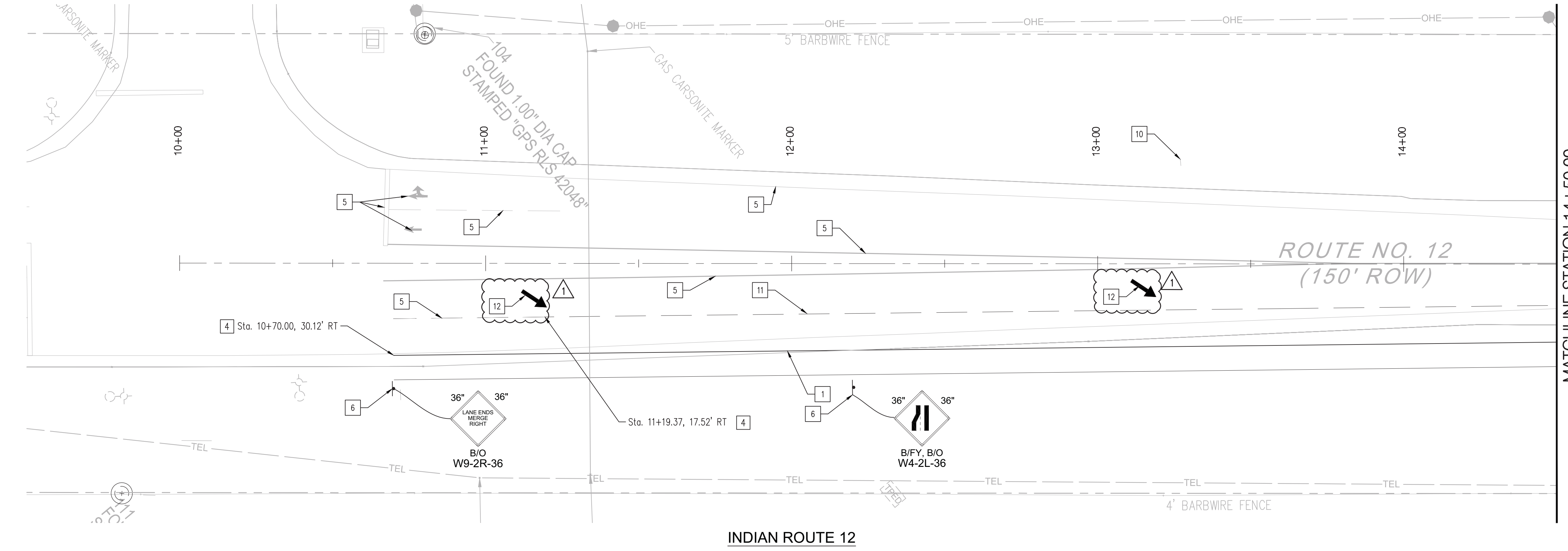
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OCTOBER 6, 2016

KEYED NOTES

1. INSTALL NEW 4" SOLID WHITE HOT THERMOPLASTIC RETROREFLECTIVE STRIPE.
 2. INSTALL NEW 4" SOLID DOUBLE YELLOW HOT THERMOPLASTIC RETROREFLECTIVE STRIPE.
 3. INSTALL DIAGONAL YELLOW HOT THERMOPLASTIC RETROREFLECTIVE STRIPES AT 20' SPACING AND 45° ANGLE. SEE DETAIL THIS SHEET.
 4. MATCH EXISTING PAVEMENT STRIPE.
 5. EXISTING PAVEMENT STRIPE TO REMAIN.
 6. INSTALL SIGN.
 7. INSTALL PREFORMED THERMOPLASTIC REFLECTIVE PAVEMENT MARKING, WORD, "ONLY".
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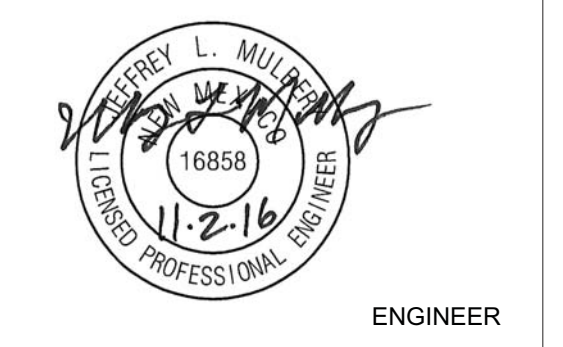
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2. ALL NEW PAVEMENT MARKINGS INCLUDING LANE LINES, STOP BARS, AND ARROWS SHALL BE HOT THERMOPLASTIC REFLECTIVE MARKINGS.
3. CONTRACTOR SHALL REMOVE ALL CONFLICTING EXISTING PAVEMENT MARKINGS. SEE ERADICATION NOTE #1 THIS SHEET.



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Revision Schedule		
Revision Number	Revision Date	Revision Description
1	11-01-2016	ADD.02

PROJECT NUMBER: 20150432
DRAWN BY: MS
PROJ MGR: JM

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STRIPING AND SIGNING PLAN
BOP - STA 19+50

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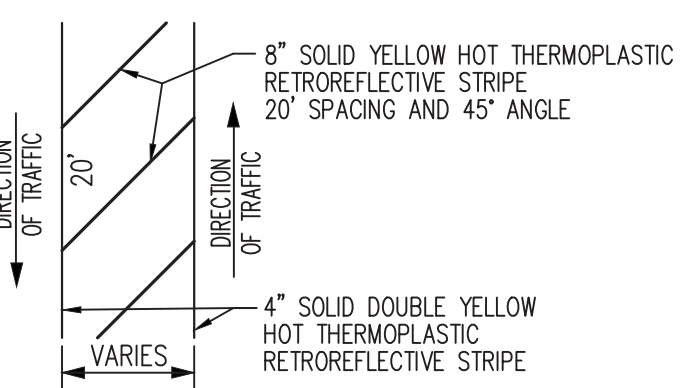
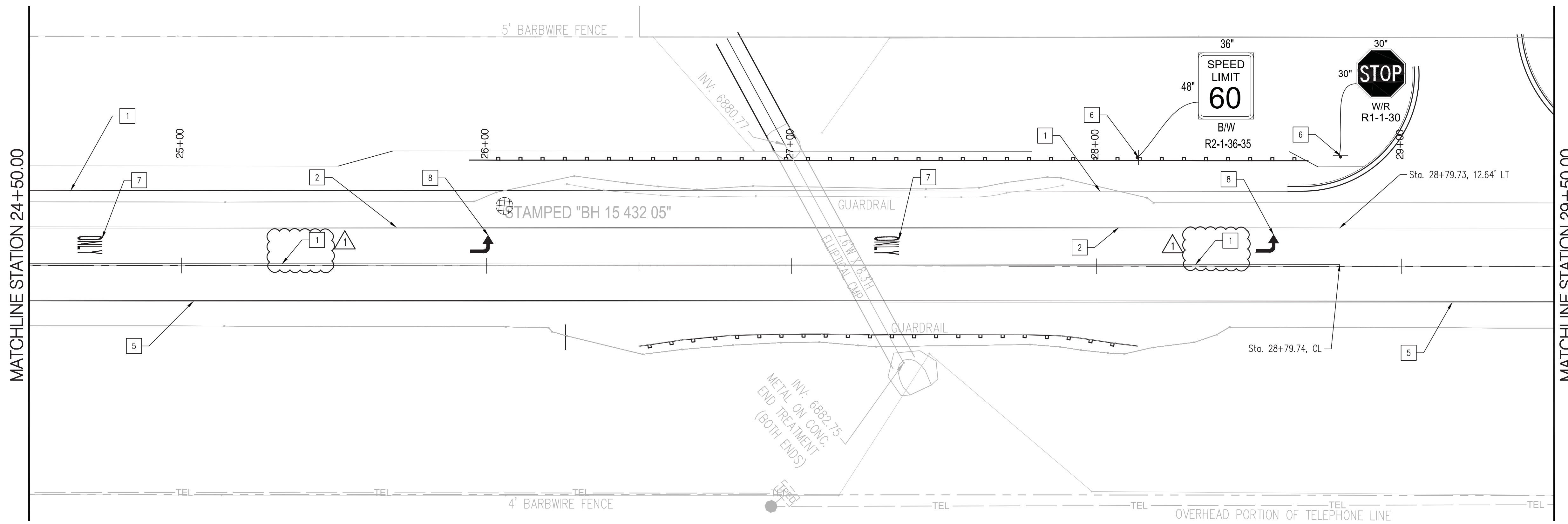
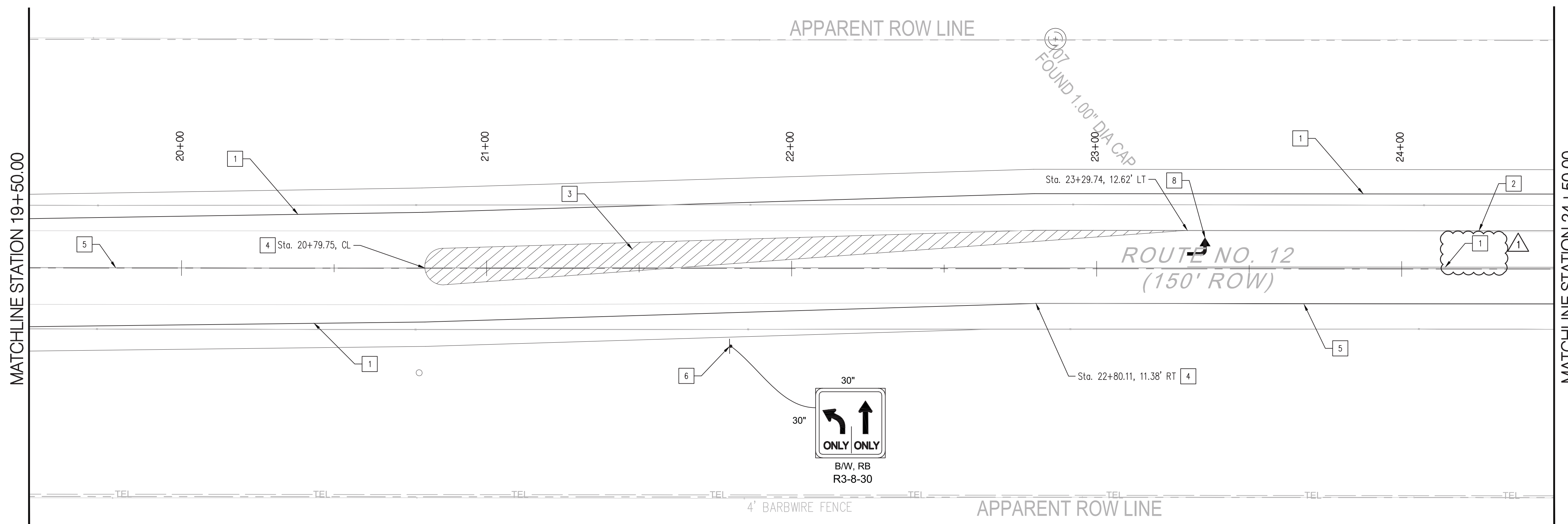
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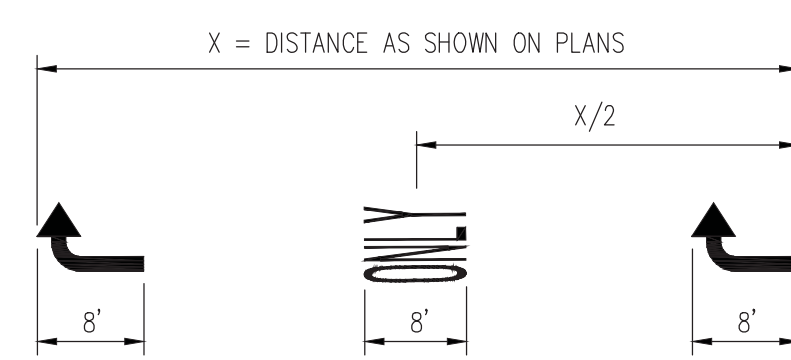
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DIAGONAL CROSSHATCH MARKING DETAIL NTS



PAVEMENT SYMBOL MARKING DETAIL NTS

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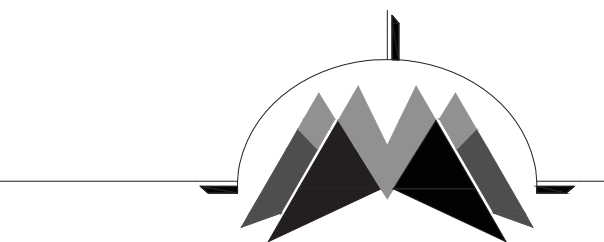
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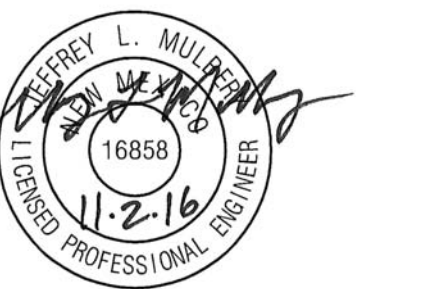
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Revision Number	Revision Date	Revision Description
1	11-01-2016	ADD.02

PROJECT NUMBER 20150432 DRAWN BY MS PROJ MGR JM

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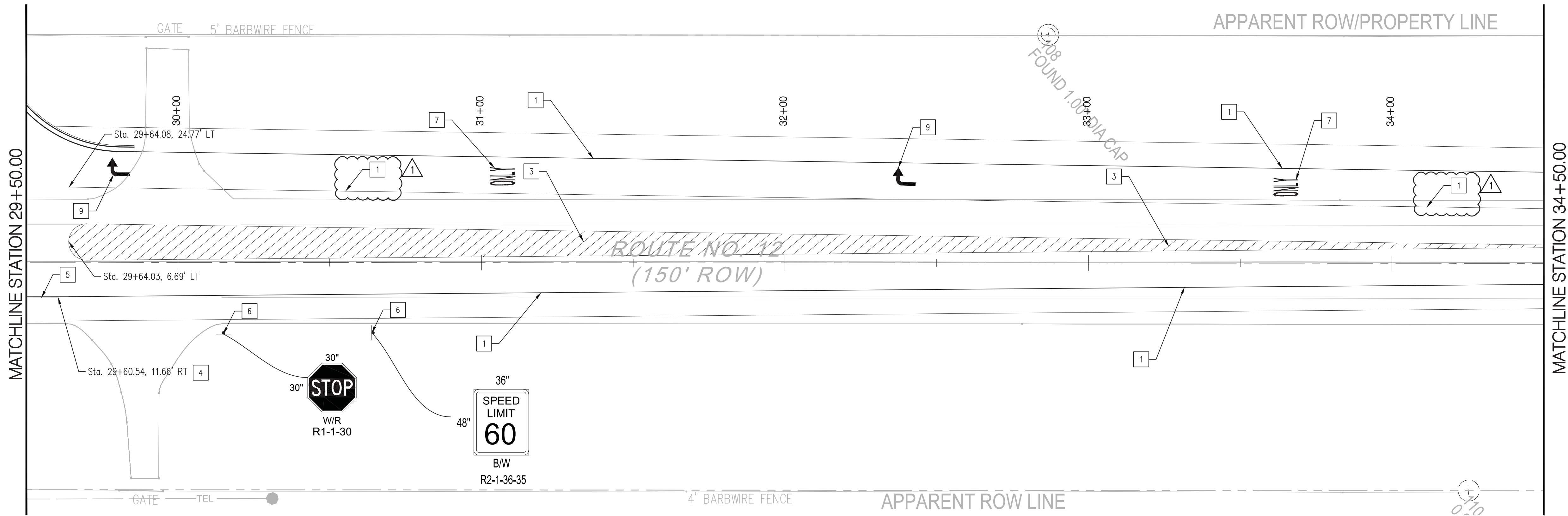
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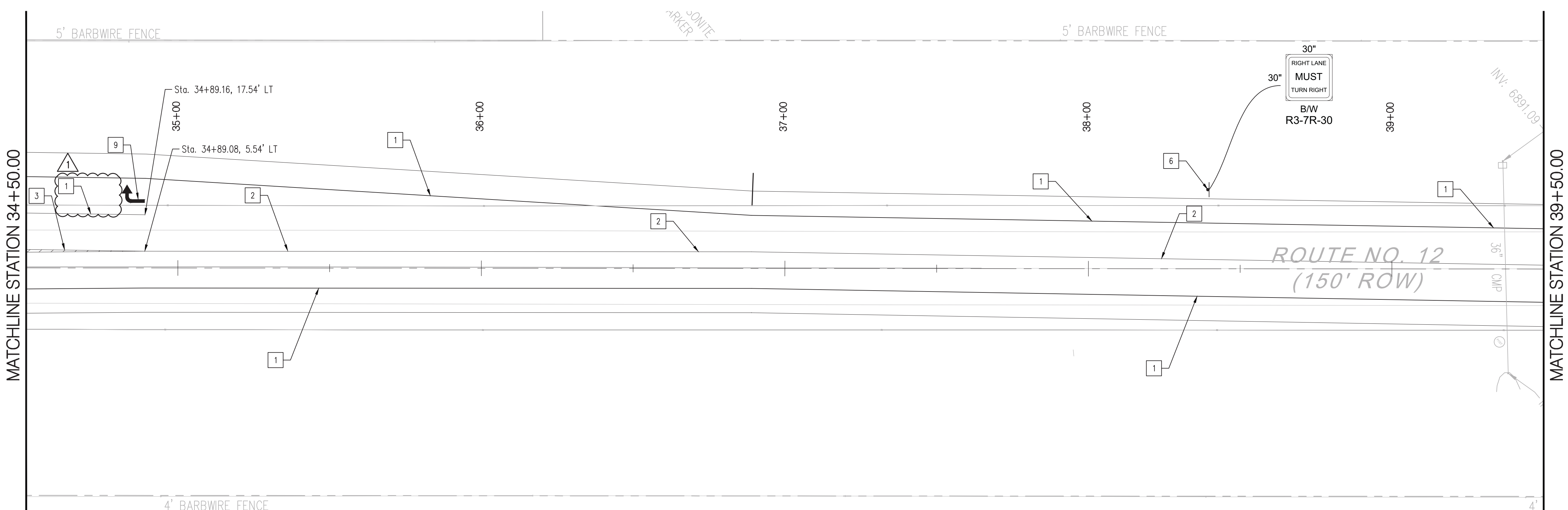
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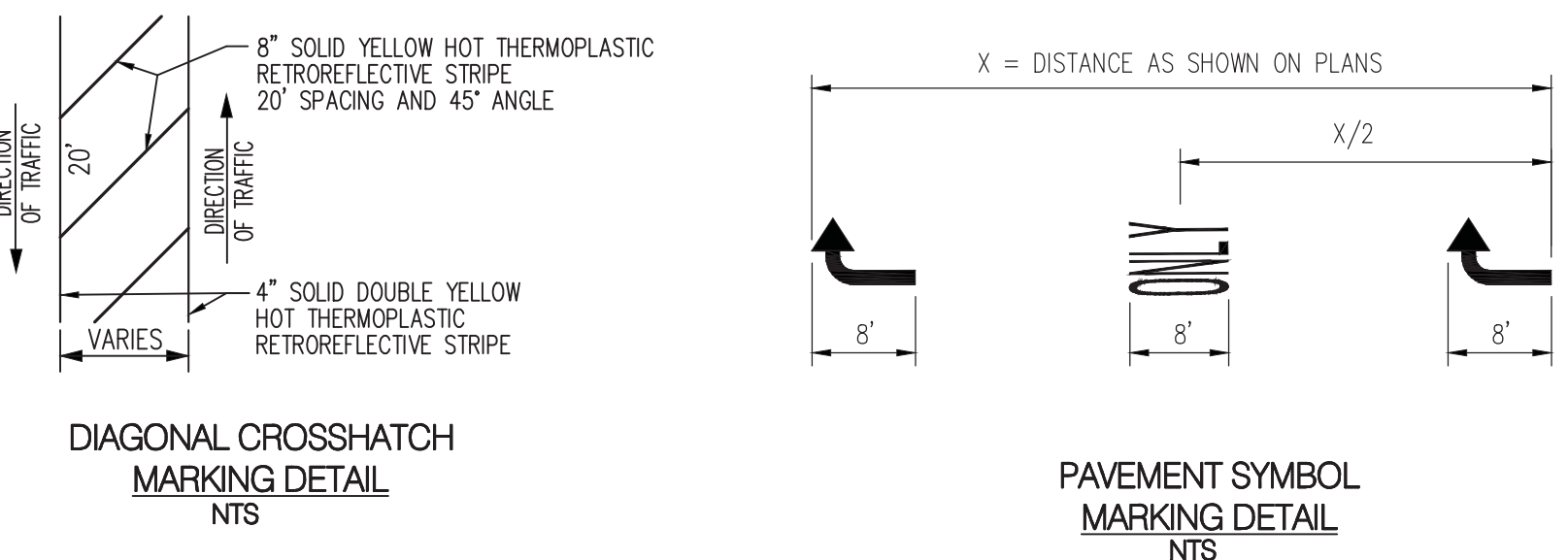
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INDIAN ROUTE 12



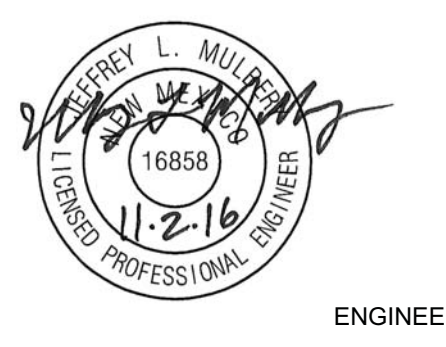
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Revision Schedule		
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PROJECT NUMBER 20150432 DRAWN BY MS PROJ MGR JM

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**SECTION 09 9713
COATINGS**

PART 1 GENERAL

1.01 SCOPE

- A. Interior and exterior coatings of steel water reservoirs.\
- B. Coating of exposed piping.
- C. All testing.

1.02 REFERENCES

- A. Steel Structures Painting Council, "Steel Structures Painting Manual Vol. 2: SSPC Specifications".
- B. American Standard Scheme for the Identification of Piping Systems, Standard A13_1.
- C. National Sanitation Foundation: NSF Specifications.
- D. AWWA D102-97: Coating Steel Water Storage Tanks

RELATED SECTIONS

- A. 21 41 23A Welded Steel Water Storage Tank

1.03 SUBMITTAL DATA

- A. Submittals shall be made in accordance with Section 01 3000 Administrative Requirements of the Project Manual.
- B. Manufacturer's product – specific application instructions.
- C. Schedule of products to be used and mil thickness to be applied in accordance with manufacturer's recommendations.
- D. Manufacturer's standard color selection chart.

1.04 DELIVERY AND HANDLING

- A. Materials shall be brought to the site in the original sealed containers.
- B. Containers shall be opened or used only after Owner's or Engineer's inspection of contents.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Tnemec:
 - 1. Tank Interior – Pota-pox Series 20
 - 2. Tank Exterior Primer - Series 66
 - 3. Tank Exterior Finish - Urethane Series 74
 - 4. Piping Series N69 Hi Build Epoxoline II
- B. Engineer – approved equivalent

2.02 PAINT SYSTEMS

- A. Tank Exterior:
 - a. Three coats consisting of two coats of hi-build epoxy-polymide and a top coat of semi-gloss aliphatic polyurethane.
 - b. Materials:
 - i. The first and intermediate coats shall be a two-component epoxy coating in accordance with MIL-P-24441, tinted to match finish color.
 - ii. Finish coat shall be two-component semi-gloss aliphatic polyurethane in accordance with SSPC PS Guide 17.00 Type V of the special color chosen by the Owner.
 - c. Thickness: dry film thickness, in mils of the paint shall be:

- i. 1st and Intermediate coats: 4.0 - 5.0 per coat
 - ii. Finish coat: 2.5 - 3.5
 - iii. Total system: 8.0 - 12.0
 - d. Color: selected by Owner from paint system manufacturing standard colors
 - e. AWWA Point System Designation: OCS-5-S
- B. Tank Interior:
 - a. Used for any surfaces in contact with water or exposed to water vapor
 - b. Three coat, two component, catalyzed epoxy-polyimide paint system
 - c. Color: white
 - d. Materials:
 - i. Suitable for potable water service, evaluated for long-term fresh water resistance and demonstrated satisfactory service in fresh water for at least 18 months; approved by NSF for potable water use.
 - ii. The materials shall consist of:
 - 1. Paint 1: a three coat system in accordance with DID-C-24654, including a contrasting primer.
 - 2. Paint 2: a three coat system of non-coal tar containing two component epoxy material in accordance with ANSI/AWWA C210, including a primer and two finish coats or three coats of the same epoxy coating without the use of a separate primer.
 - 3. Paint 3: an equivalent system for which documentation consisting of test data, service history and toxicological information have been provided by the manufacturer.
 - iii. Packaging: packaged in containers of suitable size so that one container of each component is used in mixing the paint to the proper proportions.
 - e. Thickness: the dry film thickness, in mils of the paint shall be:
 - i. Primer: 3.0 - 5.0
 - ii. Finish coats: 4.0 – 6.0 per coat
 - iii. Total system: 11.0 – 15.0
 - f. AWWA Paint System Designation: ICS-2-W
- C. Piping:
 - a. First coat: 4.0 to 6.0 dry mils.
 - b. Second coat: 4.0 to 6.0 dry mils.
 - c. Total minimum dry film thickness shall be 8.0 mils.

PART 3 EXECUTION

2.01 SURFACE PREPARATION

- A. Inside Surfaces:
 - a. New Tank:
 - i. The interior surfaces of new tanks shall be cleaned by SSPC-SP10, "Near White Blast Cleaning".
 - ii. All mill scale and rust shall be removed.
- B. Outside Surfaces:
 - a. New Tank:

- i. For new tanks, exterior surfaces shall be cleaned by either SSPC-SP6, "Commercial Blast Cleaning".
- ii. All mill scale and rust shall be removed.

2.02 FIELD WELDS AND ABRASIONS

- A. All weld areas and all areas on which the shop paint has been damaged shall be cleaned after field welding is completed.
- B. Outside surfaces: exterior surfaces shall be cleaned by SSPC-SP6, "Commercial Blast Cleaning" except that CCPC-SP3, "Power Tool Cleaning" may be used when this is a satisfactory method of surface preparation for the primer to be applied.
- C. Inside surfaces: interior surfaces shall be cleaned by SSPC-SP10, "Near White Blast Cleaning".

2.03 APPLICATION

- A. The requirements of SSPC-PA1 shall be followed with regard to storage of paint and thinner, mixing, thinning, painting contact surfaces, application of shop and field paint and drying of painted steel.
- B. Timing of Application
 1. Paint materials shall be applied immediately after surface preparation (and wash priming when required), before any surface rusting occurs or any dust or soil has accumulated.
 2. Shop-applied prime coats may be applied by any method that attains an acceptable coating.
 3. Field priming shall be performed by brushing or spraying for the inside surfaces and by brushing milling or spraying for the outside surfaces.
 4. When plates have been shop primed, all weld areas on which shop primer has been damaged shall be cleaned again in the field and primed with the same primer, applied to the same dry film thickness as the shop coat.
- C. Outside and Inside Surface Painting:
 1. Outside surfaces shall be painted by spraying or rolling.
 2. Inside surfaces shall be painted by spraying.
 3. Conventional spraying, airless spraying and hot spraying are acceptable methods.
- D. Interior Coating Standard:
 1. The interior coating, up to the high water line, shall be applied to give a "pinhole-free" surface over the entire interior tank surface, as defined by NACE Standard RP0188-88.
 2. The term "pinhole-free" means absolutely continuous.
- E. Coating System Application on Other Surfaces:
 1. Brush- apply one coat of the interior coating system at all of the tank's welded connections, edges and inside angles.
 2. This "striped" application shall be in addition to the millage specified and shall be performed prior to the first spray application of the coating system.

2.04 TESTING

- A. Film Thickness:
 1. Paint film thickness shall be verified by measuring the wet film thickness of each coat as it is applied and the dry film thickness of the entire system.
 2. When film thicknesses are indicated without an indicated tolerance, the allowable gauge tolerance shall be twice the indicated accuracy of the measurement; that is, for a measurement with an indicated accuracy of +/- 0.25 mil, the allowable tolerance is +/- 0.5 mil.
- B. Wet Film Thickness:

1. The wet film thickness shall be measured with a gauge that will measure the wet film thickness within an accuracy of +/- 0.5 mil.
 2. A wet film thickness measurement shall be made for each 100 sq. ft. of surface painted.
- C. Dry Film Thickness:
1. The dry film thickness shall be measured in accordance with SSPC-PA2 with a magnetic gauge that will measure the dry film thickness within an accuracy of +/- 0.25 mil.
 2. As many dry film thickness measurements as are feasible shall be made so that there is approximately one measurement for each 100 sq. ft. of surface painted.
 3. If an Owner's representative is present at the site, the dry film thickness measurements shall be made while surfaces are accessible at locations selected by the Owner's representative.
 4. Extensive re-rigging after paint has dried so dry film thickness measurements can be made is not required, provided that:
 - a. The number of measurements made is equivalent to one for each 100 sq. ft. of surface painted.
 - b. The location of the measurements is reasonably distributed.
 - c. All measurements taken meet or exceed the specified minimum dry film thickness.
 5. Additional coats shall be applied in order to attain the minimum dry film thickness specified for the painted system.
- D. Testing Inside Surfaces:
1. For the inside paint system, 100% of the painted surfaces below the overflow shall be tested with a wet-sponge, low voltage holiday detector after the paint has cured to the extent recommended by paint manufacturer.
 2. The sponge shall be kept saturated with an electrolyte (5% NaCl) and a surfactant (2% household detergent).
 3. During testing the wet sponge shall be kept in continuous contact with the painted surface.
 4. Locations where holidays are detected shall be marked for repair and retested after repairs have been completed.

2.05 COATINGS CERTIFICATION

- A. Interior and exterior coatings shall be certified by an independent NACE certified inspector and accredited by the National Association of Corrosion Engineers (NACE) and acceptable to the Owner.
- B. NACE Certified Coating Inspector Obligations:
1. The NACE certified coatings inspector shall make all required site inspections and tests at the tank fabrication shop and the project site in order that he may certify the coatings system was constructed in compliance with the coating manufacturer's recommendations, this specification, and the applicable standards referenced herein.
 2. Tests performed at the project site will be scheduled in order that the owners representative on the project is present during all testing.
- C. Test Report:
1. A test report shall be prepared and submitted to the Owner at the conclusion of dry film thickness and indicating:
 - a. The film thickness gauge used
 - b. The locations where tests were made.

- c. The dry film thickness at each location.
 - d. The name of the person making the tests.
 - e. The names of the persons who are representing the Contractor and the Owner and who are witnessing the test.
2. The test report shall be certified by the NACE certified coating inspector, indicating compliance with this specification.
3. The report will also include the dates and times of inspections made at the tank fabrication site for surface preparation.

PART 4

MEASUREMENT AND PAYMENT

- A. Payment for the work of this section shall be part of the work of Section 21 41 23B and/or exposed piping assemblies shown on the Drawings. Payment shall include coating testing and inspection and eleven month anniversary inspection.

END OF SECTION

SECTION 21 41 23
WATER STORAGE TANK FOR FIRE PROTECTION

PART 1 GENERAL

1.01 SCOPE

- A. This Section provides for the furnishing and installing of the water storage tank for Fire Protection for the NTUA Headquarters Complex.
- B. The Contractor has the option to provide either a welded steel storage tank per AWWA D100 or a bolted steel water storage tank per AWWA D103.
- C. Work Included
 - 1. Storage tank with dimensions shown on the plans.
 - 2. Tank foundation.
 - 3. All water pipe and fittings inside tank, supply and suction water pipe connection at outside of tank.
 - 4. Tank appurtenances as listed in this section.
 - 5. Fittings, valves and other piping appurtenances.
 - 6. Tank coating, priming and insulating.
 - 7. Electric heating system.
 - 8. Altitude valve for tank level control.

1.02 RELATED WORK

- A. Section 01 3000 – Administrative Requirements
- B. Section 01 7800 – Closeout Submittals
- C. Section 21 41 23A Welded Steel Water Storage Tank
- D. Section 21 41 23B Bolted Steel Water Storage Tank
- E. Section 09 97 13 Coatings For Steel Tank

1.03 REFERENCES

- A. The most recent editions of the publications listed in the following text form a part of the specification to the extent referenced. The publications are referred to by the following abbreviation:
 - 1. ANSI/AWWA D100 – Welded Steel Tank for Water Storage.
 - 2. ANSI/AWWA D103 – Standard for Factory Coated Bolted Steel Tanks.
 - 3. NFPA 22 – Water Tanks for Private Fire Protection.
 - 4. ANSI/AWWA D102 – Painting Steel Water Storage Tanks.
 - 5. SSPC – Steel Structures Painting Manual, Volume 2, Systems and Specifications.
 - 6. ASTM B209 – Aluminum and Aluminum-Alloy Sheet and Plate.
 - 7. ASTM D220 – Pictorial Surface Preparation Standards for Painting Steel Surfaces.
- B. Geotechnical Engineering Report, Navajo Nation Justice Center, Chinle, Arizona, dated March 30, 2011, with Addenda.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Product Data
 - a. Altitude valve
 - b. Gate valves
 - c. Water meter

d. Vaults

B. Shop Drawings:

1. Include dimensioned tank fabrication drawings indicating all appurtenances with necessary plan and elevation views.
 2. Include engineering calculations for tank and foundation by registered professional engineer in the State of Arizona.
 3. Include tank foundation engineering calculations, construction geometry and sections, and materials of construction.
 4. Include the following tank finish data:
 - a. Manufacturer's standard product data, performance characteristics and material safety data sheet for each primer and finish coating.
 - b. List of materials to be used under this section.
 - c. Manufacturer's literature and written instructions for surface preparation, mixing and application of each primer and finish coating.
 - d. Exception to or deviations from specified requirements, if any, and reasons for same.
 5. Tank heating system including power requirements, location of tank penetrations, parts list and heat loss calculations.
 6. Tank insulation installation drawings and product sample.
- C. Field Samples: Duplicate samples of each type of paint proposed, approximately 3" x 6" on suitable material, representing finished Work as closely as possible. Label each sample and designate stage of finish.
- D. Tank inspection report
- E. Tank manufacturer qualifications including listing of 3 similar installations within the last 5 years.
- F. Operations and Maintenance manuals, per Section 01 7800, for the following:
1. Altitude valve
 2. Water meter
 - 3 Tank insulation
 4. Tank heater
 5. Water storage tank inspection and testing recommendations, including water temperature, per NFPA 25.
- G. Benchstock 1% of the total liters of exterior paint onsite for future.

1.05 DELIVERY AND STORAGE

- A. Deliver water storage tank system components and parts to the job site and handle and store in such a manner as to prevent permanent distortion of any part or other damages affecting structural, mechanical or electrical integrity.
- B. Replace damaged items that cannot be restored to "as new" condition by the Contractor at no additional cost.
- C. Store all items which would suffer operational degradation by exposure to the ambient atmosphere off the ground, in a well-drained location, protected from the weather and accessible for inspection and handling.

PART 2 – PRODUCTS

2.01 TANK ACCESSORIES

Except as stipulated herein, provide tank accessories of the kind and construction specified in the 2008 edition of NFPA 22.

- A. Ladders: Provide fixed ladders on the inside and outside of the tank meeting the requirements of AWWA and OSHA. Safety cages shall be provided. The interior ladder shall be treated to resist corrosion and rusting (29CFR 1910.27(b)(7)(i)).
- B. Access Manways: Provide two circular manways, 30 inches in diameter in the tank shell at locations shown on the drawings. Provide manholes with gasketed and bolted covers with manhole cover davit.
- C. Inlet Pipes: Provide a 4 standard weight steel inlet pipe, sized per the Drawings. The inlet shall terminate inside the tank as shown on the drawings.
- D. Outlet Pipe: Provide a standard weight steel outlet pipe, sized per the Drawings, with anti-vortex plate and baffles. Extend the outlet pipe overflow pipe, sized per the Drawings, outside the tank wall and terminate with a flange.
- E. Overflow Pipe: Provide standard steel weight overflow pipe. The overflow pipe shall consist of standard weight steel pipe, supported by brackets from the exterior side of the tank shell, and shall be provided with an insect screen. The minimum metal thickness for the overflow pipe shall be 7mm. Provide a weir box at the upper end with an overflow elevation as shown on the plans.
- F. Drain: Provide a drain pipe, sized per the drawings, complete with gate valve, box and cover, as shown on the drawings.
- G. Roof Manway: Provide one lockable, rainproof roof manway.
- H. Vent: Provide at the apex of the roof, a vent capable of venting air in and out of the tank based on an inflow water rate of 2,000 gpm. Equip the vent with insect-proof stainless steel screen (#16 mesh or finer).
- I. Level Indicator: Provide a standard type level indicator-gage with guided float. Provide stainless steel cable. Locate indicator near the tank ladder.
- J. Altitude Valve: Provide an altitude valve on the tank fill line as shown. The altitude valve shall be equal to Cla-Val 210-01. A reservoir sensing line shall be installed from the valve to the tank. The altitude valve shall be a hydraulically-operated, pilot controlled, diaphragm-actuated, modified globe valve.
- K. Electric Heating Element, Thermostat, and Thermometer Inlets: Provide tank penetrations for the flange heater and appurtenances, per the requirements of this section.
- L. Provide Lightning Protection per NFPA 780, Section 4.4.

2.02 DESIGN CRITERIA

- A. Usable Capacity – 180,000 gallons
- B. Dimensions – as shown on Drawings
- C. Seismic Use Group IV (Fire Suppression Facility)
- D. Site Class Per Geotechnical Report
- E. Lowest, one-day mean ambient temperature - 20 degrees F

2.03 TANK FOUNDATION

- A. Tank foundation shall be designed and provided as specified in either Section 21 43 23A or 21 43 23B.

2.03 PAINTING, COATING AND INSULATING

- A. Delivery and Storage
 - 1. Deliver all materials to the job site in original, new and unopened containers bearing manufacturer's name and label, coating type, stock number, date of manufacture, contents by volume for major constituents, thinning and application instructions, and color number and name. Provide a dated receipt for materials purchased for The Owner's representative's approval. Do not use materials until The Owner's representative has inspected contents and obtained data from information on container labels.

2. Store materials in weather resistant enclosed structures and protect from extreme temperatures. Flammable materials shall be stored in accordance with state and local codes. Remove materials exceeding storage life recommended by the manufacturer from the site.
- B. Spare Supplies: Provide one unopened gallon container of each color and type of paint and each type of solvent and thinner required by the specification to the owner's representative.
- C. Tank Insulation System:
 1. Insultherm, Inc. or an approved equal.

Insultherm, Inc.
P.O. Box 311
La Porte, Texas 77572-0311
(281) 470-8442
 2. Wall Panel System:
 3. Panels: Provide prefabricated vertical standing seam wall panel system in accordance with ASTM 8209, 3105-H14, or 1100-H14, embossed with polyester coil coating, in color approved by owner. Panels shall be aluminum, 1mm thick by 600mm wide by height of tank sidewall.
 4. Insulation: Manufacturer's standard 40mm thick polyisocyanurate foam with a foil vapor barrier on both sides, laminated to panels with adhesive.
 5. Adhesive: Manufacturer's standard, non-flammable contact type.
 6. Attachments:
 7. Cables: 7mm o.d. stainless steel cables.
 8. Turnbuckles: 10mm x 150mm take-up galvanized steel turnbuckles and copper nicopress sleeves.
 9. Straps: Manufacturer's standard 13mm wide x 0.5mm thick stainless steel.
 10. Roof Panel System:
 11. Panels: Provide stucco embossed aluminum weather barrier, 1mm thick by 600mm wide seam-to-seam, extended from side to center in radial fashion using double folded seam system: finish shall be polyester coil coated, in color approved by owner.
 12. Insulation: Manufacturer's standard 40mm thick polyisocyanurate board with foil facing on both sides.
 13. Miscellaneous materials:
 14. Bars: 10mm mild steel round bars, furnished by tank builder.
 15. Straps: 7mm wide by 0.5mm thick stainless steel.
 16. Extrusion: 10mm by 175mm by 3mm thick aluminum.
 17. Bolts: 7mm by 10mm stainless steel.
 18. Angle Clips: Manufacturer's standard 10mm x 150mm x 50mm wide x 5mm thick carbon steel.

2.04 ELECTRIC HEATING SYSTEM

- A. Provide an automatic electric heating system for the tank. The design of the heating system shall be coordinated with the design of the insulation system to meet the requirements of NFPA 22. The complete package will consist of the following items as indicated on the drawings:
 1. Flange heater, 60kW, 480V/3 phase NEMA I alloy sheath immersion heating elements with 50 mm brass screw plugs. Elements to be mounted at 765 mm above finished floor of tank. The element must be removable without draining the tank.

2. Control panel to be mounted on the flange.
3. One (1) 0EF – 160EF, mercury filled, aluminum cased, thermometer with heavy glass front. Provide temperature graduation scale for thermometer of not more than 2°F. Provide adjustable joint separable socket assembly for mounting thermometer stem into storage tank.
4. All O-rings, gaskets, sealers, nuts, bolts, etc. required to secure the elements, thermostats, and thermometer rigidly to the tank shell.

2.05 ELECTRIC HEATING SYSTEM CONTROLS

- A. Provide controls for electric heating system per control manufacturer's recommendations. Provide complete with all appurtenances to operate the electric water heating system of the tank as follows:
 1. Thermostat to start element operations when water temperature in tank reaches 42 °F.
 2. Thermostat to stop element operations when water temperature in tank reaches 47°F.
 3. Thermometer to be mounted at 36 inches above finished floor of tank.
- B. Provide NPT threaded coupling for each sensor and thermometer to be installed by tank manufacturer. Coordinate exact size of each fitting to accommodate sensor wells, etc.
- C. Coordinate with electrical contractor to achieve operating system.

2.06 TANK IDENTIFICATION PLATE

- A. Provide permanently mounted engraved identification plate with the following information:
 1. Design capacity of tank.
 2. Manufacturer's name and project number.
 3. Height and diameter of tank.
 4. Date of construction.
 5. Mount identification plate on side wall of tank approximately 2 m above the tank floor.

B. PART 3 EXECUTION

3.01 TANK CONSTRUCTION

- A. Tank construction shall be as specified in either Section 21 43 23A or 21 43 23B

3.02 INSULATION

- A. Wall Panels:
 1. Install Foamglas insulation around bottom 6 inches of tank to prevent moisture from weeping up the tank sidewall.
 2. Attach panels to steel cables places around tank on 36-inch centers with the bottom cable 18 inches from the bottom and the top cable 12 inches down from the rim. Pull each cable tight prior to tensioning with turnbuckles.
 3. Tie each panel to cable with ½ inch by ½ inch straps by looping strap around each cable and hooking both ends over the standing seam. Seam shall then be machine folded with straps included. Finished height of each double standing seam shall be 1 inch.
- B. Roof Panels:
 1. Fasten standing seam panels to round bar, tack welded to tank roof every 5 feet. Bars shall be on 36 inch circular centers. Seams shall run perpendicular to the round bar, secured at each intersection with straps looped around the bar with each end folded into the double folded standing seam. Seams shall be folded in the down slope direction.
 2. Top rim of tank shall be fitted with aluminum extrusion which shall be bolted in place 1.5 inch leg extended out and set at a height equal to the roof insulation thickness.
- C. Repair of Insulation Defects

1. Repair any defects discovered during inspection with the same material as used for the original insulation and finish coating.
2. After any necessary repairs, conduct a final inspection prior to acceptance by the Owner's representative.
3. Tank Identification: Provide stenciled lettering, min 12 inches high, identifying tank as "Fire Storage"/Non Potable.

3.03 DISINFECTION

- A. The Fire Storage tank is not required to be disinfected.

3.04 TESTING

- A. Testing shall be per either Section 21 43 23A or 21 43 23B

3.05 CLEAN UP OF SITE

Upon completion of the Work, remove and dispose of all rubbish or other material remaining as a result of these operations, and return the site to as good a condition as when the Work began.

3.06 WARRANTY

Warranty the structure for one year to the extent that any defects due to faulty design, workmanship or material which may appear in the structure will be repaired. It is understood that the Contractor has prepared the detailed design of this structure and all its members, connections and foundation plans in accordance with standard practices. It is the intent of these specifications that full responsibility for the adequacy of the design to conform to the governing standard specifications, and the safety of the structure is included in this section. This requirement has precedence over and governs the interpretation of any clause in these specifications.

END OF SECTION

SECTION 21 4123A
WELDED STEEL WATER STORAGE TANKS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Design of tank, all tank appurtenances, and tank foundation and preparation of all submittals by a Professional Engineer, licensed to practice in the State of Arizona.
- B. Reservoir foundation.
- C. Furnishing and erection of welded steel water storage tank.
- D. Painting and protective coatings.

1.02 RELATED REQUIREMENTS/WORK SPECIFIED ELSEWHERE

- A. Section 01 3000: Administrative Requirements
- B. Section 01 7800: Closeout Submittals
- C. Section 31 0000: Earthwork
- D. Division 03 : Concrete
- E. Section 09 9713: Coatings for Steel Tank

1.03 REFERENCES

- A. AWWA D100: Standards for Welded Steel Tanks for Water Storage, latest edition.
- B. API 650 for tanks designed in accordance with Section 14 of AWWA D100.
- C. American Welding Society, D1.1: Structural Welding Code and D2.4: Symbols for Welding, Brazing, and Nondestructive Examination.
- D. Geotechnical Investigation performed for this project by GEOMAT, dated March 30, 2011, with Addenda.

1.04 SUBMITTALS

- A. Prior to fabrication, submit per Section 01300, Submittals:
 - 1. Certificates of welders proposed for use on this project verifying AWS qualifications; Welders shall have achieved or renewed their AWS qualifications within the past 12 months preceding the Bid Date for this project.
 - 2. Tank and foundation design calculations including earthquake loads and shop drawings stamped by licensed Professional Engineer, registered in the State of New Mexico.
 - 3. Tank layout and accessory drawings
 - 4. Details for all member, plate, and fastener sizes and welded joints; Use AWS 2.4 weld symbols to indicate size and net length of welds.
- B. Prior to start of tank painting, submit the following test reports per Section 01300:
 - 1. Radiographic weld inspection report
 - 2. Vacuum tests on all floor seams
 - 3. For Tanks designed per AWWA D100, Section 14, pressure tests of all shell penetrations per API 650, Section 5.3.5.
- C. Disinfection Test Results.
- D. VOC test results on samples of water left in the tank following disinfection to assure proper curing of inside coating as specified in Section 09800.
- E. Certification to Owner of Compliance with AWWA D100 with Request for Final Payment

1.05 QUALITY ASSURANCE

- A. AWWA D100 – Section 11: The Contractor shall contract for radiographic testing by a qualified firm to perform this testing whose inspection staff is AWS-certified and which has at least five (5) years experience with inspection and testing of welded steel structures.
- B. Hydrostatic testing to be performed as part of Tank Disinfection

1.06 FOUNDATION DESIGN CRITERIA

- A. A geotechnical investigation of the project site has been conducted by GEOMAT and will be made available.
- B. Additional geotechnical investigation, if required for design, will be the responsibility of the Contractor.
- C. Design Codes (most stringent criteria shall govern):
 - 1. AWWA D100-05, Sections 12 and 13
 - 2. 2009 NFPA 5000 Building Construction and Safety Code
 - 3. IBC 2006
 - a. ASCE 7-05 Minimum Design Loads for Buildings and Other Structures
 - b. ACI 318-05 Building Code Requirements for Structural Concrete
- D. Specific design criteria in addition to that specified on the contract drawings:
 - 1. Occupancy and Use Category: IV – Fire Suppression Facility
 - 2. Minimum frost depth: 30 inches
 - 3. Minimum thickness: 20 inches
 - 4. Allowable soil bearing pressure (on engineered fill): 2,500 psf
 - 5. Foundation type: Reinforced concrete ringwall per Paragraph 3.03 of this Section.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. AWWA D100 unless otherwise scheduled
- B. Concrete: Division 03.

2.02 FABRICATION

- A. AWWA D100 unless otherwise scheduled or as shown on Drawings.

2.03 PROTECTIVE COATINGS

- A. See Section 09 9713.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. AWWA D100
 - 1. Foundation: Continuous reinforced concrete ringwall per AWWA D100 Section 12.6, Type 1.
 - 2. Sand cushion: 8 inches thick and constructed as shown on drawings;
 - 3. Existing soil on which foundation or sand cushion will rest: Scarify/Excavate to the depth and extents shown on the Drawings and compact to a minimum of 95 percent of maximum density per ASTM D1557.
 - 4. Structural fill per Section 501 and recommendations of the geotechnical investigation.

3.02 DISINFECTION

- A. AWWA C652: Chlorination Method 2 unless otherwise scheduled or approved by Engineer.
- B. AWWA D100: TESTING

- C. Sampling and analysis cost paid by Contractor including all tests to demonstrate compliance with VOC standards as described in Section 09 9713.
- D. Sampling done in presence of Engineer or Owner.
- E. Discharge of chlorinated water: Discharges shall first be dechlorinated using sodium thiosulfate or other suitable means to achieve a free chlorine residual concentration < 1.0 mg/L.

3.03 SCHEDULE

- A. "Section" as stated below refers to specific sections within AWWA D100.
- B. Site Commercial Development Reservoir :
 - 1. Capacity: Nominal 275,000 gallons
 - 2. Diameter: 46'-0" (inside)
 - 3. Maximum water depth without overflow: 24'-0"
 - 4. Finish floor elevation: 6,705.5
 - 5. High water elevation: 6,728.64
 - 6. Roof type (Section 3.5): Cone roof with knuckle
 - 7. Welded joint details per Section 1.4: yes
 - 8. Copper bearing steel per Section 2.2.6: no
 - 9. Snow load (Section 3.1.3): 25 psf
 - 10. Wind load (Section 3.1.4): 100 mph
 - 11. Corrosion allowance (Section 3.9):
 - a) Floor plates: Minimum plate thickness shall be 3/8" including corrosion allowance
 - b) Walls – 1/16"
 - c) Roof plates – none
 - d) Beam and channels (web only) – none
 - 12. Balcony (Section 4.7): Fabricated to the general dimensions shown on the Drawings; Design live load for the Balcony shall be 900 lbs.
 - 13. Increased wind load consideration (Section 4.15): Not required
 - 14. Silt stop (Section 7.2.1): Not required
 - 15. Ladders (Section 5):
 - a) Outside tank ladder: See Paragraph 3.03.B.12 above.
 - b) Interior ladder: Required
 - 1) Safety cage: Required
 - 2) Safety climb device per OSHA, 29 CFR Part 1910: Required
 - 3) Side rails: Required
 - c) Roof Ladder with side rails (Sections 7.4.3 and 5.4.3): Required
 - 16. Shop inspection (Section 11.1): At Engineer's discretion
 - 17. Written weld report (Section 11.2): Required
 - 18. Radiographic film/test segments (Section 11.2.1.1): Property of Owner
 - 19. Inspection for complete joint penetration (Section 11.4.1.1): Radiographic
 - 20. Foundation (Section 12): Type 1 Ringwall per Section 12.6 requirements and recommendations of the geotechnical investigation.
 - 21. Piling foundation (Section 12.7.3): Not required
 - 22. Concrete work (Section 12.8): Concrete design materials, reinforcing, and construction per Section 100 requirements and as shown on Drawings.

23. Distance foundation to piping (Section 12.9.2): As shown on Drawings.
24. Seismic design (Section 3.1.5 and Section 13.1.2): Per AWWA D100-05 and ASCE 7.
25. Probe mounting means, brackets, and other welded items for control systems, electrical equipment, and other accessories: As shown on Drawings.
26. Vent design air flow rate (Section 7.7): 1500 gpm
27. Roof vent must have a stainless steel screen of 16 mesh.
28. Cathodic Protection System: Per Section 26 4220
29. Overflow weir box: Fabricated as shown on the Drawings and capable of passing 300 gpm that corresponds to the ultimate design condition fill rate.
30. Tank manways, roof hatch, inlet, outlet, overflow, and drain piping within 5 feet of the ringwall, level sensing instrument connection, and housing, vent, and related tank appurtenances: Furnished and located as shown on the Drawings.

PART 4 MEASUREMENT AND PAYMENT

4.01 GENERAL

Costs for the work in this section shall be included in the lump sum bid amount for this item to include manufacturer design, tank and appurtenance, and foundation, including any additional geotechnical investigation required for the design.

END OF SECTION

SECTION 21 41 23 B
BOLTED STEEL TANK

PART 1 GENERAL

1.01 SCOPE

Furnish and erect a glass-fused-to-steel bolted water storage tank, including foundation, tank structure and tank appurtenances as shown on the Drawings and described herein.

- A. All required labor, materials and equipment shall be included.
- B. All materials furnished by the tank manufacturer, which are in contact with the stored water shall be certified and listed by the National Sanitation Foundation (NSF) to meet ANSI/NSF Additives Standard No. 61. Certification of a coating type alone will not be sufficient to meet this requirement.

1.02 REFERENCES

- A. SSPC SP-10 - Surface Preparation Standard – Near-White Metal Blast Cleaning
- B. ASTM C633-79 - Standard Test Method for Adhesion or Cohesive Strength of Flame-Sprayed Coatings
- C. ISO 28706-1:2008 – Vitreous and Porcelain Enamels – Determination of Resistance to Chemical Corrosion
- D. ISO 2859 – Sampling Procedures for Inspection by Attributes
- E. EN 14430:2004 – Vitreous and Porcelain Enamels – High Voltage Test
- F. ISO 6370-2 – Vitreous and Porcelain Enamels – Determination of Resistance to Abrasion

1.03 QUALIFICATIONS OF TANK SUPPLIER

- A. The Engineer's selection of factory applied glass-fused-to-steel bolted tank construction for this facility has been predicated upon specific criteria, construction methods, and an optimum coating for resistance to internal and external tank corrosion. Deviations from the specified design, construction or coating details, will not be permitted.
- B. The tank manufacturer shall submit with its proposal a drawing showing major dimensions and plate thickness upon which the bid is based and a site specific foundation design based on the soils report showing preliminary dimensions and approximate quantities of concrete and reinforcing steel. The tank and foundation drawings shall be signed and sealed by a Professional Engineer licensed in the state of Arizona.
- C. Strict adherence to the standards of design, fabrication, erection, product quality, and long term performance established in this Specification will be required by the Owner and Engineer.
- D. Certification from the tank manufacturer that all steel and aluminum used for the tank shall be smelted and produced in the U.S.A. deviations will not be permitted.
- E. Only bids from U.S.A manufactured tank suppliers who have successfully pre-qualified will be considered.
- F. The Engineer reserves the right to evaluate all bids based on long term, 50 year minimum operation, coatings and maintenance costs. Values to be used in this evaluation will be at the discretion of the Engineer, as detailed in this specification and bid tabulation form. The Engineer will add such costs, dependent upon the type of tank offered, to the bidder's price to determine the effective low bid for purposes of making the award.

1.04 RELATED WORK

- A. Section 21 41 23 – Fire Protection Tank

1.05 DESIGN CODES AND GUIDES

- A. The most recent editions of the publications listed in the following text form a part of the specification to the extent referenced. The publications are referred to by the following

abbreviation:

1. ANSI/AWWA D103 – Standard for Factory Coated Bolted Steel Tanks.
2. NFPA 22 – Water Tanks for Private Fire Protection.
3. 2009 NFPA 5000 - Building Construction and Safety Code
4. IBC 2006 - International Building Code
 - a. ASCE 7-05 - Minimum Design Loads for Buildings and Other Structures
 - b. ACI 318-05 - Building Code Requirements for Structural Concrete
- B. Specific design criteria in addition to that specified on the contract drawings:
 1. Occupancy and Use Category: IV – Fire Suppression Facility
 2. Minimum frost depth: 30 inches
 3. Minimum thickness: 20 inches
 4. Allowable soil bearing pressure (on engineered fill): 2,500 psf
 5. Foundation type: Reinforced Concrete Bottom with Embedded Steel Base Setting Ring per Paragraph 1.09.A of this Section.

1.06 SUBMITTALS

The following shall be submitted in accordance with Administrative Requirements of the project, Section 01 3000 of the Project Manual.

- A. Shop Drawings:
 1. Dimensioned tank fabrication drawings indicating all appurtenances with necessary plan and elevation views.
 2. Engineering calculations for tank and foundation by registered professional engineer in the State of Arizona.
 3. Tank foundation plan.
 4. Tank foundation materials of construction.
 5. Include the following tank finish data:
 - a. Manufacturer's standard product data, performance characteristics and material safety data sheet.
 - b. List of materials to be used under this section.
 - c. Exception to or deviations from specified requirements, if any, and reasons for same.
- B. Tank inspection report including test results.
- C. Tank manufacturer qualifications including listing of 3 similar installations within the last 5 years.
- D. Operations and Maintenance manual.
- E. Tank Warranty.
- F. Certification from the tank manufacturer that the tank meets the requirements of the standards listed in Section 1.03.

1.07 COATING

A. GLASS COATING

The tank shall be provided with a glass fused-to-steel coating per AWWA D103.

B. FACTORY INSPECTION

1. The manufacturer's quality system shall be ISO 9001 certified and refer to ISO (International Organization for Standardization) for the following testing and procedures.
2. Chemical Resistance of Glass Coating

- a. Frits shall be individually tested in accordance with pertinent sections of ISO 28706-1:2008.
3. Factory Holiday Test
 - a. A dry volt test using a minimum of 1100 volts is required.
 - b. Frequency of the test shall be every sheet. Any sheet registering a discontinuity on the interior surface of floor shall be rejected.
4. Measurement of Glass Thickness
 - a. Glass thickness shall be measured using an electronic dry film thickness gage (magnetic induction type) approved by Manufacturer. The thickness gage shall have a valid calibration record.
 - b. The thickness of the glass shall be between 10.0 and 18.0 mils (0.010 and 0.018 inches).
5. Measurement of Color
 - a. The exterior color of the sheets shall be measured using a colorimeter approved by CST Storage. The colorimeter shall have a valid calibration record.
 - b. The color must fall within the tolerance specified by CST Storage; else the panel shall be rejected.
6. Impact Adherence Test
 - a. The adherence of the glass coating to the steel shall be tested in accordance with ISO standards. Any sheet that has poor adherence shall be rejected.
7. Fishscale Test
 - a. The glass coating shall be tested in-house for fishscale by placing the full size production sheets in an oven at 400° F for one hour. The sheets will then be examined for signs of fishscale. Any sheet exhibiting fishscale shall be rejected and all sheets from that gage lot will be similarly tested.

1.08 SHIPPING AND HANDLING

- A. All sheets that pass Factory Inspection and Quality Control checks shall be protected from damage prior to packing for shipment.
- B. Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion during shipment.
- C. Individual stacks of panels will be wrapped in heavy mil plastic and steel banded to special wood pallets built to maintain the roll-radius of the tank panels and minimize contact or movement of finished panels during shipment.
- D. Shipment from the factory will be by truck, hauling the tank components exclusively.

1.09 ERECTION

A. FOUNDATION

1. The tank foundation shall be either:
 - a. Type 1, Steel-bottom tanks supported on ringwalls per AWWA D103.
 - Or
 - b. Type 6, Concrete-bottom with embedded steel base setting ring per AWWA D103
2. The tank foundation is a part of this contract and shall be installed by the Authorized Tank Dealer. A site specific foundation design signed and sealed by a Professional Engineer licensed in the state of Arizona, based on the soils report, shall be submitted for review and approval.
3. The tank foundation shall be designed by the manufacturer to safely sustain the

structure and its live loads.

4. Tank footing design shall be based on the soil bearing capacity given in the geotechnical report. Copies of the soil report are to be provided to the bidder prior to bid date by the Owner or Engineer.

B. Sidewall Structure

1. Field erection of the glass-coated, bolted-steel tank shall be in strict accordance with the procedures outlined in the manufacturer's erection manual, and performed by an authorized dealer of the tank manufacturer, regularly engaged in erection of these tanks, using factory trained erectors.
2. Specialized erection jacks and building equipment developed and manufactured by the tank manufacturer shall be used to erect the tanks.
3. Particular care shall be taken in handling and bolting of the tank panels, structural members, and appurtenances to avoid abrasion of the coating system. Prior to a liquid test, all surface areas shall be visually inspected by the Engineer.
4. No backfill shall be placed against the tank sidewall without prior written approval of the tank manufacturer. Any backfill allowed shall be placed according to the strict instructions of the tank manufacturer.

C. Roof

1. The roof shall be a structurally supported dome roof per AWWA D103.
 - a. The dome shall be clear span and designed to be self-supporting from the periphery structure with primary horizontal thrust contained by an integral tension ring.
 - b. The dome and tank shall be designed to act as an integral unit. The tank shall be designed to support an aluminum dome roof including all specified live loads.
2. Roof Vent
 - a. A properly sized vent assembly in accordance with AWWA D103 shall be furnished and installed above the maximum water level of sufficient capacity so that at maximum design rate of water fill or withdrawal, the resulting interior pressure or vacuum will not exceed ½ inch water column.
 - b. The overflow pipe shall not be considered to be a tank vent.
 - c. The vent shall be constructed of aluminum such that the hood can be unbolted and used as a secondary roof access.
 - d. The vent shall be so designed in construction as to prevent the entrance of birds and/or animals by including an expanded aluminum screen (½ inch) opening. An insect screen of 23 to 25 mesh polyester monofilament shall be provided and designed to open should the screen become plugged by ice formation.

D. APPURTENANCES

1. Pipe Connections
 - a. Where pipe connections are shown to pass through tank panels, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly. Tank shell reinforcing shall comply with AWWA D103 latest edition. A single component urethane sealer shall be applied on any cut panel edges or bolt connections.
 - b. Overflow piping shall be sized as shown on the Drawings and shall be seamless aluminum tubing.
2. Outside Tank Ladder
 - a. An outside tank ladder shall be furnished and installed as shown on the submittal drawings.
 - b. Ladders shall be fabricated of aluminum and utilize grooved, skid-resistant rungs.

- c. Safety cage and step-off platforms shall be fabricated of galvanized steel. Ladders shall be equipped with a hinged lockable entry device.
 3. Shell Manways
 - a. One bottom access door shall be provided as shown on the submittal drawings in accordance with AWWA D103.
 - b. The manhole opening shall be a minimum of 30 inches in diameter. The access door (shell manhole) and the tank shell reinforcing shall comply with AWWA D103 latest edition, Sec. 5.1.
 4. Cathodic Protection
 - a. A passive cathodic protection system shall be designed and supplied by the tank manufacturer based upon information supplied by the Engineer or Owner.

E. HYDROSTATIC FIELD TESTING

1. Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling tank to its overflow elevation.
2. Any leaks disclosed by this test shall be corrected by the authorized dealer in accordance with the manufacturer's recommendations.
3. Water required for testing shall be furnished by the Owner at the time of tank erection completion, and at no charge to the tank erector. Disposal of test water shall be the responsibility of the Owner.
4. Labor and equipment necessary for hydrostatic tank testing is to be included in the price of the tank.

F. TANK MANUFACTURER'S WARRANTY

The tank manufacturer shall include a warranty for the tank materials and coating. As a minimum, this warranty shall provide assurance against defects in workmanship and materials, under normal and proper use, maintenance and operation, during the period expiring on the earlier of (i) one year after liquid is first introduced into the tank or (ii) 14 months after shipment from the factory.

The manufacturer shall further warrant that the glass coated product zone surfaces (that portion of the tank interior below the normal high elevation of the contained liquid) will not corrode, under normal and proper use, maintenance and operation, during the period expiring on the earlier of (i) 12 months after liquids is first introduced into the tank or (ii) 14 months after shipment from the factory.

SECTION 26 4220

CATHODIC PROTECTION BY IMPRESSED CURRENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope

1. Contractor shall design, furnish, install, energize, adjust, and test an impressed current cathodic protection system, complete as described herein for each water storage tank to be constructed. Engineering data, drawings, field services, and reports on the status of the completed installation shall be provided to Engineer by Contractor. All labor, equipment, materials, and technical services to provide and check out the complete cathodic protection system shall be provided by Contractor.
2. Contractor shall coordinate related work included in other sections.

1.02 QUALITY ASSURANCE

- A. Source: Contractor shall obtain complete impressed current cathodic protection system from one system supplier.
- B. Reference Standard: Contractor shall follow recommendations of the National Association of Corrosion Engineers for items allowing Contractor flexibility.

1.03 SUBMITTALS

- A. Shop Drawings. Contractor shall submit for approval detailed calculations, drawings and data documenting the sizing of cathodic protection system components to include, but not be limited to: Anode; Rectifier Unit; Potential Control Devices; Electrical Cable; Conduits; Reference Cells; Cable Connectors; Connection Insulation; Anode Suspension Ropes; Installation Arrangement and Details.
- B. Certifications
 1. Contractor shall submit evidence of qualification of corrosion engineering. Certifications shall state that the cathodic protection system complies with the requirements of this section.
 2. Contractor shall submit following final testing and adjustment certifying that the impressed current cathodic protection system was manufactured, installed and operates in accordance with the system design submitted by the supplier.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General

1. Contractor shall furnish and install a complete impressed current cathodic protection system consisting of a platinized niobium wire anode loop within the water storage tank, a cathodic protection rectifier, control equipment and devices necessary to

maintain constant tank-to-water potential, and facilities as required to monitor system performance, all as described in this section.

2. The cathodic protection system shall provide completely unattended operation under all normal operating conditions. It shall be capable of automatically maintaining a selected constant potential at the location monitored by its reference device or devices under all normal operating conditions. It shall also be capable of restoring and then maintaining the selected potential after periods of extended power outage. The system shall be completely self-regulating. Restoration of power after extended power outages shall not, in itself, overload the system causing protective devices to render the system inoperative. Capability of automatic restoration of protective potentials after power outage shall be accomplished without reducing the effectiveness of automatic protective devices. The system shall be fully protected against abnormal conditions such as those which result from lightning strokes, internal system short circuits, or overloads.

B. Cathodic Protection Rectifier Unit

1. The rectifier output control shall protect the unit from electrical faults but shall not shut it down when system requirements exceed the rectifier output rating. The output shall be controlled by the unit output reaching either full rated voltage or full rated current, whichever occurs first and shall operate as follows.
2. When the system voltage requirement exceeds the nameplate voltage rating of the rectifier unit, the rectifier output current shall rise to the full rated output current level and continue operation at full rated current output until the system voltage requirement decreases.
3. When the system current requirement exceeds the nameplate current rating of the rectifier unit, the rectifier output current shall rise to the full rated output current level and continue operation at full rated current output until the system current requirement decreases.
4. Final coordinated design is the responsibility of Contractor. The following items are guidance and system component intent:
 - a. Input Power: Single phase, 60 Hz, 115 volt AC.
 - b. Input Protection: Thermal magnetic circuit breaker.
 - c. Input Transformer: Adjustable output voltage, may be increased or reduced in steps not exceeding 1.5 volts.
 - d. Output Voltage Rating: 28 volts DC minimum.
 - e. Output Current Rating: 6 amperes DC minimum.
 - f. Stacks: Non-aging selenium full-wave bridge.
 - g. Cooling: Convection, in accordance with NEMA requirements for operation in 40°C ambient.
 - h. Surge Protection: Output filter.
 - i. Meters: Voltmeter, indicating rectifier output volts; ammeter, indicating total rectifier output amperes; ammeters, indicating, as required to monitor rectifier output amperes to each tank-to-water potential control device.
 - j. Cabinet: Outdoor, wall-mounted, corrosion resistant louvers and bug screens on all ventilation openings, hinged door with three-point hatch, NEMA Type 3R, lockable by padlock.
 - k. Cabinet Finish: Match color and texture of water storage tank, inside and out. Coating system and number of coats match material supplied.

C. Tank-to-Water Potential Control Devices

1. The cathodic protection system provided shall include control devices of solid state design and equipment capable of maintaining a constant tank-to-water potential within the tank of minus 900 millivolts. Maximum potential variation shall be guaranteed not to exceed plus or minus 25 millivolts. The tank to electrolyte potential measured and maintained by the controller should be free of error produced by IR drop. Manual tap adjustment shall not be required to maintain output of connected impressed current anode system through full rated output current range of the potential control device.
2. The potential control device shall be so circuited that its measuring circuit is sensitive only to the potential of the metal surface being protected. The measuring circuit of the potential control device shall be unaffected by voltage drops occasioned by the flow of protective current through the various components in the circuit between the rectifier anode and the metal surface being protected.
3. Potential control devices shall have demonstrated at least two (2) years of satisfactory performance in a similar installation.
4. The potential control device shall be mounted integral with the cathodic protection rectifier or shall be provided in a smaller individual NEMA 3R cabinet.

D. Elapsed Time Meter

1. An elapsed time meter shall be mounted integral with each potential control device. The elapsed time meter shall be interlocked with the potential control device output circuit to operate only when the potential control device and rectifier supplying it are operating and supplying protective current to the tank.

E. Impressed Current Anode Segments

1. Impressed current anode wire shall be platinized niobium wire sized for 20-year life. Alternate wire composition can be proposed with test reports sealed by a Registered Professional Engineer.

F. Electrical Cable

1. All electrical cable shall be stranded copper with 600 volt insulation. Cable which will never be submerged shall have NEC Type TW insulation. Cable which will be submerged shall have low density, high molecular weight polyethylene insulation Anaconda Type CP, Cathodic Protection Cable. Cable sizes shall conform to NEC requirements.

G. Conduit

1. All conduit and fittings shall be rigid hot-dip galvanized steel and shall be sized according to NEC. All fittings shall be of cast metal.

H. Reference Cells

1. All reference cells shall be copper-saturated copper sulfate solution type and shall be guaranteed to have a five-year service life.

I. Cable Connectors

1. Connectors for splices in the cable runs or at anode connections shall be copper compression connectors.

J. Connection Insulation

1. Completed cable splices shall be encapsulated using a splice kit composed of a mold and an epoxy resin insulating compound.

K. Anode Suspension Ropes

1. Anodes suspension ropes shall be of nylon or other acceptable material.

2.02 ARRANGEMENT

- A. Arrangement, number, and location of anode wire within the water storage tank shall be provided by the system supplier. Steel anchors provided by the Contractor shall be welded to the inside of the tank to meet requirements of the Cathodic Protection System supplier. Anode cables shall be routed through the water tank side wall by means of a pressure entrance fitting nominally two feet above the ringwall.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The cathodic protection system shall be installed in accordance with drawings submitted by Contractor which have been reviewed and returned without exception by Engineer.
- B. Installation details, procedures, and methods shall be in accordance with these specifications and established practices of the cathodic protection industry.
- C. Contractor shall furnish a technically competent superintendent and experienced employees as required to accomplish the cathodic protection system installations in a prompt and effective manner. Each of the superintendent and experienced employees shall have at least five years of documented experience on similar installations.
- D. All equipment shall be installed level and plumb and shall be located to be easily accessible for maintenance. Conduit shall be installed parallel to dominate structure surfaces and supported at 5-foot intervals in conformance with NEC requirements as accepted by the Engineer.
- E. The cathodic protection rectifier and potential control device cabinet (if required) shall be located adjacent to each other at the location indicated on the Contractor's drawings reviewed by the Engineer.
- F. Positive DC output cables equal to the number of anode wire loops shall be routed from the cathodic protection rectifier to the anode wire loops.
- G. Each terminal shall be clearly and permanently identified as to the anode ring or section of ring being supplied by the feeder cable connected to that terminal.
- H. All conductors interconnecting cathodic protection devices, which are located in different enclosures external to the water storage tank, or between devices located in enclosures external to the tank and those located within the tank, shall be routed in rigid galvanized steel conduit.
- I. Conductors between cathodic protection system components located external to the water storage tank and components located within the tank shall be routed within the tank only for

the distance necessary to reach the components to which they connect. Routing of conductors beneath the tank roof to avoid external routing in conduit will not be permitted.

- J. Miscellaneous details of construction shall be as described in the articles which follow:
1. **Monitoring Reference Cells:** Two removable monitoring reference cells shall be installed in the water storage tank. One cell shall be located adjacent to the reference cell used for potential control; the second cell shall be located similarly in close proximity to the tank wall near the bottom approximately 180 degrees from the first reference cell. Access openings for these cells shall be provided in the roof of the tank. A connecting cable for monitoring system performance shall be installed in conduit from each of these cells into the rectifier cabinet and terminated upon terminal blocks with permanently identified terminals.
 2. **Potential Measurement Openings:** Three potential measurement openings with removable gasketed covers shall be provided in the roof of the water storage tank. One of these openings shall be in each quadrant located where highest and lowest structure-to-water potentials are expected to be found in that quadrant.
 3. **Welding and Cutting:** All welding or cutting of the water storage tank necessary for installation of cathodic protection devices, equipment, or raceway shall be completed prior to internal coating of the tank.
 4. **Electrical Service:** Contractor will furnish and install electrical power at a nominal 110 volts, 60 Hz, single phase to a Contractor-furnished terminal block at one location within the cathodic protection rectifier.

3.02 ENERGIZING, ADJUSTING, AND TESTING THE CATHODIC PROTECTION SYSTEM

- A. After the complete cathodic protection system is completely installed and supply power and water are available, Contractor shall energize the cathodic protection system and shall adjust the system until performance is optimum, based upon tank-to-water potential readings at numerous locations within the tank.
- B. The tank shall be filled and remain filled to capacity throughout the cathodic protection adjustment period.
- C. The rectifier shall initially be energized at its minimum output level. Rectifier output shall be increased manually until protective levels approach those required for protection.
- D. When the tank-to-water potential measured with each monitoring reference cell is at least 0.90 volts, tank-to-water potential measurements at 4-foot intervals from the tank bottom to the high water line shall be made at each potential measurement opening adjacent to the tank wall and tank-to-water potential measurements on the bottom shall be made at each potential measurement opening which is not near the tank wall. Tank-to-water potential measurements shall be recorded and evaluated. Rectifier output shall be adjusted as required until no tank-to-water potentials measured within the tank are greater than 1.10 volts, nor less than 0.90 volts.
- E. After initial tank-to-water potential adjustment is complete, the cathodic protection rectifier shall be switched to automatic potential control.
- F. Between 24 hours and 72 hours after completion of initial adjustment of the water storage tank cathodic protection system, a final adjustment shall be made. Tank-to-water potential measurements accompanied by rectifier output adjustments shall be repeated in a manner similar to the initial adjustment procedure.

- G. When final adjustment of the cathodic protection system is complete, all tank-to-water potential measurements, rectifier readings, and rectifier setting data shall be recorded and reports containing the information obtained turned over to Engineer.
- H. When Engineer is satisfied that the cathodic protection system is complete, is functioning as specified, is correctly adjusted, and has received the Final Certified Operations Report from the system supplier, the cathodic protection system will be accepted.

3.03 DRAWINGS AND DATA

- A. Complete fabrication, assembly and installation drawings; wiring and schematic diagrams; and details, specifications, and data covering the materials used and the parts, devices and accessories forming a part of the cathodic protection system furnished, shall be submitted in accordance with the procedure set forth in the specifications.

END OF SECTION

FOOD SERVICE
AVTEC BAFFLE FILTER TYPE VENTILATOR SPECIFICATIONS

MFR.: AVTEC
MODEL: AFWO-PBB
ITEM: #B02

Provide AVTEC U.L. Listed, NSF approved Model AFWO Baffle Filter type ventilator, in compliance with NFPA Pamphlet No. 96, BOCA, ICBO, [Uniform Mechanical Code] and SBCCI.

Ventilator shall be 177" long X 60" wide X 30" high, and size and shape as shown on drawing and shall be complete with U.L. Classified baffle type filters, duct collar, plenum, concealed collection trough, and hanger brackets (shipped loose and installed in the field by others).

A. CONSTRUCTION:

Entire unit shall be constructed of a minimum of 18 gauge type #300 series stainless steel. All external seams and joints to be welded and liquid tight; all exposed welds to be ground and polished.

B. FILTERS:

Provide U.L. Classified stainless steel baffle type filters, installed at not less than a 45° angle, running full length behind canopy.

C. COLLECTION TROUGH:

Provide a concealed, full-length grease trough, accessible from the top for cleaning, with (1) removable grease cup in each ventilator section.

D. WALL FIRE CLEARANCE:

Provide a completely enclosed 3" air barrier between back of ventilator and rear wall and side walls-where required. Insulation by others if required by local codes.

E. OPTIONS AND ACCESSORIES:

1. U.L. Listed fluorescent light fixtures pre-wired to one connection point.

2. Avtec Automatic Exhaust Fan interlock installed and wired to comply with IMC2006 Chapter 5 section 507.2.1.1 and to include: Thermal sensor located in front of the exhaust collar in the hood and mounted in the capture plenum.
3. Manual dampers, (1) for each exhaust duct collar.
4. Utility cabinet, 14" wide x 60" deep, located on left end of hood.

F. SUPPLY AIR MAKE UP:

1. Make-up Air plenum box with perforated bottom face, Model PBB. All 300 series stainless Perforated Supply Plenum to include steel hanging brackets in fixed locations to support product via utilization of hanging rods. Perforated supply plenum utilizes stainless steel perforated panels at 39% clear area. Internal perforated diffuser panels shall be included to diffuse air over full surface. Supplied with balancing dampers and UL 555 listed fire dampers to meet volume requirements. Balancing dampers designed for air velocities between 800 and 1000

FPM.

Units can be mounted to hood at factory for easy field installation or shipped loose for proper placement in kitchen.

AVTEC BAFFLE FILTER TYPE VENTILATOR SPECIFICATIONS

MFR.: AVTEC
MODEL: AFWO-PBB
ITEM: #D06

Provide AVTEC U.L. Listed, NSF approved Model AFWO Baffle Filter type ventilator, in compliance with NFPA Pamphlet No. 96, BOCA, ICBO, [Uniform Mechanical Code] and SBCCI.

Ventilator shall be 120" long X 54" wide X 30" high, and size and shape as shown on drawing and shall be complete with U.L. Classified baffle type filters, duct collar, plenum, concealed collection trough, and hanger brackets (shipped loose and installed in the field by others).

A. CONSTRUCTION:

Entire unit shall be constructed of a minimum of 18 gauge type #300 series stainless steel. All external seams and joints to be welded and liquid tight; all exposed welds to be ground and polished.

B. FILTERS:

Provide U.L. Classified stainless steel baffle type filters, installed at not less than a 45° angle, running full length behind canopy.

C. COLLECTION TROUGH:

Provide a concealed, full-length grease trough, accessible from the top for cleaning, with (1) removable grease cup in each ventilator section.

D. WALL FIRE CLEARANCE:

Provide a completely enclosed 3" air barrier between back of ventilator and rear wall and side walls-where required. Insulation by others if required by local codes. Air barriers to be finished, where exposed.

E. OPTIONS AND ACCESSORIES:

1. U.L. Listed fluorescent light fixtures pre-wired to one connection point.
2. Avtec Automatic Exhaust Fan interlock installed and wired to comply with IMC2006 Chapter 5 section 507.2.1.1 and to include: Thermal sensor located in front of the exhaust collar in the hood and mounted in the capture plenum.

F. SUPPLY AIR MAKE UP:

1. Make-up Air plenum box with perforated bottom face, Model PBB. All 300 series stainless Perforated Supply Plenum to include steel hanging brackets in fixed locations to support product via utilization of hanging rods. Perforated supply plenum utilizes stainless steel perforated panels at 39% clear area. Internal perforated diffuser panels shall be included to diffuse air over full surface. Supplied with balancing dampers and UL 555 listed fire dampers to meet volume requirements.

Balancing dampers designed for air velocities between 800 and 1000

FPM.

Units can be mounted to hood at factory for easy field installation or shipped loose for proper placement in kitchen.

AVTEC BAFFLE FILTER TYPE VENTILATOR SPECIFICATIONS

MFR.: AVTEC
MODEL: AFIO
ITEM: #D25

Provide AVTEC U.L. Listed, NSF approved Model AFWO Baffle Filter type ventilator, in compliance with NFPA Pamphlet No. 96, BOCA, ICBO, [Uniform Mechanical Code] and SBCCI.

Ventilator shall be 48" long X 48" wide X 30" high, and size and shape as shown on drawing and shall be complete with U.L. Classified baffle type filters, duct collar, plenum, concealed collection trough, and hanger brackets (shipped loose and installed in the field by others).

A. CONSTRUCTION:

Entire unit shall be constructed of a minimum of 18 gauge type #300 series stainless steel. All external seams and joints to be welded and liquid tight; all exposed welds to be ground and polished.

B. FILTERS:

Provide U.L. Classified stainless steel baffle type filters, installed at not less than a 45° angle, running full length behind canopy.

C. COLLECTION TROUGH:

Provide a concealed, full-length grease trough, accessible from the top for cleaning, with (1) removable grease cup in each ventilator section.

D. WALL FIRE CLEARANCE:

Provide a completely enclosed 3" air barrier between back of ventilator and rear wall and side walls-where required. Insulation by others if required by local codes.

E. OPTIONS AND ACCESSORIES:

1. U.L. Listed fluorescent light fixtures pre-wired to one connection point.
2. Full length finished back.
3. Avtec Automatic Exhaust Fan interlock installed and wired to comply with IMC2006 Chapter 5 section 507.2.1.1 and to include: Thermal sensor located in front of the exhaust collar in the hood and mounted in the capture plenum.



Date: November 03, 2016

Project: NTUA-HQ COMPLEX OFFICE BUILDING
Fort Defiance, Arizona

AEG Project #: 15037

From: Brian Arnold, P.E.

Re: ADDENDA #02
- Mechanical & Plumbing Revisions to ISSUE FOR CONSTRUCTION Documents

This Addendum revises the documents for the Issue For Construction (IFC) documentation, issued October 06, 2016. This Addendum modifies portions of the original IFC documents as noted below, and forms a part of the IFC documents. All other items included in the original IFC documents remain in effect for this Project.

DOCUMENT:	DESCRIPTION:
Drawing M003 MECHANICAL EQUIPMENT SCHEDULES	- ADDS: At Cooling Tower CT-01: STAINLESS STEEL PAN BASIN VFD ON ONE (1) DISCHARGE FAN MOTOR DISCHARGE AIR DAMPERS – BOTH DISCHARGE FANS
Drawings M201a M201c M202a M202b M202c MECHANICAL PIPING PLANS	- ADDS: DIFFERENTIAL PRESSURE SENSOR 3-WAY BYPASS VALVE
Drawing M401 MECHANICAL PIPING SCHEMATIC	- ADDS: DIFFERENTIAL PRESSURE SENSOR – TYP-5 PLACES 3-WAY BYPASS VALVE - TYP-5 PLACES
Drawings M501 M502 MECHANICAL BUILDING AUTOMATION SYSTEM	- ENTIRE SHEET IS ADDED TO CONTRACT DOCUMENTS

If there are any questions or comments related to this information, do not hesitate to contact our office.

END OF MECHANICAL ADDENDA #02 ITEMS

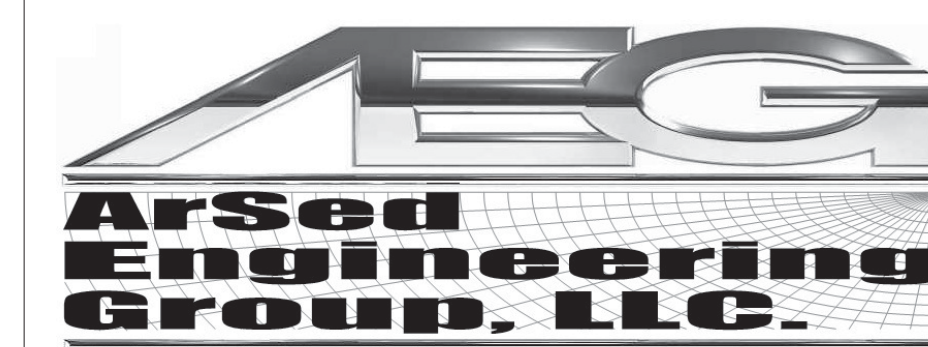
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OCTOBER 6, 2016

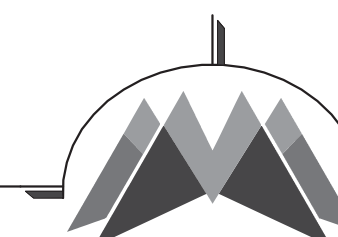
KEYED NOTES

1. LOCATION OF DIFFERENTIAL PRESSURE SENSOR AND 3-WAY BYPASS VALVE



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DYRON MURPHY ARCHITECTS, P.C.



4505 Montbel Place NE, Albuquerque, New Mexico 87107



ENGINEER

Revision Schedule		
Revision Number	Revision Date	Revision Description
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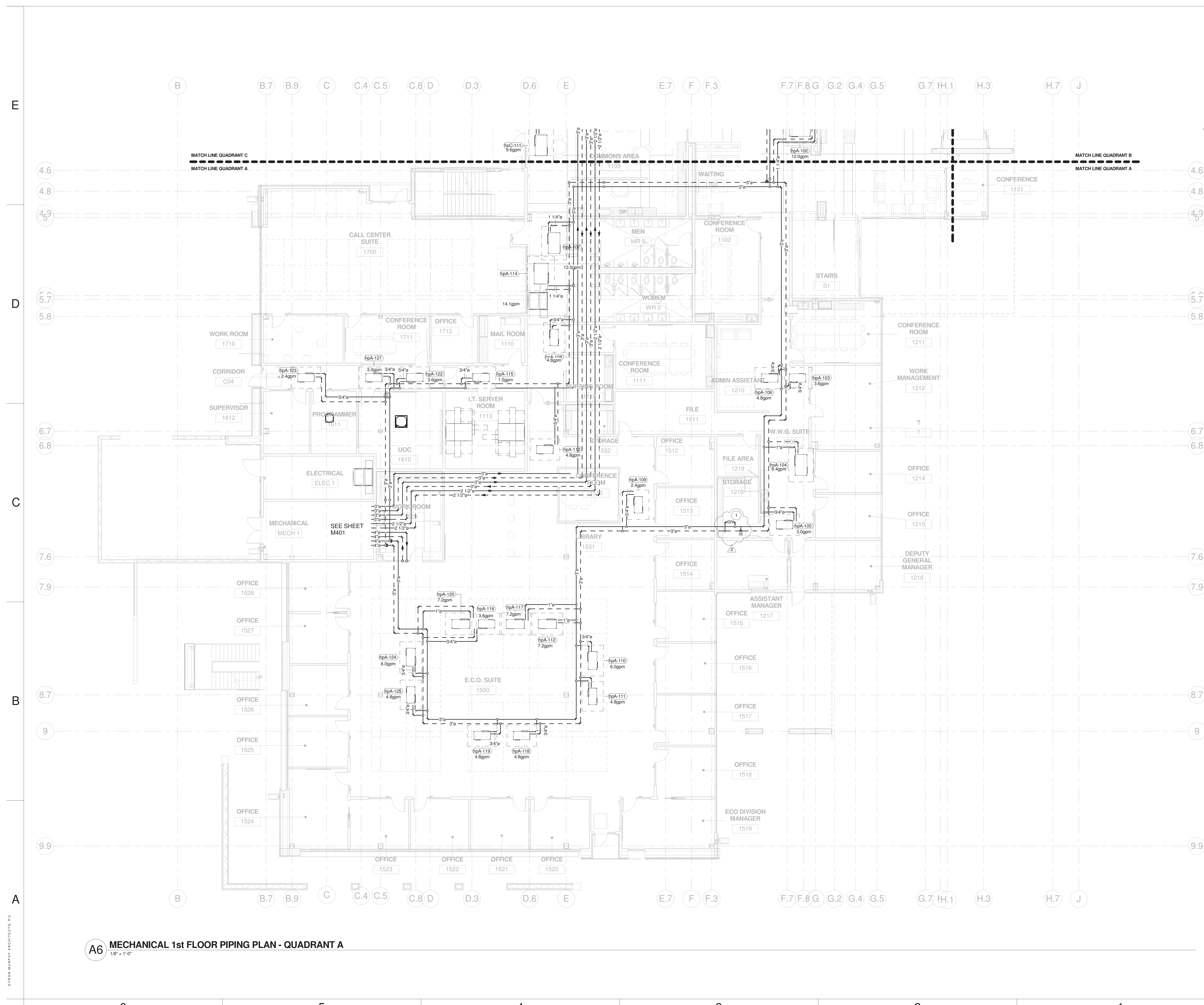
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DRAWN BY: DMT
PROJ MGR: BA
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Sheet Number

M201a

Sequence of

**MECHANICAL 1st FLOOR
PIPING PLAN - QUADRANT A**



A6 MECHANICAL 1st FLOOR PIPING PLAN - QUADRANT A
1/8" = 1'-0"

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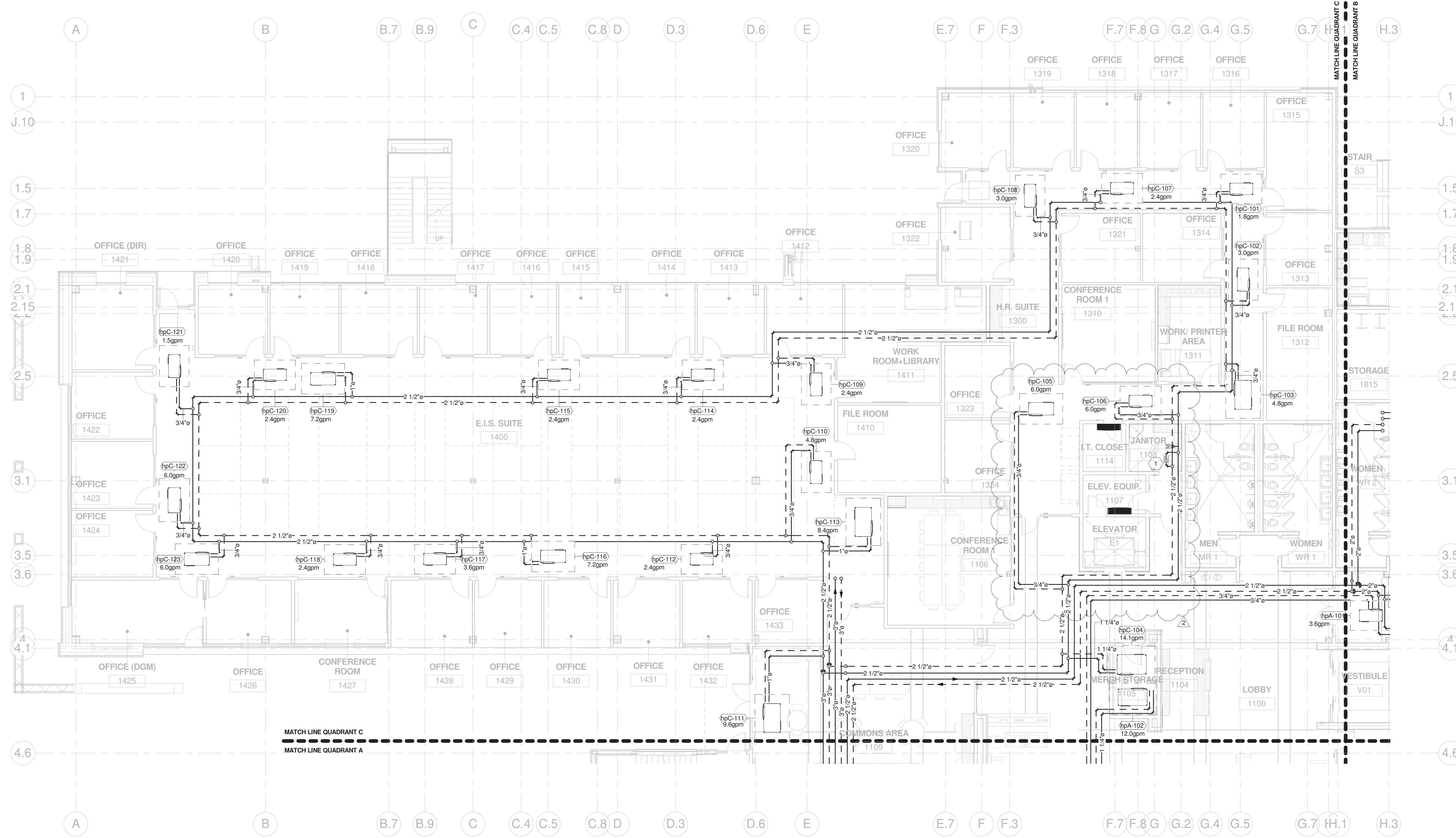
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OCTOBER 6, 2016

KEYED NOTES

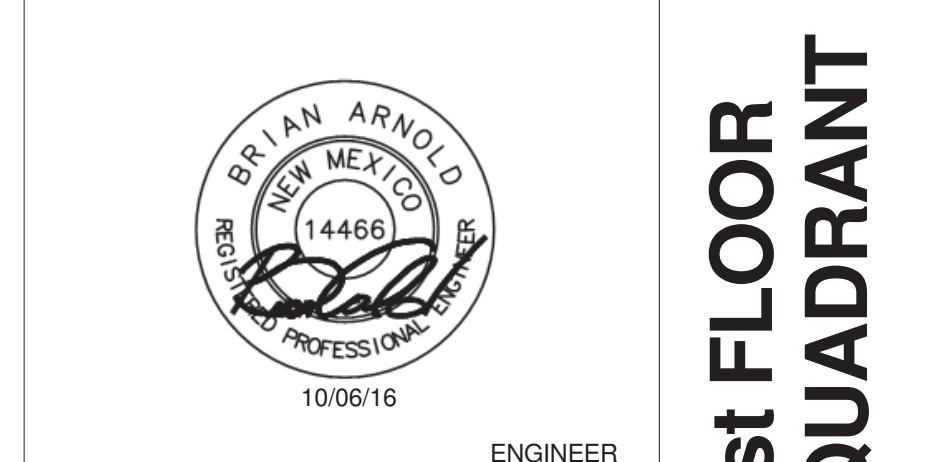
1. LOCATION OF DIFFERENTIAL PRESSURE SENSOR AND 3-WAY BYPASS VALVE



A6 MECHANICAL 1st FLOOR PIPING PLAN - QUADRANT C
1/8" = 1'-0"



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Revision Schedule		
Revision Number	Revision Date	Revision Description
2	11/3/16	ADD.02

PROJECT NUMBER: 2015.05
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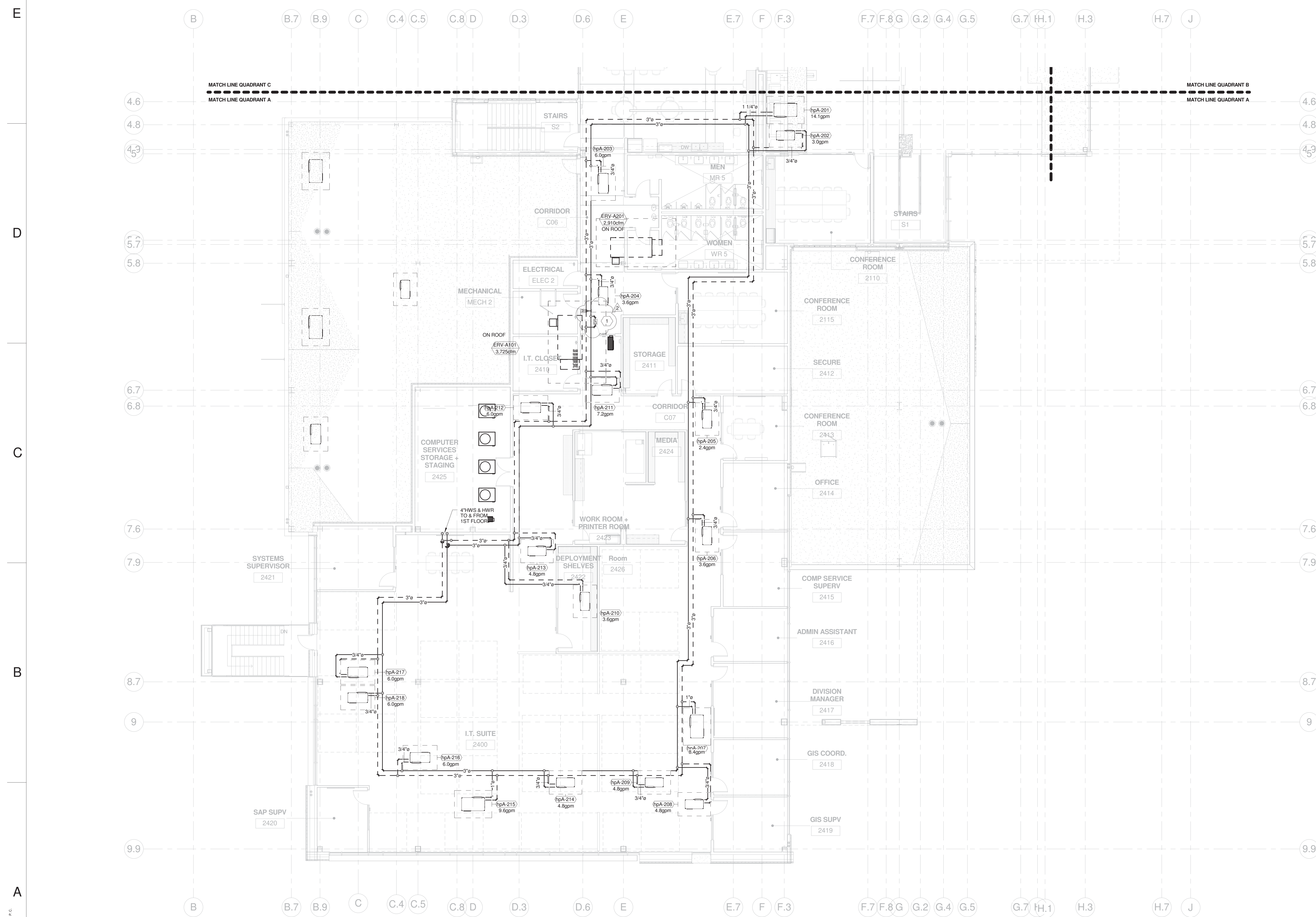
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OCTOBER 6, 2016

KEYED NOTES

1. LOCATION OF DIFFERENTIAL PRESSURE SENSOR AND 3-WAY BYPASS VALVE



A6 MECHANICAL 2nd FLOOR PIPING PLAN - QUADRANT A
1/8" = 1'-0"



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BRIAN ARNOLD
NEW MEXICO
14466
PROFESSIONAL ENGINEER
10/06/16

Revision Schedule		
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2	11/3/16	ADD.02

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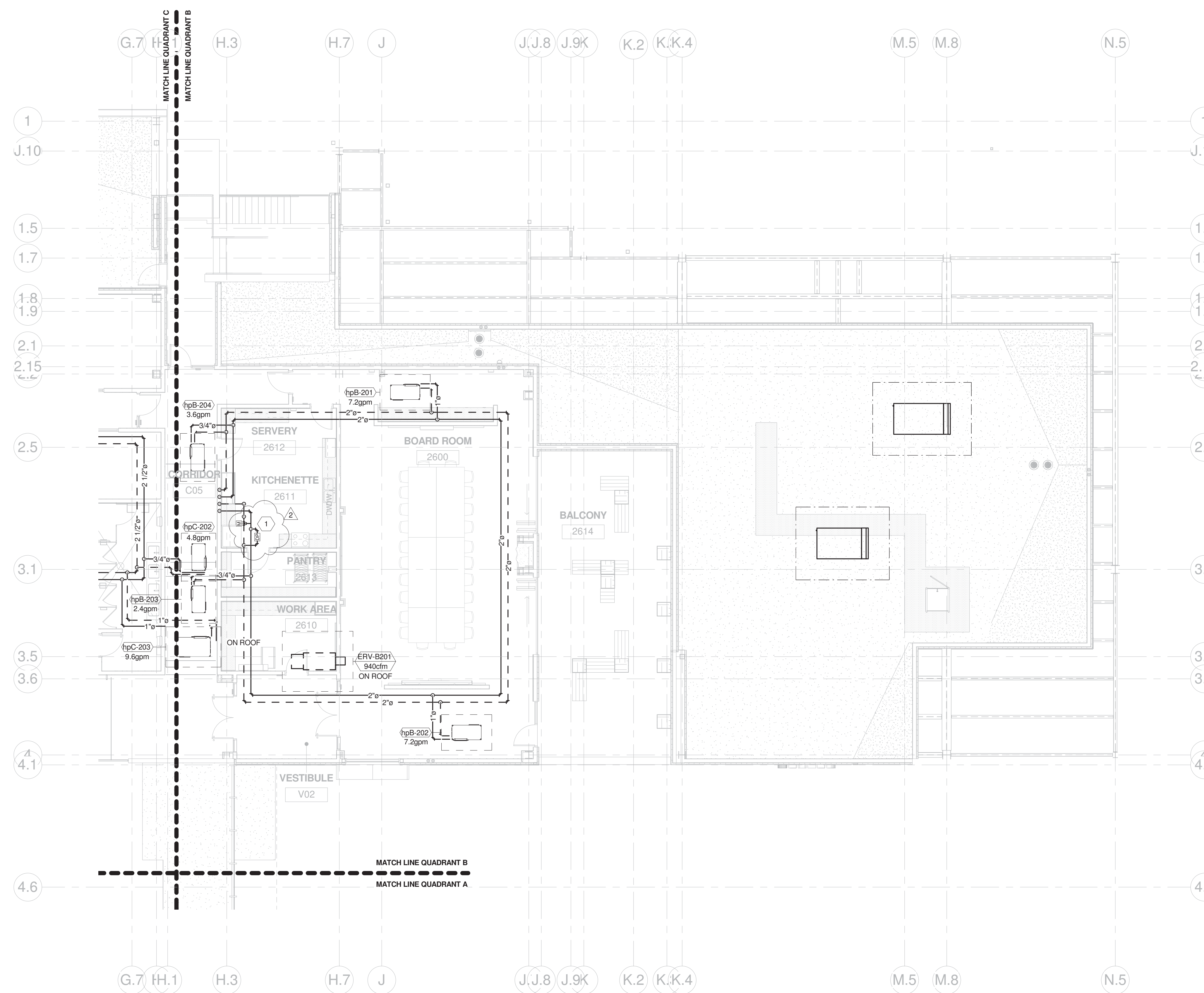
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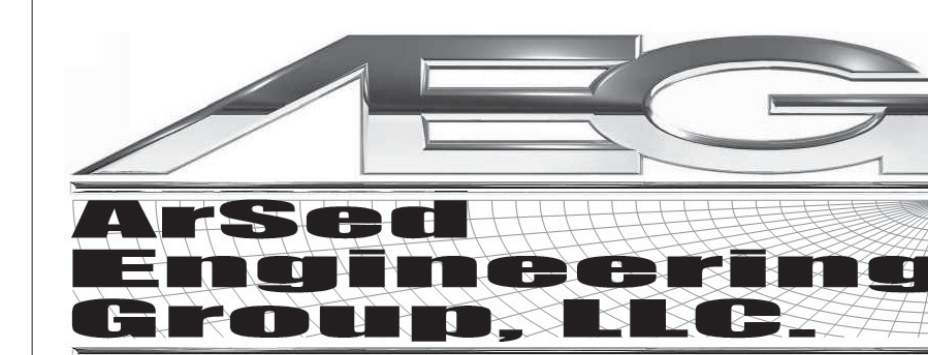
OCTOBER 6, 2016

KEYED NOTES

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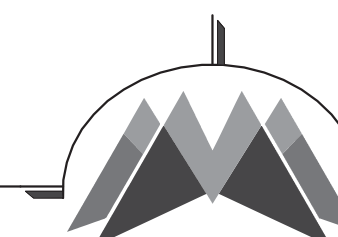


A5 MECHANICAL 2nd FLOOR PIPING PLAN - QUADRANT B
1/8" = 1'-0"



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Revision Schedule		
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2	11/3/16	ADD.02

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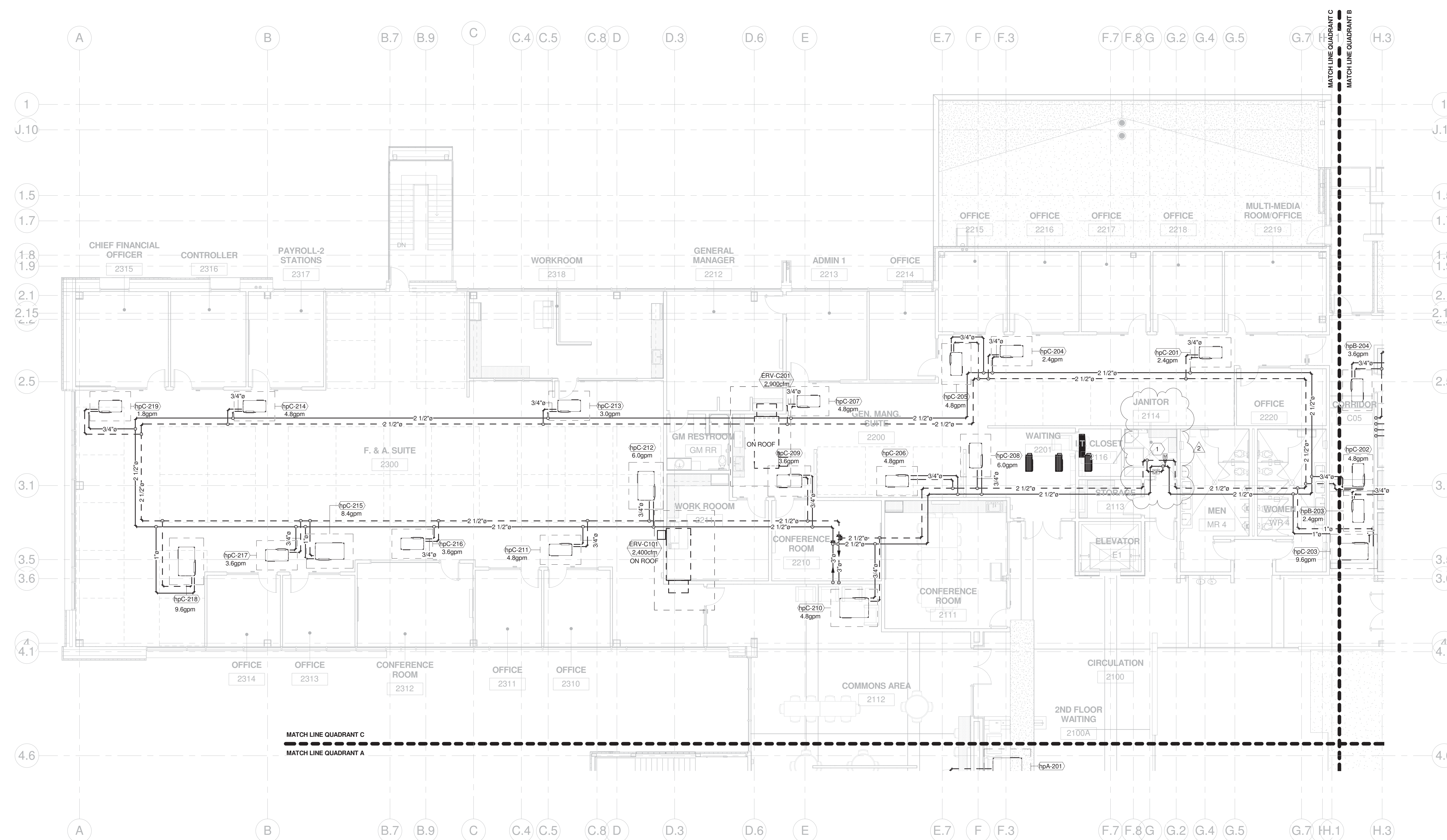
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KEYED NOTES

1. LOCATION OF DIFFERENTIAL PRESSURE SENSOR AND 3-WAY BYPASS VALVE

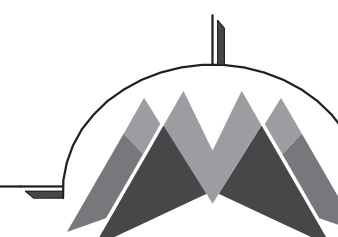


A6 MECHANICAL 2nd FLOOR PIPING PLAN - QUADRANT C
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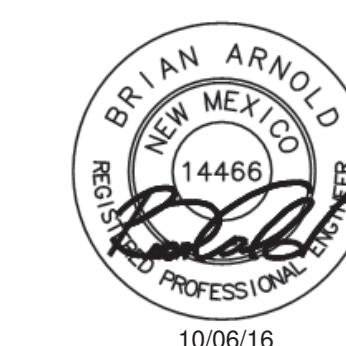


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2	11/3/16	ADD.02

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Sheet Number

M202c

Sequence of

MECHANICAL 2nd FLOOR
PIPING PLAN - QUADRANT C

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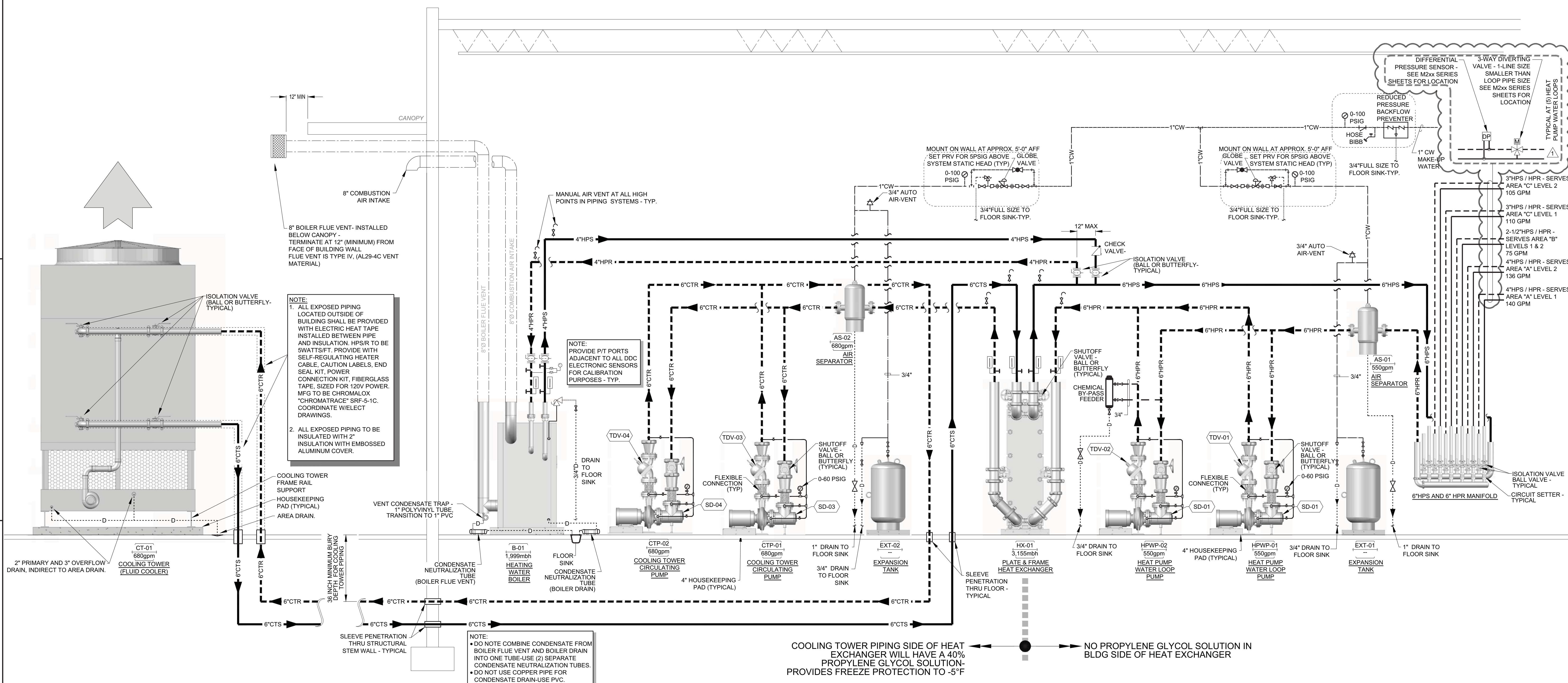
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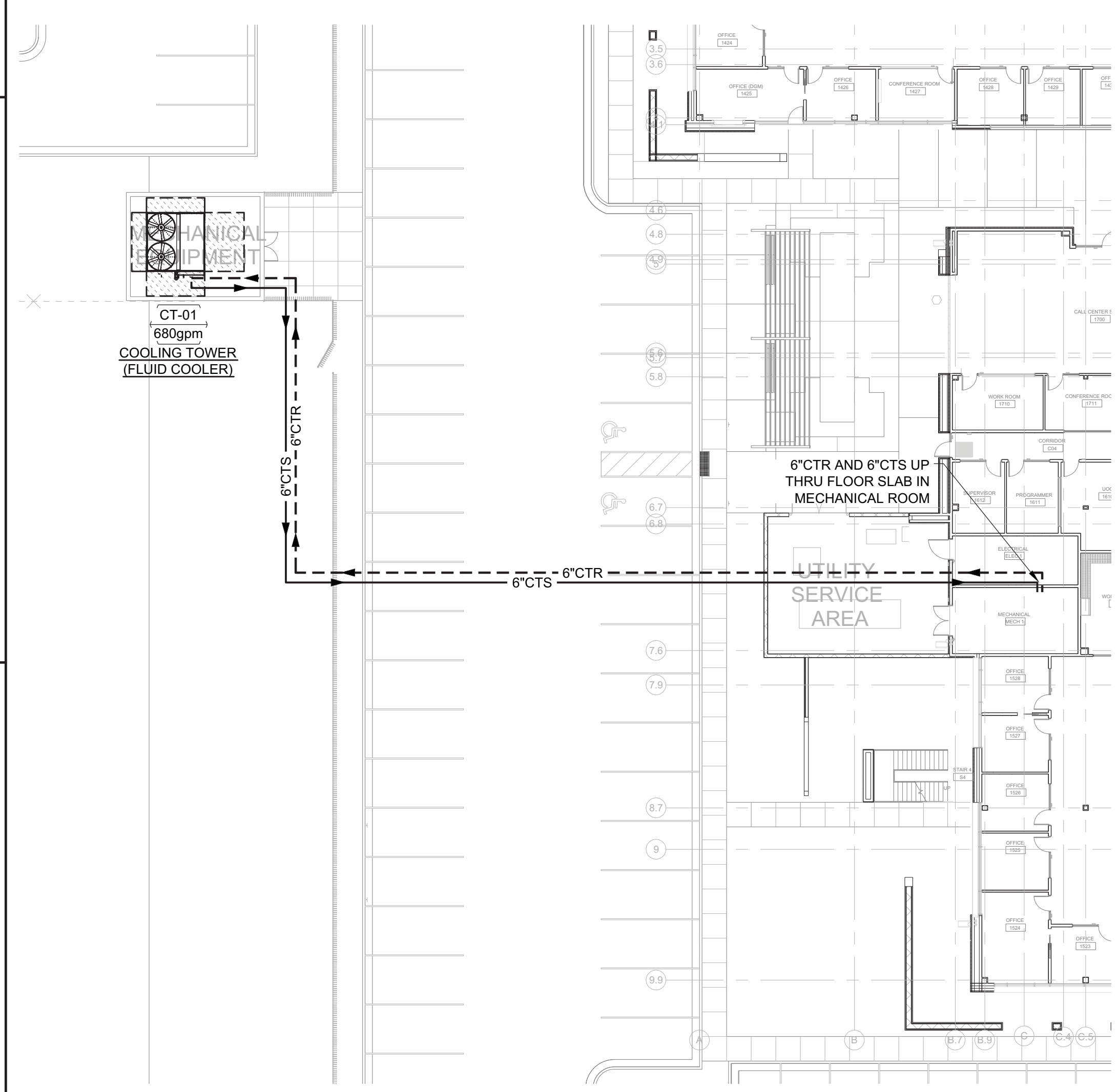
C4

B

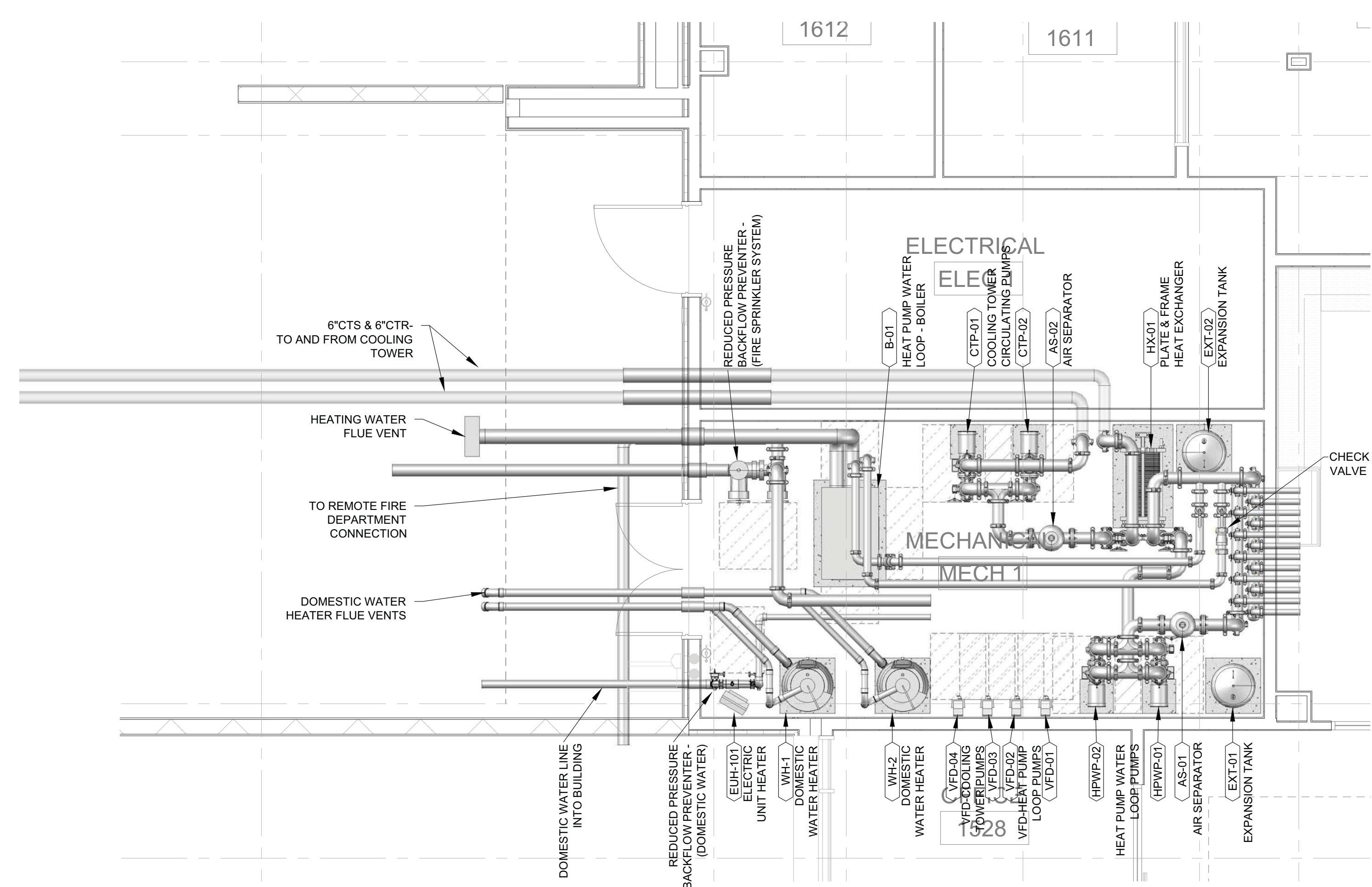
A



C4 MECHANICAL: HEAT PUMP WATER LOOP PIPING SCHEMATIC
SCALE: NONE



A6 MECHANICALSITe PLAN - PARTIAL
SCALE: 1" = 20'-0"



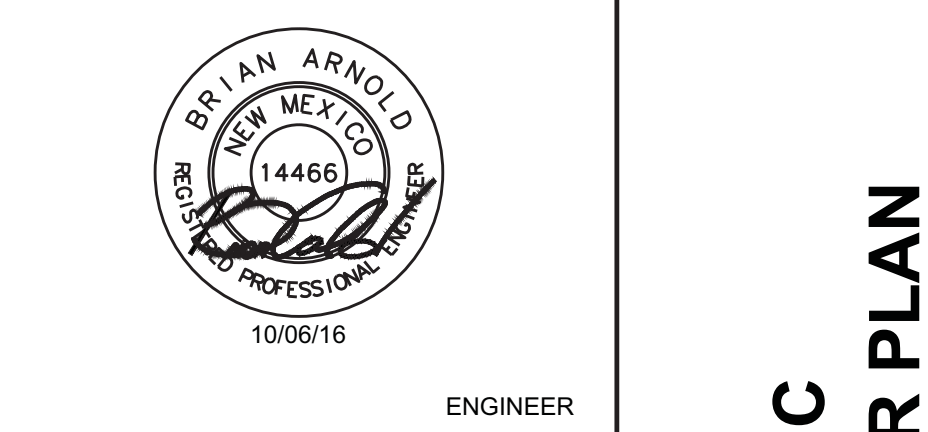
A3 MECHANICAL ROOM: ENLARGED FLOOR PLAN
SCALE: 1/4" = 1'-0"



DYRON MURPHY ARCHITECTS, P.C.



4505 Montbel Place NE, Albuquerque, New Mexico 87107



Revision Schedule		
Revision Number	Revision Date	Revision Description
1	11/3/16	ADD.02

PROJECT NUMBER	DRAWN BY	PROJ/MGR
2015.05	DMT	BA
RVTF FILE		

Sheet Title
MECHANICAL: PIPING SCHEMATIC ENLARGED FLOOR PLAN

Sheet Number
M401
Sequence of

DYRON MURPHY ARCHITECTS, P.C.

6 5 4 3 2 1

E

D

C

B

A

DYRON MURPHY ARCHITECTS, P.C.

SEQUENCE OF OPERATIONS

WATER SOURCE HEAT PUMP (TYPICAL OF 105 approx.)
 RUN CONDITIONS - SCHEDULED:
 THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

- OCCUPIED MODE: THE UNIT SHALL MAINTAIN
 - 74°F (ADJ.) COOLING SETPOINT
 - 70°F (ADJ.) HEATING SETPOINT
- UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN
 - 85°F (ADJ.) COOLING SETPOINT
 - 55°F (ADJ.) HEATING SETPOINT

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).
- LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

ZONE SETPOINT ADJUST:

- THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR.

ZONE UNOCCUPIED OVERRIDE:

- A TIMED LOCAL OVERRIDE CONTROL SHALL ALLOW AN OCCUPANT TO OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME. AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT SHALL AUTOMATICALLY RETURN TO THE SCHEDULE.

SMOKE DETECTION:

- THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SMOKE DETECTOR STATUS.

FAN:

- THE FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS SHUTDOWN ON SAFETIES.

HEATING AND COOLING - 1 COMPRESSOR STAGE:

- THE CONTROLLER SHALL RECEIVE A SIGNAL FROM THE LOOP WATER SOURCE MONITOR INDICATING THAT THERE IS WATER FLOW AND THAT THE WATER TEMPERATURE IS WITHIN ACCEPTABLE LIMITS.
- THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND CYCLE THE COMPRESSOR TO MAINTAIN ITS SETPOINT. TO PREVENT SHORT CYCLING, THE STAGE SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME. THE COMPRESSOR SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.
- THE HEATING SHALL BE ENABLED WHENEVER:
 - OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ.).
 - AND THE FAN IS ON.
 - AND THE REVERSING VALVE IS IN HEAT MODE.
- THE COOLING SHALL BE ENABLED WHENEVER:
 - OUTSIDE AIR TEMPERATURE IS GREATER THAN 60°F (ADJ.).
 - AND THE FAN IS ON.
 - AND THE REVERSING VALVE IS IN COOL MODE.
- ON MODE CHANGE, THE COMPRESSOR SHALL BE DISABLED AND REMAIN OFF UNTIL AFTER THE REVERSING VALVE HAS CHANGED POSITION.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- COMPRESSOR RUNTIME EXCEEDED: THE COMPRESSOR RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

DISCHARGE AIR TEMPERATURE:

THE CONTROLLER SHALL MONITOR THE DISCHARGE AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

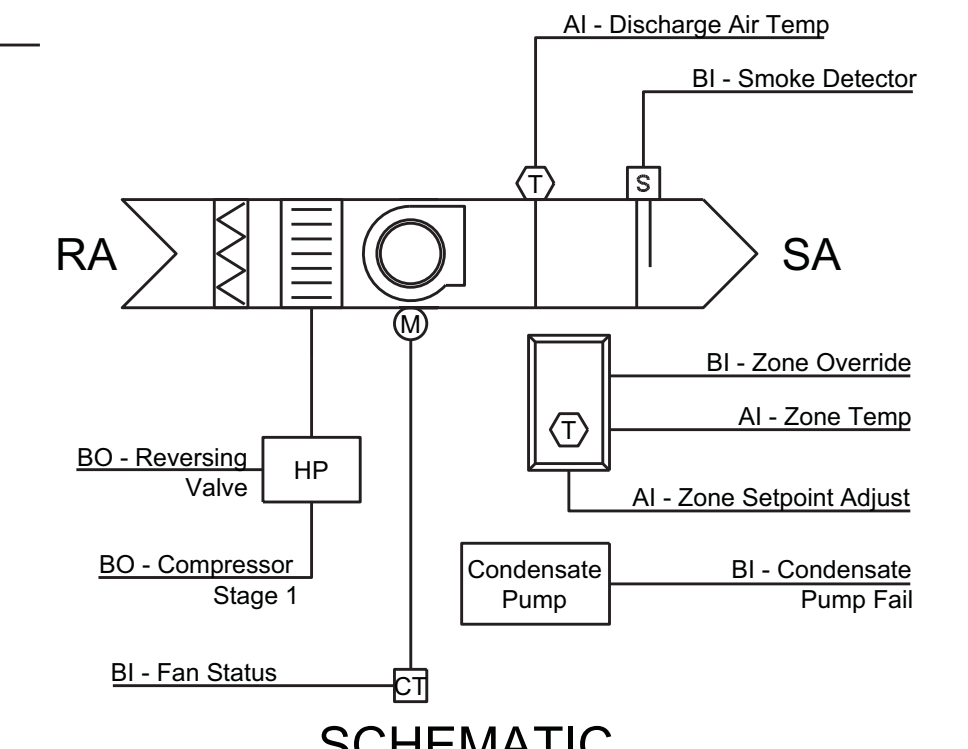
- HIGH DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS GREATER THAN 120°F (ADJ.).
- LOW DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS LESS THAN 40°F (ADJ.).

FAN STATUS:

- THE CONTROLLER SHALL MONITOR THE FAN STATUS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- FAN RUNTIME EXCEEDED: FAN STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).



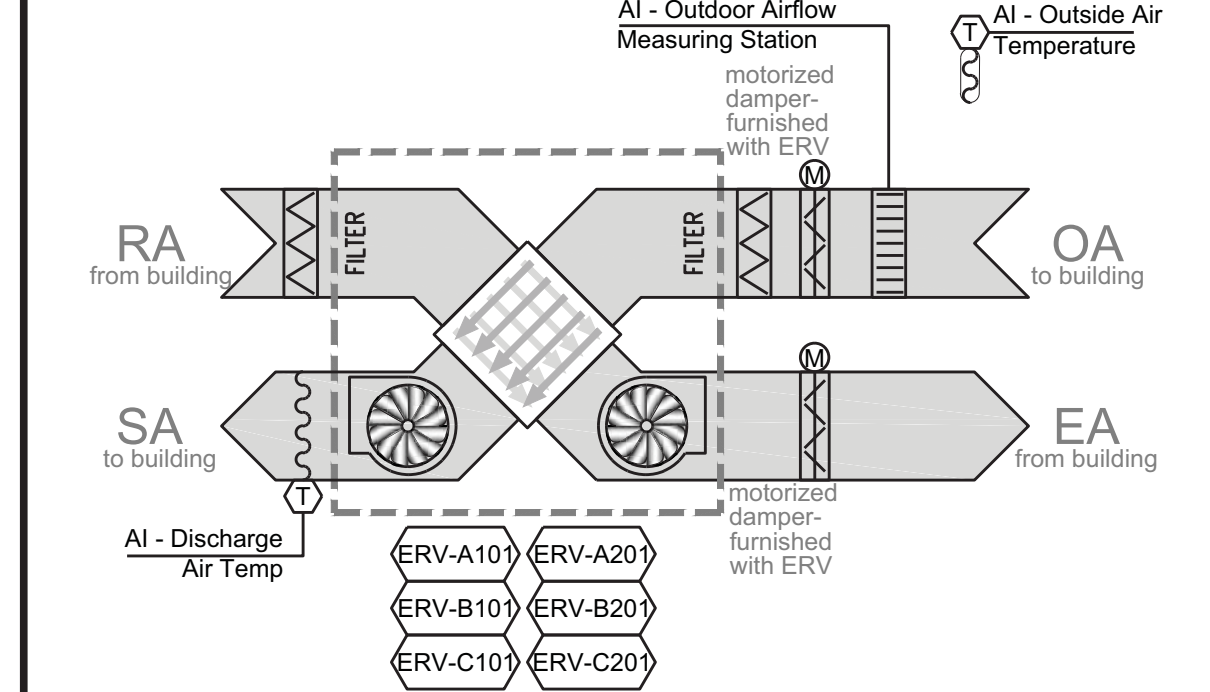
SCHEMATIC

EQUIPMENT CONTROL POINTS SCHEDULE

Point Name	Hardware Points						Software Points			Show On Graphic
	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	
Zone Temp	X								X	X
Zone Setpoint Adjust	X								X	X
Discharge Air Temp	X							X	X	X
Zone Override			X					X	X	X
Smoke Detector			X					X	X	X
Fan Status			X					X	X	X
Condensate Pump Fail			X					X	X	X
Fan Start/Stop				X				X	X	X
Compressor Start/Stop				X				X	X	X
Reversing Valve				X				X	X	X
Compressor Soft Shutdown						X			X	X
Schedule							X		X	X
Heating Setpoint								X	X	X
Cooling Setpoint								X	X	X
High Zone Temp									X	X
Low Zone Temp									X	X
Compressor Runtime Exceeded									X	X
High Discharge Air Temp									X	X
Low Discharge Air Temp									X	X
Fan Failure									X	X
Fan in Hand									X	X
Fan Runtime Exceeded									X	X

M1 WATER SOURCE HEAT PUMP (WSHP) SYSTEM CONTROL

SCALE: NONE



SEQUENCE OF OPERATION:

A. OUTSIDE AIR (ENERGY RECOVERY VENTILATING) UNIT SYSTEM:

- FACTORY ASSEMBLED UNIT - INCLUDES:
 - STATIC PLATE CORE HEAT EXCHANGER.
 - SINGLE-POINT POWER CONNECTION AND A SINGLE-POINT 24 VAC CONTACTOR CONTROL CONNECTION.
 - OA AND RA DAMPERS-MOTORIZED.
 - ELECTRIC DUCT HEATERS.

B. ERV-RUN CONDITIONS - SCHEDULED:
 THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

- OCCUPIED MODE:
 - OA AND RA DAMPERS WILL BE OPEN.
- UNOCCUPIED MODE (NIGHT SETBACK)
 - OA AND RA DAMPERS WILL BE CLOSED.

C. DISCHARGE AIR TEMPERATURE:

- THE CMXV CONTROLLER SHALL MONITOR:
 - THE OUTDOOR AMBIENT TEMPERATURE, AND,
 - THE SA DISCHARGE AIR TEMPERATURE.
- ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - HIGH DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS GREATER THAN 60°F (ADJ.).
 - LOW DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS LESS THAN 40°F (ADJ.).

D. OUTSIDE AIRFLOW MONITORING STATION:

- OUTSIDE AIR MONITORING STATION SHALL CONTINUOUSLY MONITOR THE AMOUNT OF OUTSIDE AIR INTRODUCED INTO EACH ERV WITH AN ACCURACY EQUAL TO OR GREATER 15%.
- IF OUTSIDE AIR QUANTITY DROPS BELOW SPECIFIED AIR FLOW, AN ALARM SHALL BE SENT TO THE BAS/IDC.

E. FILTER HOURS:

- THE CONTROLLER SHALL MONITOR THE FAN(S) RUNTIME.
- ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - FILTER CHANGE REQUIRED: FILTER HAS BEEN IN USE FOR MORE THAN 2200HR (ADJ.).

M2 OUTSIDE AIR (ENERGY RECOVERY VENTILATING) UNIT CONTROL

SCALE: NONE

EQUIPMENT CONTROL POINTS SCHEDULE

Point Name	Hardware Points						Software Points			Show On Graphic
	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	
Outside Air Temp	X							X	X	X
Exhaust Air Temp	X							X	X	X
Heat Wheel Discharge Air Temp	X							X	X	X
Return Air Temp	X							X	X	X
Differential Air Pressure Drop across Wheel	X							X	X	X
Outside Airflow Monitoring	X							X	X	X
High Static Shutdown			X					X	X	X
Supply Air Smoke Detector			X					X	X	X
Supply Fan Status			X					X	X	X
Exhaust Fan Status			X					X	X	X
Heat Wheel Status			X					X	X	X
Supply Fan Start/Stop				X				X	X	X
Exhaust Fan Start/Stop				X				X	X	X
Heat Wheel Start/Stop				X				X	X	X
Frost Protection					X			X	X	X
Economizer Air Temp					X			X	X	X
Supply Fan Failure									X	X
Supply Fan in Hand									X	X
Supply Fan Runtime Exceeded									X	X
Exhaust Fan Failure									X	X
Exhaust Fan in Hand									X	X
Exhaust Fan Runtime Exceeded									X	X
Heat Wheel Rotation Failure									X	X
Heat Wheel in Hand									X	X
Heat Wheel Runtime Exceeded									X	X
High Supply Air Temp									X	X
Low Supply Air Temp									X	X
High Return Air Temp									X	X
Low Return Air Temp									X	X
High Supply Air Temp									X	X
Low Supply Air Temp									X	X

NTUA HQ COMPLEX OFFICE BUILDING

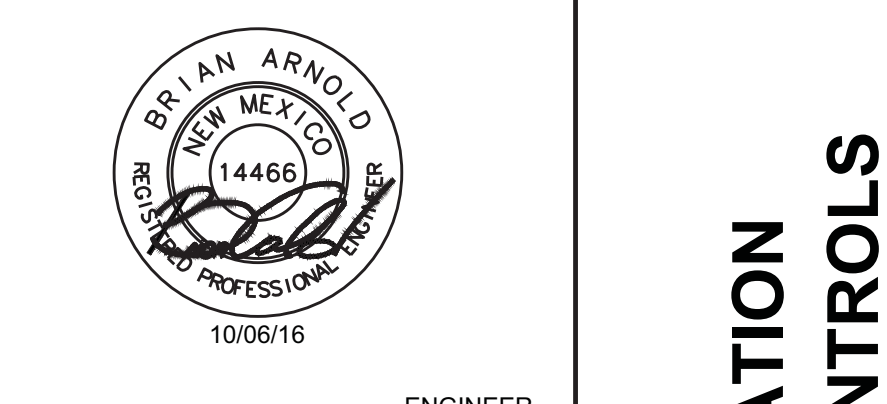
FT. DEFIANCE, ARIZONA
100% CONSTRUCTION DOCUMENTS
OCTOBER 6, 2016



DYRON MURPHY ARCHITECTS, P.C.



4505 Montbel Place NE, Albuquerque, New Mexico 87107



Revision Schedule		
Revision Number	Revision Date	Revision Description
1	11/3/16	ADD.02

PROJECT NUMBER: 2015.05
 DRAWN BY: WOOD
 PROJ/MGR: BA
 RVT FILE

Sheet Number
M502
 Sequence of

MECHANICAL: BUILDING AUTOMATION SYSTEM - DDC CONTROLS

ENTIRE SHEET IS ADDED

6

5

4

3

2

1



Allied Engineering
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(505)262-1766
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November 3, 2016

DYRON MURPHY ARCHITECTS, P.C.
4505 Montbel Place NE
Albuquerque, NM 87107

ATTN: OSCAR TOVAR,
ASSOC. AIA, SR. PROJECT MANAGER

RE: NTUA HQ COMPLEX OFFICE BUILDING
ADDENDUM #2
AEDI #50-15

Dear Mr. Tovar:

The following electrical items need to be included in an Addendum for the above referenced project:

1. On Sheet E401: Add General Note 9 to read: "Electrical Contractor to provide a combination fusible disconnect and NEMA size 0 starter in a NEMA 3R enclosure for Exhaust Fan KEF-D06 and KEF-B02. Provide contacts for interlocking with MAU's and ansul system."
2. Add Specification Section 26 4113 Lightning Protection for Structures.

This concludes the electrical items for this addendum. If you have any questions, please contact the undersigned.

Sincerely,

ALLIED ENGINEERING AND DESIGN INC.

A handwritten signature in blue ink, appearing to read 'Dennis M. Scarcell, Jr.', is written over a white background.

By:

Dennis M. Scarcell, Jr.
Vice President, Proj. Manager

SECTION 26 4113

LIGHTNING PROTECTION FOR STRUCTURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01, 03 Specification Sections, apply to this Section.
- B. Related sections include the following:
 - 1. Section 260526, "Grounding and Bonding for Electrical Systems".
 - 2. Section 265629, "Site Lighting".

1.02 SUMMARY

- A. This Section includes lightning protection for the buildings, water towers, building elements, and building site components.

1.03 SCOPE OF WORK

- A. Complete office building mounted lightning protection system conforming to NFPA 780 and the LPI-175 of the Lightning Protection Institute. Completed system shall bear the Master Label of Underwriter's Laboratories, Inc. The installation shall be complete with air terminals, terminal brackets, roof conductors, connections, fittings, down conductors and grounding.
- B. Complete Fire Protection Water Tank and Pump house Building mounted lightning protection system conforming to NFPA 780 and the LPI-175 of the Lightning Protection Institute. Completed system shall bear the Master Label of Underwriter's Laboratories, Inc. The installation shall be complete with air terminals, terminal brackets, roof conductors, connections, fittings, down conductors and grounding.

1.04 CODES, STANDARDS AND REFERENCES

- A. ANSI/NFPA 70: National Electrical Code.
- B. National Fire Protection Association - NFPA 780: Standard for the Installation of Lightning Protection Systems.
- C. Underwriters Laboratories - UL96: Lightning Protection Components.

1.05 DEFINITIONS

- A. LPI: Lightning Protection Institute.
- B. NRTL: National recognized testing laboratory.

1.06 SUBMITTALS

- A. Product Data: For air terminals and mounting accessories.
- B. Shop Drawings: Detail lightning protection system, including air-terminal locations, conductor routing and connections, and bonding and grounding provisions. Include indications for use of raceway, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding of grounded and isolated metal bodies.
- C. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include data on listing or certification by an NRTL or LPI.
- D. Certification signed by Contractor, that roof adhesive for air terminals is approved by manufacturers of both the terminal assembly and the single-ply membrane roofing material.
- E. Field inspection reports indicating compliance with specified requirements.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an NRTL or who is certified by LPI as a Master Installer/Designer.
- B. Listing and Labeling: As defined in NFPA 780, "Definitions" Article.

1.08 COORDINATION

- A. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.
- B. Coordinate installation of air terminals attached to roof systems with roofing manufacturer and Installer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Automatic Lightning Protection.
 - 2. ERICO International Corporation.
 - 3. Harger Lightning Protection, Inc.
 - 4. Heary Bros. Lightning Protection Co. Inc.
 - 5. Independent Protection Co.
 - 6. Robbins Lightning Inc.
 - 7. Thompson Lightning Protection, Inc.

2.02 LIGHTNING PROTECTION SYSTEM COMPONENTS

- A. Comply with UL 96.
- B. Roof-Mounting Air Terminals: NFPA Class II, copper, solid, unless otherwise indicated.
 - 1. Single-Membrane, Roof-Mounting Air Terminals: Designed for single-membrane roof materials.
- C. Stack-Mounting Air Terminals: Solid copper.
- D. Ground Rods, Ground Loop Conductors, and Concrete-Encased Electrodes: Comply with Section 260526, "Grounding and Bonding for Electrical Systems" and with standards referenced in this Section.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install lightning protection components and systems according to UL 96A, NFPA 70 and NFPA 780.
- B. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends and narrow loops.
- C. Conceal the following conductors:
 - 1. System conductors.
 - 2. Down Conductors.
 - 3. Interior Conductors.
 - 4. Conductors within normal view from exterior locations at grade within 200 feet of building.
 - 5. Notify Architect at least 48 hours in advance of inspection before concealing lightning protection components.
- D. Cable Connections: Use approved, exothermic-welded connections for all conductor splices and connections between conductors and other components, except those above single-ply membrane roofing.

- E. Air Terminals on Single-Ply Membrane Roofing: Comply with adhesive manufacturer's written instructions.
- F. Bond extremities of vertical metal bodies exceeding 60 feet in length to lightning protection components.
- G. A counterpoise installation based on requirements in Section 260526, "Grounding and Bonding for Electrical Systems", may be used as a ground loop required by NFPA 780, provided counterpoise conductor meets or exceeds minimum requirements in NFPA 780.
 - 1. Bond ground terminals to counterpoise conductor.
 - 2. Bond grounded metal bodies on building within 12 feet of ground to counterpoise conductor.
 - 3. Bond grounded metal bodies on building within 12 feet of roof to counterpoise conductor.
- H. Bond lightning protection components with intermediate-level interconnection loop conductors to grounded metal bodies of building at 60-foot intervals.

3.02 CORROSION PROTECTION

- A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.
- B. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

3.03 FIELD QUALITY CONTROL

- A. UL Inspection: Provide inspections as required to obtain a UL Master Label for system.

END OF SECTION