"RE-BUILDING THE CITY'S WATER SYSTEMS FOR THE 21ST CENTURY"

Sewerage & Water Board OF NEW ORLEANS

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NEW ORLEANS, LA 70165 • 504-529-2837 OR 52-WATER
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Addendum No. 2

Date: 7/6/2025

Your reference is directed to **Contract Number:** 2025-SWB-51 (Contract 30266) for New 16" Sewer Force Main on Lafitte St. (N. Dorgenois St.-N. Galvez St.) & New 48" Sewer Force Main on N. Galvez St. (Conti St.-Lafitte St.) which is scheduled to open at **11:30 a.m. CST** on **July 11, 2025** for SWBNO Networks Engineering Department.

This addendum provides for the following:

1) Questions and Answers
2) Revisions to Plans
3) Louisiana Uniform Public Work Bid Form Replacement
4) Section 012200 Unit Prices Replacement
5) Add Section 400557 Actuators
6) Add Section 400562 Plug Valves
7) Add Geotechnical Investigation Report dated August 8, 2019
8) Attachment 5, General Wage Rates Replacement

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1. Proposal Item CF-3 "Sawcut Concrete Curb, Pavement, Sidewalk, Driveway, ETC. According to Plans ("Depth)". Is this item priced per inch depth or should there be a numeral associated with the depth?

   We presently do not know the pavement depth. The depth will be set at 8". This should cover typical driveways, sidewalks, and pavements. See updated Uniform Public Bid Form (00 41 13)

2. Is there a standard drawing for the 36" and 16" Plug Valve Boxes? Can you provide more details about these structures? Could you provide slab thickness and reinforcement details, bedding, wall thickness and materials (brick or concrete), dimensions of structures and access castings?

   See updated Contract Drawings 21 and 22 for details.

3. Is there any reinforcement steel for the "Dog House Manhole" detail shown on plan sheet 20? How thick are the bottom and top slabs? Is there any bedding required? Is this a concrete structure or brick structure? Is there any wall reinforcement?

   See updated Contract Drawing 20 for updated detail.

4. Can you clarify if item C742(55)E "Install Sewer Valve Manhole" is only for the "16 Plug Valve" described in item C742(52)(F)?

   Correct. Valve box for 36" Plug valve is included in item C742(52)(H).

5. There are notes about the “Hatch Cover” and “Air Release Valve” on plan sheet 17 reading “See Plan Sheet 17”. Are the details for these items shown on plan sheet 20 and not 17?

   Yes, on “Sheet 17: Culvert Crossing Detail” any reference to sheet 17 should reference sheet 20 (“Sheet 20: SWB Details 2). An updated sheet 17 with corrected references.

6. Plan sheet 17 shows 20 LF of 48” Ductile iron pipe to be installed. Which proposal item will be used as payment for this work?

   The 20 LF of 48” Ductile Iron pipe (from approximately STA 101+45 to STA 101+65) will be paid for under pay item C742(51)(J)(D2): Install 48” DI Sewer Force Main. See updated bid form and unit price description included.

7. Can you provide a detail for pipe bedding and backfill for the open cut sewer force main pipe.

   For HDPE pipe, use S&WB detail No. 4697-E5-A on Sheet 19. For the DI pipe, see S&WB Detail No. D-3809 and D-3810 (added to Sheet 19). A note has been added on each utility plan sheet.

8. What spacing and gauge is the wire mesh for the 36” Force Main Crossing? 66 Lbs. is not shown on any charts.

   Use 4 X 4 – W4.0 X W4.0 wire mesh.

9. The “Demo X-Section” and “Proposed X-Section” on plan sheet 18 each show steel I-Beams. There is a note on the “Proposed X-Section” reading “REQ’D I-BEAMS (PENDING FIELD CONDITIONS)”. If field conditions dictate new I-Beams, what are the dimensions for the new beams required? This also applies to the “Steel Plates” beneath the beams.

   The size of the beams will be S20x66. The steel plate will be 2 inches thick and 1.5 feet wide.

10. Regarding the brick arches on plan sheet 18, are these existing at the location of the crossing? What are the brick arches? Will they need to be repaired if new I-Beams are required?

    The location where the pipe sits does not presently have bricks. If I-beams need to be replaced (determined by Engineer during construction), it is possible that the adjacent brick arches need to be replaced.

11. Are the concrete anchor blocks paid for under Item C601(C) “Concrete Pad For Fittings”?

    Yes.

12. Can you clarify the dimensions for the blocking shown on plan sheet 19? Should there be notes associated with “See Note 2” shown on the detail?

    See attached updated Contract Drawing Sheet 19 for updated detail.

13. I attended the pre-bid meeting this morning and I have a few questions about the material specifications. I can not find specification info on the plug valves in the bid packet or the addendum. Is there information regarding the approved manufacturers, actuation, and clear opening % for the plug valves?

    See attached added specifications.

14. Can you confirm the required pipe class is Pressure Class 150 for the 36” DI pipe?

    Both the 36” and 48” pipe are Pressure Class 150 pipe as stated in the Standard Specifications for S&WB.

15. And for the lining, will you consider T431 as an alternative to P401? I have attached a comparison of the two linings

    T431 is acceptable.

16. What is the correct unit of measure for the item no. “C502(52): Superpave Asphaltic Concrete Binder Course for Composite Roadways”? See the attached marked up excerpts from the specifications. The “**UNIT PRICE FORM”** states the “UNIT OF MEASURE” is “CY” and specifications state “Unit of Measurement: Square Yard”.

    See updated Uniform Public Bid Form (00 41 13)

17. Is the Contractor required to provide “Fields Offices” and/or Office Trailers as part of this contract? See attached marked up excerpt from the specifications. The following sentences in the specifications are contradictory : *A. Field Offices, General: Prefabricated or mobile units are not required. Units shall be provided by the Contractor, at no additional cost to the Owner, with written approval from the Engineer.*

    Field office not required.

18. Please provide plans for the above-referenced S&WB Contract. The “Download Official Copy” only contains one (1) pdf file with 817 pages of specifications.

    Contract Drawings were provided under Addendum No. 1. Please find revised Contract Drawings attached with changes bubbled.

19. What are the flow rates for the 2 sewer force mains? Daily Average and Peak Flow please.

    No bypass is require for 16” force main from SPS8. SPS8 flow will be redirected after construction is complete. No bypass pumping is expected for 48” forcemain. 48” force main shall be bypassed directly with line stops with temporary valves and a bypass line.

20. Where can we discharge to, if dewatering/unwatering is needed?

    Water can be discharged into a nearby sewer manhole.

21. Do the pumps providing bypass need sound guards?

    No bypass pump should be required. One the bypass line is in place, it should hold the pressure of the existing forcemain.

22. Does the soil contain any contaminates in it? This area has been known to have contaminated soil.

    There is no known contaminated soil at this site.

23. The line stop pay item is an each item with a quantity of 1. It appears that you will need either a second line stop at the existing 48" line stop saddle or a re-stop at the existing line stop saddle on Lafitte. Should this be included in the line stop item or should there be additional pay item for the re-stop? How will the contractor be compensated for the re-stop at the existing 48" line saddle? If it is determined that a second line stop on Lafitte is required then please up the quantity to 2.

    See updated Uniform Public Bid Form (00 41 13)

24. How old and when was the existing line stop saddle installed? Is there an identification tag on the existing line stop saddle to ensure accurate pricing? What material is the existing line stop saddle consist of?

    The line stop saddles were installed in Spring 2024.

25. Can you provide specifications for the new 48" line stop? Specifically, the line stop sleeve? Will Epoxy coated be accepted?

    Line stop shall be provided with temporary valve for bypass. Epoxy coated sleeve is acceptable.

26. Is Builders Risk & OPC Required?

    Please reference page 109, section 5.04.C.3.f.(1)

27. Page 18 of the plan set shows 48" Ductile Iron being installed. A. There isn't a pay item for the 48" Ductile Iron. Should it have it's own pay item? B. Please clarify how the contractor will get paid for this item.

    See updated Uniform Public Bid Form (00 41 13).

28. The attached DBE form states to turn in with the bid but the Attestations states it is a Post Bid doc for the 2 numerically low bidders. Which is correct?

    Please adhere to Section 16.2 on page 15 and 16 of the bid documents.

29. What material is the exiting 48" SFM Line made of?

    Cast iron and/or Steel Pipe. The recently installed pipe at the Galvez/Lafitte intersection back in June 2024 is HDPE.

30. Can you provide a detail for the 20" Temporary By Pass Line?

    No, the contractor is to provide bypass line plan and materials as submittal for approval.

31. How is removal of composite paid for?

    Removal of composite pavement will be paid under Bid items C202(52)C & Bid items C202(52)I. See updated Uniform Public Bid Form (00 41 13)

32. How are fittings paid for?

    Fittings are included in piping bid item.

33. How is removal of existing SFM paid for?

    Removal of existing SFM is included in installation of replacement pipe bid item.

34. How is removal of concrete box shown on sheet 18 paid for?

    See updated Uniform Public Bid Form (00 41 13)

35. It was mentioned at the pre bid meeting that the contractor will be responsible for obtaining the street cut permit for this project. Will the contractor be charged a fee to obtain this permit?

    SWNBO will obtain street cut permit.

36. The DBE goal was stated as 30% in the pre bid meeting, but it is listed as 36% on the EDBE summary sheet. Please clarify.

    The DBE Percentage needed for this project is 30%

37. Are soil borings available for review prior to bid?

    See attached available geotechnical report.

38. Section 012200 Subsection H: Unit Price No. C502(52): Superpave Asphaltic Concrete Binder Course for Composite Roadways. The unit of measurement for this item is square yard. However, the unit price bid form has a unit of measure of cubic yard. Please clarify how this item will be measured for payment.

    See updated Uniform Public Bid Form (00 41 13)

39. Section 012200 Subsection P: Unit Price No. C742(52)(H): New 36” Plug Valve with Valve Box and Access Door. Please provide the detail required for the valve box and access door required for the 36" plug valve

    See updated Contract Drawing 22 for detail.

40. Section 015526 Subsection 3.5: A. Traffic Maintenance: 1. The Contractor shall maintain 50% of roadway to traffic at all times. Major streets shall maintain 100% of traffic of roadway access between the hours of 7:00 - 9:00 A.M. and 4:00 - 6:00 P.M. Is N. Galvez St. or Lafitte St. considered a major street? Please clarify the allowable road closures for this project. Will the contractor be allowed to close the Lafitte Greenway pathway for the duration of work in that area?

    All road closures and closures of greenway shall be approved by Engineer and DPW. See Contract Drawing Sheet 5, Note 7.

41. Plan Sheet 6: What is the existing pipe material at the 48" tie-in (STA 105+25)? What coupling should be used for the 48" tie-in? What is the existing pipe material at the 16" tie-in? Can a 48" x 16" tapping sleeve and valve be used instead of a 48"x16" tee in this location?

    Existing pipe material at STA 105+25 is HDPE. This connection should be fused.

    Existing pipe material at the 16" tie-in is HDPE. Tie-in must be fused.

42. Plan Sheet 10: Please indicate which detail should be used for the 16" plug valve manhole. Note 7 mentions abandoned feeders but does not specify the location. Is the S&WB feeder adjacent to the planed 16" sewer force main live or abandoned? Do the existing plugs on the existing 48" (to be flow filled) have an outlet to pump in the flow fill, or will the contractor be required to replace these caps with new caps prior to flow filling?

    See updated Contract Drawing 21 for detail.

    Electrical Feeder along Lafitte is active.

    The contractor will need to replace the caps after filling the 48" with flowable fill.

43. Plan Sheet 17: There is 20' of 48" ductile iron pipe shown, but there is no bid item for 48" ductile iron pipe. Please clarify. Can the contractor use ductile iron pipe in lieu of HDPE pipe for the segments installed by excavation and replacement? There are two 48" joints shown immediately before both 48" x 36" reducers with no call out. Is there a sleeve or spool piece required for these locations? Are ductile iron joints to be flanged or mechanical joint? What is the existing pipe material at the 48" tie-in (STA 101+45)? What coupling should be used for the 48" tie-in?

    See updated Uniform Public Bid Form (00 41 13)

    No, ductile iron pipe is not acceptable.

    This is a transition coupling.

    Ductile iron joints shall be mechanical joint unless called out.

    The existing pipe material at the 48" tie-in is Cast iron and/or Steel Pipe

44. Plan Sheet 18: There is no bid item for replacement of the I-beams and steel plates at the canal crossing. Will the contractor be paid to replace the I-beams and steel plates if required? There is no bid item for removal and/or replacement of the 6" concrete shown on this sheet. Will this scope of work be at no direct pay?

    See updated Uniform Public Bid Form (00 41 13)

45. 20" Temporary Bypass Line Will the northbound lanes of N. Galvez be closed for the duration of the 20" bypass, or does the contractor need to bury the bypass line across N. Galvez? The restoration drawing (sheet 13) does not show replacement of paving leading to the bypass point across N. Galvez.

    All road closures and closures of greenway shall be approved by Engineer and DPW. See Contract Drawing Sheet 5, Note 7.

The above revisions shall be incorporated in and take precedence over any conflicting part of the original proposal documents. This addendum is hereby officially made a part of the referenced proposal.

Receipt of this addendum shall be acknowledged by inserting its number and date in the space provided on the Louisiana Uniform Public Works Bid Form.

This addendum consists of one hundred eleven (111) page.

*** END OF ADDENDUM ***

SEWERAGE AND WATER BOARD OF NEW ORLEANS

ENGINEERING DEPARTMENT

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST.- N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST.- LAFITTE ST.)

SITE OR LOCATION PLAN

SHEET No.	TITLE	SHEET No.	TITLE
1	TITLE SHEET		
2	GENERAL NOTES		
3	SUMMARY OF QUANTITIES		
4	3 POINT TIES AND STREET INDEX SHEET		
5–6	GALVEZ PLAN AND PROFILE SHEETS		
7–10	LAFITTE PLAN AND PROFILE SHEETS		
11–13	PAVEMENT SHEETS		
14–16	STRIPING SHEETS		
17	CULVERT CROSSING DETAIL		
18	CULVERT REMOVAL DETAIL		
19–32	DETAIL SHEETS		
1			

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

THIS ACKNOWLEDGES THAT THE ATTACHED DRAWINGS HAVE BEEN RECEIVED BY THE SEWERAGE & WATER BOARD OF NEW ORLEANS AND HEREBY FORWARDED FOR PROCUREMENT. THE SEWERAGE & WATER BOARD OF NEW ORLEANS DOES NOT RELEASE CONSULTANT/DESIGNER FROM ANY LEGAL LIABILITY THAT MAY ARISE FROM THE BOARD'S ACCEPTANCE OR USE OF THE ATTACHED DRAWINGS FOR THEIR INTENDED PURPOSE.

GENERAL SUPERINTENDENT

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266
NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST.- N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST.- LAFITTE ST.)

TITLE SHEET

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE: NA	
DATE: 3/20/2025	SET NO. SHEET NO. 1 OF 32

1.0 ENGINEERING LAYOUT

1.1 ALL ELEVATIONS SHOWN ON THE PLANS ARE NAVD 1988, UNLESS NOTED OTHERWISE.

1.2 THE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY THE PROJECT TEMPORARY BENCH MARKS SHOWN ON PLAN WITH THE PERMANENT BENCH MARK INDICATED ON THE INDEX SHEET.

1.3 THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYING OUT THE WORK AND VERIFYING ALL MEASUREMENTS, EXISTING ELEVATIONS, AND GRADES PRIOR TO BEGINNING OF CONSTRUCTION. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE PROJECT CENTERLINE AND ADDITIONAL TEMPORARY BENCH MARKS FOR CONSTRUCTION PURPOSES BEFORE DESTROYING EXISTING MONUMENTS/NAILS/CROSS CUTS, ETC..

1.4 THE LINES AND GRADES SHOWN ON THE PLANS MAY BE VARIED SLIGHTLY BY THE ENGINEER IN THE FIELD IF CONDITIONS JUSTIFY SUCH A VARIATION. THE CONTRACTOR SHALL NOT BE ENTITLED TO AN EXTRA PAYMENT OTHER THAN WHATEVER INCREASE IN CONTRACT QUANTITIES IS INVOLVED.

1.5 THE CONTRACTOR SHALL BE RESPONSIBLE TO ESTABLISH GRADES FOR ALL ROADS TO MAINTAIN POSITIVE DRAINAGE TO THE NEAREST CATCH BASINS OR DROP INLETS WITHOUT PONDING WATER IN ROADWAYS. IF DRAINAGE CONFLICT IS OBSERVED, CONTRACTOR SHALL INITIATE A REQUEST FOR INFORMATION TO ENGINEER FOR REVIEW. CONTRACTOR SHALL EVALUATE CATCH BASIN ADJUSTMENT IN LIEU OF ROADWAY ELEVATION ADJUSTMENT, WHEN FEASIBLE.

1.6 THE CONTRACTOR SHALL CONTACT DEPT OF PUBLIC WORKS (STREET LIGHTING) TO MARK STREETLIGHT AND TRAFFIC SIGNAL UTILITY LINES AT LEAST 48 HOURS PRIOR TO SAW-CUTTING OR EXCAVATION. CONTRACTOR IS RESPONSIBLE FOR ANY COSTS IN MARKING AT NO DIRECT COST, THE FEE IS BASED ON PROJECT LIMITS. THE CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR ANY DAMAGED LINES IN 5-DAYS FOR STREET LIGHTS, AND IMMEDIATELY FOR TRAFFIC SIGNALS. IF THE CONTRACT HAS THE AREA MARKED AND DAMAGE OCCURS BECAUSE THE LINES WERE IMPROPERLY MARKED, THE CONTRACTOR WILL NOT BE RESPONSIBLE FOR THE COST ASSOCIATED WITH THE REPAIR.

2.0 ROADWAYS

2.1 ALL ROADWAY CONSTRUCTION TO BE PERFORMED IN ACCORDANCE WITH THE CITY OF NEW ORLEANS GENERAL SPECIFICATIONS FOR STREET PAVING, CURRENT EDITION, AND THE CITY STANDARD DRAWINGS. PLEASE REFER TO https://www.nola.gov/dpw/construction-engineer-resources/

2.2 UNLESS SPECIFIED OTHERWISE, PROPERTY LINES INDICATED ON THE PLANS ARE APPARENT PROPERTY LINES.

2.3 ROADWAY RADII ARE MEASURED TO THE FACE OF CURB.

2.4 CONTRACTOR SHALL COMPACT AND SHAPE THE TOP 9 INCHES OF THE SUBGRADE PRIOR TO PLACING GEOTEXTILE FABRIC AND/OR GEOGRID. (NO DIRECT PAYMENT)

2.5 ASPHALT TRANSITIONS, RESHAPED DITCHES, AND CRUSHED STONE SHOULDERS FOR SIDE STREETS, IF REQUIRED, SHALL BE DONE PER DIRECTION OF THE FIELD ENGINEER AND PAID FOR AT THE CONTRACT UNIT PRICE.

2.6 WHENEVER NEW PAVING INTERSECTS OR MEETS EXISTING PAVING THAT IS TO REMAIN, THE GRADES OF THE NEW PAVING SURFACE SHALL MATCH THE GRADE OF THE EXISTING PAVING.

2.7 FOR CONCRETE BASE ROADWAY, THE CONTRACTOR SHALL NOT OVERLAY OVER EXPANSION JOINTS. AN APPROVED JOINT SEALER SHALL BE USED OVER EXPANSION JOINTS.

2.8 WHENEVER REMOVAL OF EXISTING PAVEMENT SURFACING IS REQUIRED IN CONJUNCTION WITH PROPOSED PROFILE GRADE LINE SHOWN ON THE DRAWINGS, THE EXISTING ASPHALT CONCRETE PAVEMENT IMMEDIATELY ADJACENT TO THE EDGE OF THE CONCRETE GUTTER SHALL BE MILLED TO A MINIMUM DEPTH OF ONE (1") TO OBTAIN A SMOOTH TIE-IN BETWEEN EXISTING AND PROPOSED CONSTRUCTION.

2.9 WHENEVER ADDITIONAL PAVEMENT SURFACING MATERIAL IS REQUIRED, THE ADJACENT CONCRETE GUTTER BOTTOM WILL NOT BE COVERED WITH ASPHALT SURFACING IF THE PROPOSED PROFILE GRADE LINE SHOWN ON THE DRAWINGS IS WITHIN ONE (1") INCH. IN AREAS WHERE THE PROPOSED PROFILE GRADE LINE IS HIGHER THAN THE EXISTING GUTTER BOTTOM BY MORE THAN ONE (1") INCH, THE SURFACE OF THE EXISTING GUTTER BOTTOM OR ROLLING STRIP SHALL BE OVERLAID WITH ASPHALT SURFACING TO THE FACE OF THE CURB.

2.10 THE CONTRACTOR SHALL REMOVE ALL CULVERT PIPES IN DITCHES, METAL GRATES, AND ANY OTHER OBSTRUCTIONS THAT ARE WITHIN THE LIMITS OF THE PROPOSED ROADWAY. (NO DIRECT PAYMENT)

2.11 ALL SALVAGEABLE ROADWAY MATERIALS, AS DETERMINED BY THE ENGINEER SHALL BE DELIVERED TO THE APPROPRIATE LOCATION AS SHOWN BELOW, AND DOCUMENTED IN ACCORDANCE TO CNO REQUIREMENTS. (NO DIRECT PAYMENT)

a) STONE CURB, COBBLESTONE, ETC. SHALL BE DELIVERED TO THE PUBLIC WORKS/MAINTENANCE YARD AT 838 SOUTH GENOIS STREET.

b) STREET SIGNS, TRAFFIC CONTROL DEVICES (SIGNS & SIGNALS) TO THE PUBLIC WORKS/SIGN SHOP AT 2832 LAFITTE STREET.

2.12 WHENEVER REMOVAL OF EXISTING PAVEMENT SURFACING, CURB OR SIDEWALK IS REQUIRED IN CONJUNCTION WITH WATER SERVICE REPLACEMENT SHOWN ON THE DRAWINGS THE CONTRACTOR SHALL VERIFY METER SERVICE LOCATION AND/OR FINAL WATER SERVICE ALIGNMENT PRIOR TO SAWCUTING. CURBS SHALL BE STAMPED WITH A " W," TO DESIGNATE WATER SERVICE LINES, AS DEPICTED IN DWG NO 7134A-W. CURBS SHALL BE STAMPED WITH A " S," TO DESIGNATE SEWER SERVICE CONNECTIONS, AS DEPICTED IN DWG NO 6312-E5-A.

2.13 CONTRACTOR SHALL COORDINATE WITH OWNER OF PRIVATE UTILITIES FOR ADJUSTMENT OF VALVES, BOXES, METERS, CLEANOUTS AND OTHER MISCELLANEOUS STRUCTURES LOCATED WITHIN OR CONFLICTING WITH AREAS TO BE RECONSTRUCTED AND ACCOMMODATING ADJUSTMENTS SHALL BE AT NO DIRECT PAYMENT. ADJUSTMENT OF PUBLIC UTILITIES VALVES, BOXES, METERS, CLEANOUTS, MANHOLES AND OTHER MISCELLANEOUS STRUCTURES SHALL BE MADE AT NO DIRECT PAYMENT UNLESS SPECIFIED FOR PAYMENT UNDER RESPECTIVE ITEMS ON THE UNIT PRICE FORM.

2.14 UPON REQUEST, DPW RESERVES THE RIGHT TO REQUEST FROM THE CONTRACTOR UP TO 50% OF THE RECYCLED ASPHALT PAVEMENT (RAP). CONTRACTOR SHALL DELIVER RAP TO A LOCATION SPECIFIED BY THE DIRECTOR WITHIN A 30 MILE RADIUS OF OF PROJECT SITE AT NO DIRECT PAY.

3.0 DRIVEWAYS, SIDEWALKS, & INCIDENTAL PAVEMENT

3.1 ALL LEGAL DRIVEWAYS REMOVED SHALL BE REPLACED IN KIND UNLESS OTHERWISE NOTED.

3.2 THE EXACT LIMITS OF REMOVAL AND REPLACEMENT OF DRIVEWAYS AND SIDEWALKS SHALL BE DETERMINED BY THE ENGINEER. THE CONTRACTOR SHALL NOT REMOVE ANY DRIVEWAY OR SIDEWALK WITHOUT PRIOR APPROVAL OF THE ENGINEER.

3.3 AT INTERSECTIONS WHERE THE SIDEWALK PAVEMENT IS TO REMAIN, HANDICAPPED RAMPS SHALL BE INSTALLED BY SAW CUTTING AND REMOVING ONLY THAT PORTION OF SIDEWALK REQUIRED TO ALLOW FOR CONSTRUCTION OF THE HANDICAPPED RAMPS.

3.4 THE CONTRACTOR IS REQUIRED TO SAW CUT (1" MINIMUM DEPTH) SIDEWALKS, DRIVEWAYS, CURBS, CONCRETE PAVEMENT, TO INSURE A STRAIGHT LINE BETWEEN OLD AND NEW WORK.

3.5 ALL SIDEWALKS AND DRIVEWAYS DAMAGED BY THE CONTRACTOR DURING CONSTRUCTION, WHICH IN THE OPINION OF THE ENGINEER ARE OUTSIDE THE LIMITS OF THE ROADWAY CONSTRUCTION, SHALL BE REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.

3.6 THE CONTRACTOR SHALL ADJUST THE ELEVATIONS OF THE NEW SIDEWALKS SO AS TO ALLOW DRAINAGE AWAY FROM THE PROPERTY AT ALL TIMES. SIDEWALK ELEVATIONS MAY BE ADJUSTED TO ALLOW DRAINAGE THROUGH DRIVEWAYS WITH DEPRESSED CURBS, UPON ENGINEER APPROVAL.

3.7 PAYMENT FOR EXCAVATION ASSOCIATED WITH CONSTRUCTION OF NEW SIDEWALKS, DRIVEWAYS, FOOTLAPS, AND HANDICAP RAMPS SHALL BE INCLUDED IN THE RESPECTIVE ITEM.

3.8 PAYMENT FOR GRADING OF FILL MATERIAL BETWEEN BACK OF CURB AND SIDEWALK SHALL BE INCLUDED IN THE RESPECTIVE ITEM.

3.9 CONTRACTOR SHALL OBSERVE ALLOWABLE TIME LIMITS OF OPEN ROADWAY PANELS AND SIDEWALKS, AND MAINTAIN PEDESTRIAN SAFETY, AS SPECIFIED IN GENERAL SPECIFICATIONS C724.04, C706.01, AND C706.02.

3.10 CRUSHED STONE OR CRUSHED CONCRETE USED FOR TEMPORARY SURFACING OF UTILITY TRENCHES, DRIVEWAYS, AND ROADWAYS BEFORE PAVING, INCLUDING THE COST OF MATERIALS, LABOR, AND EQUIPMENT SHALL BE PROVIDED AND PLACED AT NO DIRECT PAY.

4.0 UTILITIES

4.1 IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY LOCATION AND DEPTH OF ALL EXISTING UTILITIES BEFORE STARTING CONSTRUCTION. THE DEPARTMENT OF PUBLIC WORKS IS NOT RESPONSIBLE FOR ACCURACY OF THE LOCATION OF THESE UTILITIES SHOWN ON THE PLANS. THE CONTRACTOR IS CAUTIONED THAT MANY OF THE UNDERGROUND UTILITY PIPES, LINES, CONDUITS, CABLES, ETC., ARE LOCATED IMMEDIATELY BELOW THE EXISTING GRADE.

4.2 EXISTING POWER POLES SHALL BE RELOCATED BY OWNER AFTER THE CURB LINE HAS BEEN STAKED OUT IN THE FIELD FOR CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE RESPECTIVE UTILITY COMPANIES FOR THE REMOVAL OR RELOCATION OF THE EXISTING UTILITIES WHICH INTERFERE WITH THE WORK.

4.3 THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO EXISTING UTILITIES WHICH OCCURS DURING CONSTRUCTION AND SHALL IMMEDIATELY REPORT ANY DAMAGE TO THE UTILITY ENTITIES. ALL REPAIRS OF THE DAMAGED UTILITIES SHALL BE DONE BY THE RESPECTIVE UTILITY ENTITY, EXCEPT S&WB POWER FEEDER, WHICH SHALL BE REPAIRED BY THE CONTRACTOR. ALL REPAIR COSTS SHALL BE BORNE BY THE CONTRACTOR.

4.4 ALL PRIVATELY OWNED UTILITY MANHOLES AND OTHER STRUCTURES WILL BE ADJUSTED BY THE UTILITY COMPANIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT THE UTILITY COMPANIES AND REQUEST THE NECESSARY ADJUSTMENTS. THE ABOVE REQUEST SHALL BE MADE AT LEAST 2 WEEKS PRIOR TO CONSTRUCTION IN AREA OF CONFLICT TO ALLOW THE REQUIRED UTILITY COMPANY SUFFICIENT TIME FOR PERFORMING THE WORK.

5.0 SEWERAGE & WATER BOARD ITEMS

5.1 ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE CURRENT GENERAL SPECIFICATIONS; DRAWING NUMBERS 7260-S, 7260-W & 7260-D; AND THE STANDARD DRAWINGS OF THE S&WB OF NEW ORLEANS, LOUISIANA EXCEPT WHERE OTHERWISE NOTED IN THE CONSTRUCTION DOCUMENTS.

5.2 THE LOCATION OF EXISTING UTILITIES SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY THE SAME AND SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT THEM.

5.3 THE CONTRACTOR SHALL VERIFY ELEVATION OF EXISTING INVERTS THAT ARE A PART OF THIS JOB. PRIOR TO INSTALLING NEW UTILITY, CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE ENGINEER.

5.4 ALL CHANGES FROM THESE DRAWINGS MUST BE APPROVED BY THE S&WB PRIOR TO BEGINNING THE CONSTRUCTION WITH WHICH THEY ARE CONCERNED.

5.5 THE CONTRACTOR SHALL NOTIFY THE CHIEF OF ENGINEERING OF THE S&WB IN WRITING NOT LESS THAN THREE (3) OR MORE THAN TEN (10) WORKING DAYS IN ADVANCE OF STARTING THE CONSTRUCTION.

5.6 FINAL ACCEPTANCE OF THE SYSTEM WILL BE SUBJECT TO A ONE (1) YEAR MAINTENANCE PERIOD FOLLOWING ACCEPTANCE OF THE PROJECT BY THE S&WB. BEFORE FINAL INSPECTION OF THE WORK, THE CONTRACTOR SHALL SUBMIT AN "AS-BUILT" DRAWING TO THE S&WB SHOWING CHANGES IN LINE OR GRADE FROM THE ORIGINAL DRAWINGS, AND THE LOCATION AND DEPTH OF ALL HOUSE CONNECTIONS AS PER S&WB REQUIREMENTS.

5.7 IN CASE OF CONFLICT BETWEEN THE NEW DRAIN LINES AND THE SEWER HOUSE CONNECTIONS, THE CONTRACTOR SHALL ADJUST THE SEWER HOUSE CONNECTIONS TO AVOID THE CONFLICTS. ALL APPLICABLE S&WB SPECIFICATIONS AND GUIDELINES SHALL BE FOLLOWED BY THE CONTRACTOR DURING THESE ADJUSTMENTS.

5.8 ALL NEW MANHOLES, CATCH BASINS, AND DROP INLETS, SHALL BE PLACED ON A 6" LAYER OF CRUSHED STONE OR APPROVED EQUAL (NO DIRECT PAYMENT)

5.9 THE INSTALLATION OF THE WATER MAINS CLOSER TO A SEWER HAS BEEN DESIGNED TO BE LAID IN A SEPARATE TRENCH LOCATED ON ONE SIDE OF THE SEWER AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE GRAVITY SEWER.

5.10 THE CONTRACTOR IS HEREBY ADVISED THAT CONTINUOUS OPERATION OF THE DRAINAGE, SEWER AND WATER SYSTEMS ARE VITAL TO THE HEALTH, SAFETY AND WELFARE OF THE CITY OF NEW ORLEANS. THE CONTRACTOR SHALL PERFORM NO WORK OR CAUSE ANY SYSTEM OUTAGE WHICH MAY JEOPARDIZE THE OPERATION OF THE DRAINAGE, SEWER AND WATER SYSTEM. AS SUCH, THE SWBNO POWER DISPATCHER ON DUTY WILL HAVE FULL AUTHORITY TO DENY ANY NEW OUTAGE REQUESTS OR REQUIRE THE RETURN INTO SERVICE, ANY SWBNO POWER CABLES, WHICH MAY DELAY THE PROGRESS OF THE WORK.

5.11 FEEDER OUTAGES ARE REQUIRED FOR SAFETY OF THE PERSONNEL AND EQUIPMENT IN ANY AREAS WHERE THE NEW CONSTRUCTION COMES WITHIN 10 FEET OF SWBNO UNDERGROUND OR AERIAL MEDIUM VOLTAGE POWER CABLES. CONTRACTOR SHALL COORDINATE HIS WORK LEADING UP TO AND DURING SAID OUTAGE WITH THE BOARD ENGINEER, MR. CELSO ANTUNEZ, WHO SHALL BE GIVEN 48 HOURS MINIMUM ADVANCED NOTICE OF HIS DESIRE TO SCHEDULE AN OUTAGE AND SHALL ABIDE BY THE PARTICULAR CAUTIONS, REQUIREMENTS AND POSSIBLE RESTRICTIONS SET BY THE BOARD ENGINEER.

5.12 THE CONTRACTOR SHALL COORDINATE HIS WORK LEADING UP TO AND DURING SAID OUTAGES WITH THE SWBNO POWER DISPATCHER AT (504) 865-0575, ONLY AFTER CONTACTING MR. CELSO ANTUNEZ AT (504) 583-0263 OR (504) 865-0456, WHO SHALL BE GIVEN 48 HOURS MINIMUM ADVANCED NOTICE. SPECIAL PERMISSION MUST BE GRANTED FOR FEEDERS TO BE LEFT DE-ENERGIZED FOR MORE THAN AN EIGHT HOUR WORKDAY.

5.13 THE CONTRACTOR IS REQUIRED TO CONTACT IMMEDIATELY VIA PHONE CALL, THE BOARD ENGINEER, IF ANY EXISTING SWBNO CABLES ARE DAMAGED OR ASSUMED DAMAGED IN CONNECTION WITH THIS PROJECT. THE BOARD WILL HAVE TO INSPECT THE DAMAGES TO DETERMINE, SPECIFIC APPROVED REPAIR METHODS AND PARTS. THE CONTRACTOR IS REQUIRED TO PAY FOR ALL CABLE REPAIRS AS A DIRECT RESULT OF THE WORK PERFORM UNDER THIS PROJECT.

6.0 DRAIN LINES

6.1 THE COST FOR DRAINAGE EXCAVATION, BEDDING MATERIAL, SHEETING, BRACING, BACK FILLING, GRADING, AND HAULING AWAY SURPLUS MATERIALS SHALL BE INCLUDED IN THE UNIT PRICE FOR DRAINAGE PIPES BEING INSTALLED.

6.2A ALL EXISTING HOUSE CONNECTIONS ARE TO BE RECONNECTED TO NEW DRAIN LINES WITH 6" PVC DRAIN LINE. THE HOUSE CONNECTIONS WILL BE ATTACHED TO NEW RCP BY DRILLING THE RCP (NO 7.2A TAPPING WILL BE ALLOWED) AND USING A RUBBER BOOT OR SAND-IMPREGNATED PVC BELL TO CONNECT TO THE NEW PVC PIPE. AN ALTERNATE METHOD COULD UTILIZE AN RCP TEE IN THE MAIN LINE WITH A RUBBER BOOT (I.E. KOR-N-SEAL BOOT, OR APPROVED EQUAL) TO CONNECT THE 6" PVC TO THE LATERAL STUB OF THE TEE.

6.2B IN LIEU OF THE ABOVE, AN ALTERNATIVE METHOD MAY BE UTILIZED BY TYING THE 6" DRAIN HOSE CONNECTIONS INTO AN 8" COLLECTOR LINE LOCATED BEHIND THE CURB AND TIED INTO THE CATCH BASINS. TO BE INSTALLED AS DIRECTED BY THE D.P.W. REPRESENTATIVE. NO 90 DEGREE BENDS WILL BE ALLOWED IN DRAIN HOUSE CONNECTION PIPES.

6.3 ON DRAIN POINT REPAIRS, NO BRICK OR CONCRETE COLLARS WILL BE ALLOWED.

6.4 FOR ALL DRAIN REPAIRS, THE CONNECTION OF ANY TWO DISSIMILAR MATERIALS SHALL BE ACCOMPLISHED BY INSTALLATION OF A "NO-HUB" COUPLING CONSISTING OF A NEOPRENE SLEEVE AND BUSHING ADAPTER, TWO STAINLESS STEEL BANDS, AND STAINLESS STEEL SCREWS. THE COUPLING SHALL BE MANUFACTURED IN STRICT ACCORDANCE WITH THE CAST IRON SOIL PIPE INSTITUTE SPECIFICATIONS C301, LATEST REVISION, AS MANUFACTURED BY TYLER CLAY PRODUCTS CORP., FERNCO, OR APPROVED EQUAL. DRAIN LINES INDICATED FOR REMOVAL WILL BE REMOVED AND DISPOSED IN A PROPER MANNER. THE CONTRACTOR SHALL BACKFILL THE RESULTING VOID WITH APPROVED COMPACTED BACKFILL MATERIAL AT NO DIRECT PAY. MANHOLES AND CATCH BASINS INDICATED TO BE ABANDONED IN PLACE, SHALL BE REMOVED TO THREE (3) FEET BELOW GRADE AND THEN PLUGGED AND FILLED WITH SAND.

6.5 THERE WILL BE NO DIRECT PAYMENT FOR TIE-IN NEW OR EXISTING LINES TO ANY MANHOLES.

7.0 HORTICULTURE REQUIREMENTS

7.1 THE CONTRACTOR SHALL COMPLY WITH ALL "HORTICULTURE REQUIREMENTS" SPECIFIED BY THE DEPARTMENT OF PARKS & PARKWAYS. HORTICULTURE CONSTRUCTION CONFLICTS OBSERVED DURING CONSTRUCTION LAYOUT SHALL BE PROVIDED TO ENGINEER OF RECORD TO ASSESS PROJECT IMPACT. CONTRACTOR SHALL SUBMIT A REQUEST FOR INFORMATION, WITH JUSTIFICATION FOR PROPOSED CHANGE.

7.2 THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PARKWAYS & PARKS PRIOR TO REPLACING ANY UTILITY LINES LOCATED NEAR TREES. IF NECESSARY THE CONTRACTOR SHALL SHORE THE AREA NEAR TREES, USE ROOT GUARDS, AND OTHER PRECAUTIONS NECESSARY TO PROTECT THE TREES.

7.3 ALL TREE REMOVALS, BRANCH PRUNING, OR ROOT CUTTING, SHALL BE PERFORMED BY A LICENSED ARBORIST, APPROVED BY THE DEPARTMENT OF PARKWAYS & PARKS.

7.4 ALL TREE GRATES, ETC., SHALL BE DELIVERED TO THE DEPARTMENT OF PARKWAYS & PARKS NURSERY AT 2829 GENTILLY BLVD. (NO DIRECT PAYMENT)

7.5 ALL EXISTING TREES, SHRUBS, AND VEGETATION DISTURBED BY THE CONTRACTOR'S OPERATION, SHALL BE REPLACED IN-KIND OR REPAIRED AT NO DIRECT PAY.

7.6 THE CONTRACTOR SHALL NOTIFY PROPERTY OWNERS PRIOR TO TRIMMING ANY TREES LOCATED ON PRIVATE PROPERTY.

7.7 ALL HOUSE CONNECTIONS AND CURBS WHICH ARE LOCATED WITHIN THE TREE DRIP LINES SHALL BE AIR SPADED AT NO DIRECT PAY, NO MECHANICAL TRENCHING WILL BE ALLOWED. ARBORIST MUST BE PRESENT DURING EXCAVATION.

7.8 THE CONTRACTOR SHALL BE REQUIRED TO RESTORE ALL GREEN SPACES THAT ARE DISTURBED BY CONSTRUCTION TO ITS PRE-EXISTING CONDITIONS. (NO DIRECT PAYMENT) SEEDING AND SODDING SHALL COMPLY WITH THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS SECTION C717 AND SECTION C714 RESPECTIVELY.

8.0 TRAFFIC CONTROL

8.1 PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT TO THE CITY TRAFFIC ENGINEER FOR REVIEW AND APPROVAL A COMPLETE CONSTRUCTION SIGNAGE, TRAFFIC MAINTENANCE, AND PUBLIC SAFETY PLAN, PER SECTION C129 OF THE GENERAL SPECIFICATIONS, WHICH, AT A MINIMUM, INCLUDE THE FOLLOWING:

1. A SIGN INVENTORY – A LIST OF ALL EXISTING TRAFFIC CONTROL DEVICES (SIGNS, SIGNALS, RAISED MARKERS, PAVEMENT MARKINGS, ETC.) ACCURATELY LOCATED ON THE PLANS (NO DIRECT PAY).
2. A PLAN FOR THE PROPOSED ROUTE ON WHICH CONSTRUCTION MATERIALS AND EQUIPMENT ARE TO BE TRANSPORTED TO OR FROM THE CONSTRUCTION SITE.
3. A DETOUR PLAN SHOWING PROPOSED ROUTES FOR LOCAL AND TRANSIENT TRAFFIC ON WHICH LOCATIONS OF DETOUR TRAFFIC CONTROL DEVICES AND CONSTRUCTION ZONE OR WORK ZONE TRAFFIC CONTROL DEVICES ARE SHOWN. TRAFFIC CONTROL DEVICE APPLICATIONS AND METHODS SHALL BE IN COMPLIANCE WITH PART 6 OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
4. THE NAME AND TELEPHONE NUMBER OF THE RESPONSIBLE PERSON IN CHARGE OF THE PROJECT.
5. TRAFFIC CONTROL PLAN SHALL BE PROVIDED TO IDENTIFY ALL INTERSECTION AND ROADWAY DETOURS AND CLOSURES. ALL DETOURS AND CLOSURES MUST BE REVIEWED AND APPROVED BY THE DIRECTOR OR CHIEF TRAFFIC ENGINEER.
6. TRAFFIC CONTROL PLANS MUST BE PROVIDED TO DEPARTMENT OF PARKS AND PARKWAYS, WHEN TREE CANOPIES ARE TO BE DISTURBED. CONTRACTOR SHALL OBTAIN PERMIT FROM PARKS AND PARKWAYS AT LEAST 7 BUSINESS DAYS PRIOR TO TREE TRIMMING, TO BE PERFORMED BY A LOUISIANA LICENSED ARBORIST.

8.2 THE CONTRACTOR SHALL SEEK APPROVAL OF THE CITY TRAFFIC ENGINEER FOR ANY TRAFFIC RELATED PLAN CHANGE, INCLUDING REMOVAL, RELOCATION OR ADDITION OF TRAFFIC CONTROL DEVICES BEFORE OR DURING THE COURSE OF CONSTRUCTION.

8.3 ALL EXISTING TRAFFIC CONTROL DEVICES THAT ARE IN CONFLICT WITH THE CONSTRUCTION OR WORK ZONE TRAFFIC CONTROL PLAN SHALL BE COVERED OR REMOVED BY THE CONTRACTOR, AND THE REMOVED DEVICES RETURNED TO THE CITY SIGNAL SHOP OR SIGN SHOP AT 2832 LAFITTE STREET. ALL EXISTING DEVICES LEFT IN THE CONSTRUCTION OR WORK ZONE SHALL BE MAINTAINED IN GOOD CONDITION BY THE CONTRACTOR DURING THE COURSE OF CONSTRUCTION.

8.4 ALL REMOVED TRAFFIC CONTROL DEVICES SHALL BE RESTORED TO THEIR ORIGINAL POSITION AND ORIENTATION BY THE CONTRACTOR PRIOR TO THE TIME OF FINAL INSPECTION.

8.5 ALL TRAFFIC CONTROL DEVICES AND ASSOCIATED HARDWARE (SIGNS, SIGNALS, CONDUITS, CABLES, MARKINGS, ETC.) REMOVED OR DAMAGED DURING THE EXECUTION OF THIS CONTRACT, OTHER THAN AS PROVIDED FOR IN THIS CONTRACT SHALL BE REPLACED AT NO COST TO THE CITY.

8.6 ANY DAMAGE CAUSED BY THE CONTRACTOR'S WORK SHALL BE IMMEDIATELY REPORTED BY THE CONTRACTOR TO THE CITY TRAFFIC ENGINEER. REPAIRS SHALL BE PERFORMED BY THE CONTRACTOR OR BY CITY FORCES, AT THE DISCRETION OF THE CITY TRAFFIC ENGINEER, WITH ALL ASSOCIATED COSTS BEING PAID BY THE CONTRACTOR.

8.7 THE CONTRACTOR SHALL CONTACT THE CITY'S TRAFFIC SIGNAL SHOP THROUGH THE TRAFFIC ENGINEERING DIVISION (504-658-8040) PRIOR TO THE START OF THE JOB FOR TRAFFIC SIGNAL UTILITY MARKINGS AND COORDINATION.

9.0 GENERAL

9.1 CONTRACTOR IS TO NOTIFY RESIDENTS OF CONSTRUCTION A MINIMUM OF ONE WEEK PRIOR TO START OF CONSTRUCTION.

9.2 CONTRACTOR SHALL TAKE REASONABLE MEASURES TO AVOID UNNECESSARY NOISE APPROPRIATE FOR THE AMBIENT SOUND LEVELS IN THE AREA DURING WORKING HOURS. ALL CONSTRUCTION MACHINERY AND VEHICLES SHALL BE EQUIPPED WITH PRACTICAL SOUND MUFFLING DEVICES, AND OPERATED IN A MANNER TO CAUSE THE LEAST NOISE, CONSISTENT WITH EFFICIENT PERFORMANCE OF THE WORK.

9.3 CONTRACTOR SHALL TAKE REASONABLE MEASURES TO AVOID UNNECESSARY DUST. SURFACES SUBJECT TO CREATING DUST SHALL BE KEPT MOIST WITH WATER OR BY APPLICATION OF CHEMICAL DUST SUPPRESSANT. DUSTY MATERIAL IN PILES OR IN TRANSIT SHALL BE COVERED TO PREVENT BLOWING.

9.4 CONTRACTOR SHALL CONTACT THE FOLLOWING AT LEAST THREE (3) WORKING DAYS PRIOR TO BEGINNING OF CONSTRUCTION AROUND THEIR RESPECTIVE UTILITIES:

a)	S&WB:	INSPECTION:	MR. KYLE BREUX	(504) 865-0435
		ELECTRICAL ENGINEERS:	MR. CELSO ANTUNEZ	(504) 583-0263
b)	DEPARTMENT OF PUBLIC WORKS:	MAINTENANCE:	MR. ERIC KELLY	(504) 658-8062
		TRAFFIC:		(504) 658-8040
		ENGINEERING:	MR. NGUYEN PHAN	(504) 658-8030
		STREET LIGHTING:	MR. JOSEPH "ANDY" LOY	(504) 658-8049
c)	ENTERGY:	ELECTRICAL:	MR. WILLIAM ARMSTRONG	(504) 595-3855
		GAS:	MR. STEPHEN MIRAMBELL	(504) 593-3473
		AFTER HOURS		1-800-368-3749
d)	AT&T:		MR. KSHITIZ POKHREL	(504) 355-7461
e)	COX CABLE:		MR. DENNIS LACOMBE	(504) 358-6079
f)	DEPARTMENT OF PARKS & PARKWAYS:	CHIEF URBAN FORESTER:	MR. MICHAEL DENNIS	(504) 658-3224
g)	LOUISIANA ONE CALL:			1-800-272-3020
h)	HISTORIC PRESERVATION SPECIALIST		MR. PHILIP GILMORE	(504) 658-8698
j)	ARCHEOLOGIST		MR. MICHAEL GODZINSKI	(504) 658-8632

9.5 CONTRACTOR SHALL DEVELOP AND SUBMIT SITE-SPECIFIC SAFETY AND HEALTH PLAN, TO INCLUDE SAFE WORK PRACTICES FOR REVIEW.

LEGEND

- EXISTING (FINE LINE)
- NEW CONSTRUCTION (BROAD LINE)
- REQUIRED REMOVAL AND/OR PLACEMENT OF CONCRETE PAVEMENT, SIDEWALK, OR ADA RAMP CNO DPW (HEX)
- REQUIRED REMOVAL AND/OR PLACEMENT OF CONCRETE PAVEMENT, SIDEWALK, OR ADA RAMP SWBNO (TRIANG)
- REQUIRED REMOVAL AND/OR PLACEMENT OF ASPHALT ROADWAY CNO DPW (ANSI 131)
- REQUIRED REMOVAL AND/OR PLACEMENT OF ASPHALT ROADWAY SWBNO (ANSI 131)
- REQUIRED REMOVAL AND/OR PLACEMENT OF ASPHALT/CONCRETE COMPOSITE ROADWAY CNO DPW (ANSI 131/HEX)
- REQUIRED REMOVAL AND/OR PLACEMENT OF ASPHALT/CONCRETE COMPOSITE ROADWAY SWBNO (ANSI 131/TRIANG)
- REQUIRED COLD MILL/COLD PLANING AND PLACEMENT OF ASPHALT SURFACE COURSE CNO DPW (ANSI 133)
- REQUIRED COLD MILL/COLD PLANING AND PLACEMENT OF ASPHALT SURFACE COURSE SWBNO (ANSI 133)
- REQUIRED REMOVAL AND PLACEMENT OF ASPHALT OR CONCRETE ROADWAY FOR SWBNO ESSA
- REMOVE/CONSTRUCT BARRIER CURB
- REMOVE/CONSTRUCT MOUNTABLE CURB
- REMOVE/CONSTRUCT TIMBER CURB
- BRIDGE
- RAILROAD
- LEVEE
- FENCE LINE
- TREE
- HEDGE
- BUILDING
- CULVERT
- BASE LINE
- EXISTING RIGHT OF WAY
- CENTER LINE

SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER IN ENVIRONMENTAL ENGINEERING
STATE OF LOUISIANA
7/1/2025

LEGEND (CONT.)

UNDERGROUND PIPING MUST BE SHOWN AS A SINGLE LINE WHEN PIPE SIZES ARE LESS THAN 36" FOR DRAINS & 12" FOR SEWER, WATER & GAS. DOUBLE LINES WHEN SIZES ARE/ OR EXCEEDS 36" FOR DRAINS, 12" FOR SEWER, WATER & GAS

D12"	EXISTING DRAIN LINE	D36"	36"ø & UP
D12"	PROPOSED DRAINLINE	D36"	36"ø & UP
S8"	EXISTING SEWER	S12"	12"ø & UP
S8"	PROPOSED SEWER	S12"	12"ø & UP
W8"	EXISTING WATER	W12"	12"ø & UP
W8"	PROPOSED WATER	W12"	12"ø & UP
G2"	EXIST GAS	G12"	12"ø & UP
G8"	PROPOSED GAS	G12"	12"ø & UP

- UGT — UNDERGROUND TELEPHONE CABLE
- UGE — UNDERGROUND ELECTRIC LINE (SPECIFY S&WB OR OTHER)
- TV — UNDERGROUND TELEVISION CABLE
- PROPOSED VERTICAL CATCH BASIN (VCB)
- PROPOSED MOUNTABLE CATCH BASIN (MCB)
- PROPOSED MANHOLE (MH)
- EXISTING CATCH BASIN (EXISTCB)
- or / or DROP INLET EXISTING/PROPOSED (DI)
- WATER VALVE/MANHOLE (CIRCULAR)(WVMC)
- WATER VALVE/MANHOLE (RECTANGULAR)(WVMR)
- DRAIN MANHOLE (DRAINMH)
- SEWER MANHOLE (SEWERMH)
- WATER MANHOLE (WATERMH)
- GAS MANHOLE (GASMH)
- TRAFFIC MANHOLE (TRMH)
- TELEPHONE MANHOLE (TELMH)
- TELEGRAPH MANHOLE (TGMH)
- ELECTRIC MANHOLE (ELECMH)
- TRASH RECEPTACLE (SUB-SURFACE) (TRASH)
- UTILITY VALVE (UV)
- WATER METER (WM)
- RESIDENTIAL MAIL BOX (RMB)
- TELEPHONE INTERFACE BOX (TIB)
- CLEAN OUT FOR SEWER (COS)
- CLEANOUT FOR DRAIN (COD)
- CABLE TV BOX (TVB)
- TSB TRAFFIC SIGNAL BOX (TSB)
- TCB TRAFFIC CONTROL BOX (TCB)
- UTILITY POLE (UP)
- GUY POLE (GP)
- GUY WIRE & ANCHOR (GWA)
- POWER POLE (PP)
- EXISTING CURB (SPECIFY TYPE)
- LIGHT STANDARD (LS)
- TRAFFIC SIGNAL STANDARD (TSS)
- EXISTING FIRE HYDRANT (EFH)
- PROPOSED FIRE HYDRANT (PFH)
- TRAFFIC SIGN (TS)
- IRON PIPE OR IRON ROD (IP)
- CROSS CUT IN CONCRETE (CROSS)
- D24" REMOVE EXIST. DRAIN LINE
- REMOVE EXIST. MANHOLE (SEWER, DRAIN OR WATER)
- ADJ. ADJUSTMENT
- T.T. TREE TRIMMING
- R.P. ROOT PRUNING
- WATER METER/MANHOLE

REV.	DATE	DESCRIPTION	BY

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

GENERAL NOTES

DR. DK
TRC. DK
CK. RI
AP. XX
SCALE:
DATE: 3/20/2025
SET NO.
SHEET NO. 2 OF 32

Std. Spec.	DESCRIPTION OF ITEM	Unit	Total Qty.
C202(52)(C)	REMOVAL AND DISPOSAL OF EXISTING PORTLAND CEMENT CONCRETE PAVEMENT	SY	84
C202(52)D	REMOVAL AND DISPOSAL OF EXISTING SIDEWALK, DRIVEWAY, FOOT LAP (CONCRETE, BRICK, ASPHALT, ETC.)	SY	175
C202(52)(E)	REMOVAL AND DISPOSAL OF EXISTING CURB (CONCRETE, ASPHALT, BRICK, ETC.)	LF	364
C202(52)(I)	REMOVAL AND DISPOSAL OF EXISTING ASPHALTIC CONCRETE PAVEMENT	SY	903
C203(51)	ROADWAY EXCAVATION	CY	356
C203(59)	GEOTEXTILE FABRIC FOR STABILIZATION	SY	1986
C203(60)	GEOGRID	SY	903
C302(51)	BASE COURSE	CY	219
C502(52)	SUPERPAVE ASPHALTIC CONCRETE BINDER COURSE FOR COMPOSITE ROADWAYS	SY	84
C502(53)-1	SUPERPAVE ASPHALTIC CONCRETE WEARING COURSE (2" THICK)	SY	3087
C502(53)-2	SUPERPAVE ASPHALTIC CONCRETE BINDER COURSE (5" THICK)	SY	903
C509(51)A	COLD PLANING ASPHALTIC PAVEMENT (2" AVERAGE THICK)	SY	2151
C706(51)(A)	CONCRETE SIDEWALK (4" THICK)	SY	88
C707(56)	6" CONCRETE BARRIER CURB WITH DOWELS	LF	364
C714(51)	SODDING	SY	293
C742(52)(F)	NEW 16" PLUG VALVE	EA	1
C742(52)(H)	NEW 36" PLUG VALVE WITH VALVE BOX AND ACCESS DOOR	EA	1
C741(55)(A)	REPLACE 5/8" TO 1'' WATER HOUSE CONNECTION WITH 1'' WATER HOUSE CONNECTION (FROM MAIN TO METER)	EA	5
C741(55)(B)	REPLACE 1-1/2" WATER HOUSE CONNECTiON (FROM MAIN TO METER)	EA	5
C741(55)(C)	REPLACE EXISTING 2" WATER HOUSE CONNECTION (FROM MAIN TO METER)	EA	5
C741(78)	PLUG EXISTING 48" SEWER MAIN AND FILL WITH FLOWABLE MATERIAL (SAND/CEMENT MIXTURE)	LF	1750
C742(60)	REPLACE EXIST. SEWER H.C. FROM NEW MAIN TO BACK OF CURB	EA	3
C742(63)	REPLACE EXIST. SEWER H.C. BEYOND BACK OF CURB	LF	15
CSW-01	REPAIR WATER MAIN WITH FULL CIRCLE CLAMP (PIPE SIZE 4" - 8")	EA	5
CSW-02	REPAIR WATER MAIN WITH FULL CIRCLE CLAMP (PIPE SIZE 12" - 16")	EA	5
CSW-03	REPAIR WATER MAIN WITH BELL JOINT CLAMP (PIPE SIZE 4" - 12")	EA	5
CSW-04	REPAIR WATER MAIN WITH BELL JOINT CLAMP (PIPE SIZE 16" - 24")	EA	5
CF-3	SAW CUT CONCRETE CURB, PAVEMENT, SIDEWALK, DRIVEWAY, ETC. ACCORDING TO PLANS (8"DEPTH)	LF	1045
C706(54)R	REMOVAL OF HANDICAP RAMPS, CURB AND GUTTER, AND CONCRETE SIDEWALKS AT INTERSECTIONS INCLUDING SAW CUTTING	SY	102
C706(54)	HANDICAP RAMPS, CURB AND GUTTER, AND CONCRETE SIDEWALKS AT INTERSECTIONS	SY	102
C706(54)SW	SIDEWALK TRANSITION ADJACENT TO HANDICAPPED RAMPS	SY	48
C742(57)C	SEWER POINT REPAIR UP TO 12 FEET (8" AT 6.1' - 8.0')	EA	1
C742(58)C	SEWER POINT REPAIR BEYOND 12 FEET (8" AT 6.1' - 8.0')	LF	10
C742(51)(16)(D)	INSTALL 16" HDPE SEWER FORCE MAIN	LF	89
C742(51)(16)(D)HDD	INSTALL 16" HDPE SEWER FORCE MAIN VIA HDD	LF	1477
C742(51)(I)(D)	INSTALL 36" DI SEWER FORCE MAIN	LF	109
C742(51)(J)(D)	INSTALL 48" HDPE SEWER FORCE MAIN	LF	309
C742(51)(J)(D2)	INSTALL 48" DI SEWER FORCE MAIN	LS	20
DCR-1	DRAINAGE CANAL REHABILITATION	LS	1
SP-1	DEMO EXISTING AIR RELEASE CONCRETE BOX	EA	1
C742(55)(E)	INSTALL SEWER VALVE MANHOLE	VF	14
C706(51)(C)	MEDIAN MAINTENANCE DRIVE	EA	2
ARV-1	AIR RELEASE VALVE	EA	1
C732(52)(A)W	PLASTIC PAVEMENT STRIPING (4" SOLID WHITE)	LF	319
C732(52)(A)Y	PLASTIC PAVEMENT STRIPING (4" SOLID YELLOW)	LF	280
C732(53)(A)W	PLASTIC PAVEMENT STRIPING (4" DASHED WHITE)	LF	151
C732(53)(A)Y	PLASTIC PAVEMENT STRIPING (4" DASHED YELLOW)	LF	139
C732(52)(D)W	PLASTIC PAVEMENT STRIPING (12" WHITE STOP BAR)	LF	122
C732(52)(E)W	PLASTIC PAVEMENT STRIPING (24" SOLID WHITE PEDESTRIAN CROSSWALK)	LF	852
C742(55)D	DOGHOUSE MANHOLE WITH HATCH LID	EA	1
C601(C)	CONCRETE PADS FOR FITTINGS (6" THICK)	CY	5
C742(51)H	20" TEMPORARY BYPASS LINE	LF	470
CSS-01	NEW 48" LINESTOP	EA	2

1

STATE OF LOUISIANA
SPARKLE D.W. NOBILE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

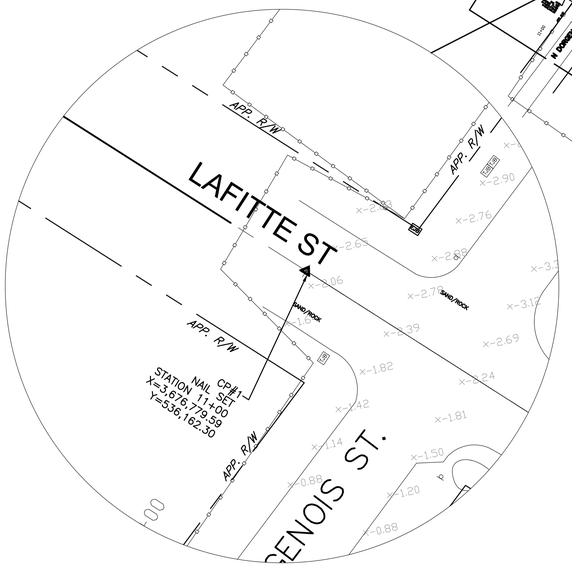
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

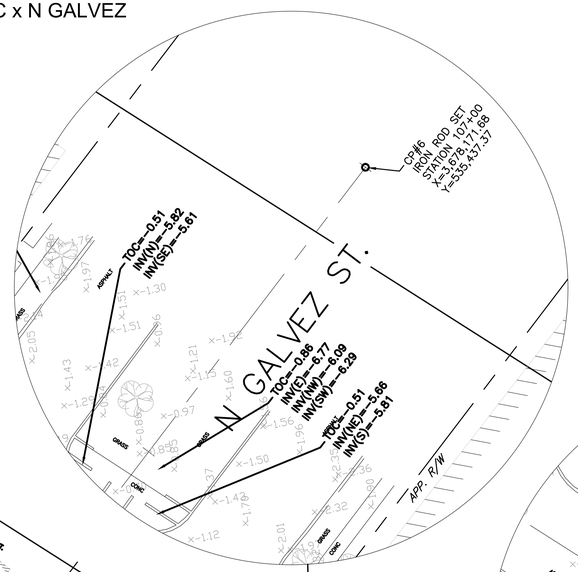
SUMMARY OF QUANTITIES

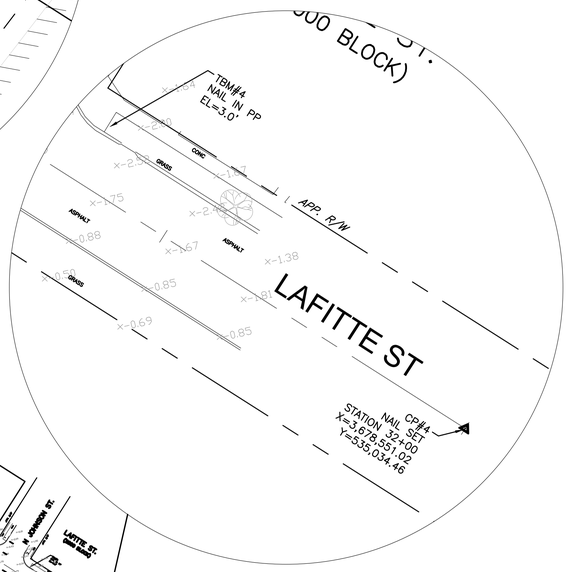
DR. DK
TRC. DK
CK. RI
AP. XX
SCALE:
DATE: 3/20/2025
SET NO.
SHEET NO. 3 OF 32

THREE POINT TIES
LAFITTE x N DORGENOIS



THREE POINT TIES
MAGIC x N GALVEZ





THREE POINT TIES
LAFITTE x N GALVEZ

THREE POINT TIES
CONTI x N GALVEZ

TEMPORARY BENCHMARK (TBM)

TBM "1" IS ±18.0 FEET NORTH OF THE CENTERLINE OF LAFITTE STREET AND ±246.0 FEET EAST OF THE CENTERLINE OF N. DORGENOIS ST.
ELEVATION: 3.00' N.A.V.D. 88 GEOID 12B

TBM "3" IS ±53.0 FEET NORTHWEST OF THE CENTERLINE OF GALVEZ STREET AND ±21.0 FEET NORTHEAST OF THE CENTERLINE OF LAFITTE ST.
ELEVATION: 3.00' N.A.V.D. 88 GEOID 12B

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

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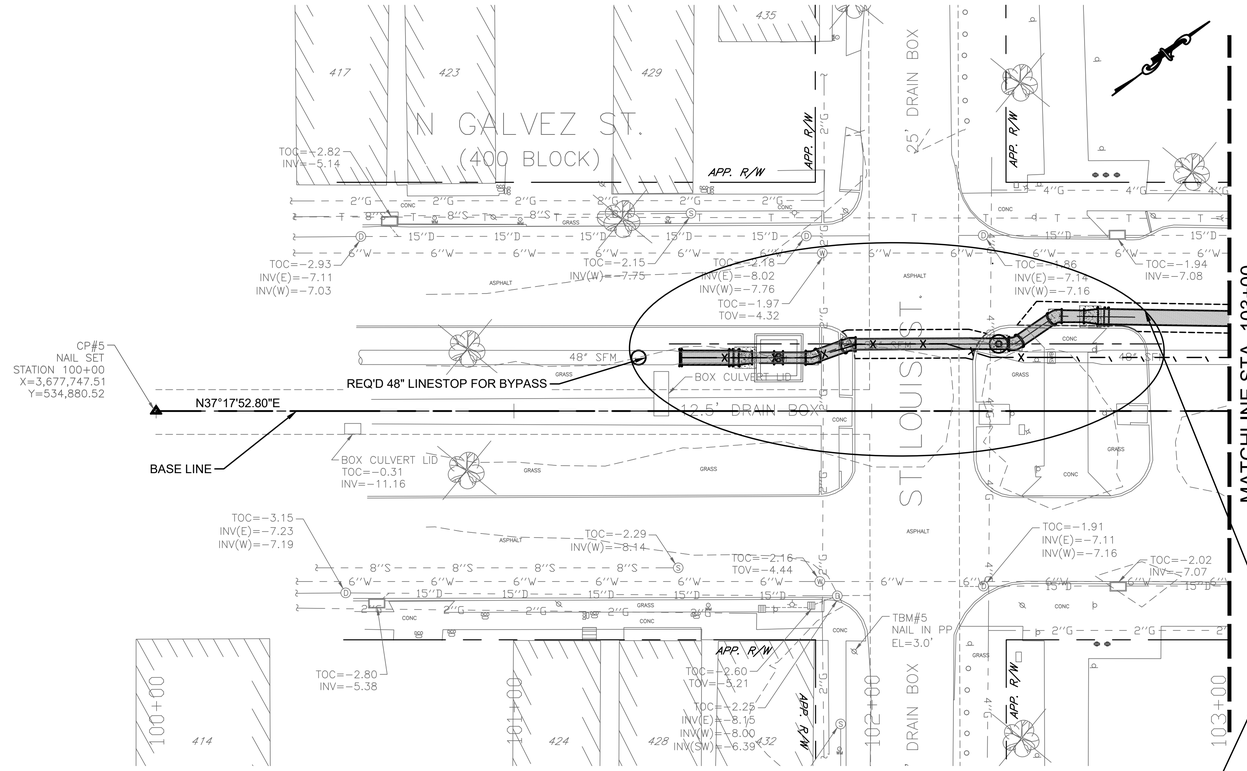
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

3-POINT TIES & STREET INDEX SHEET

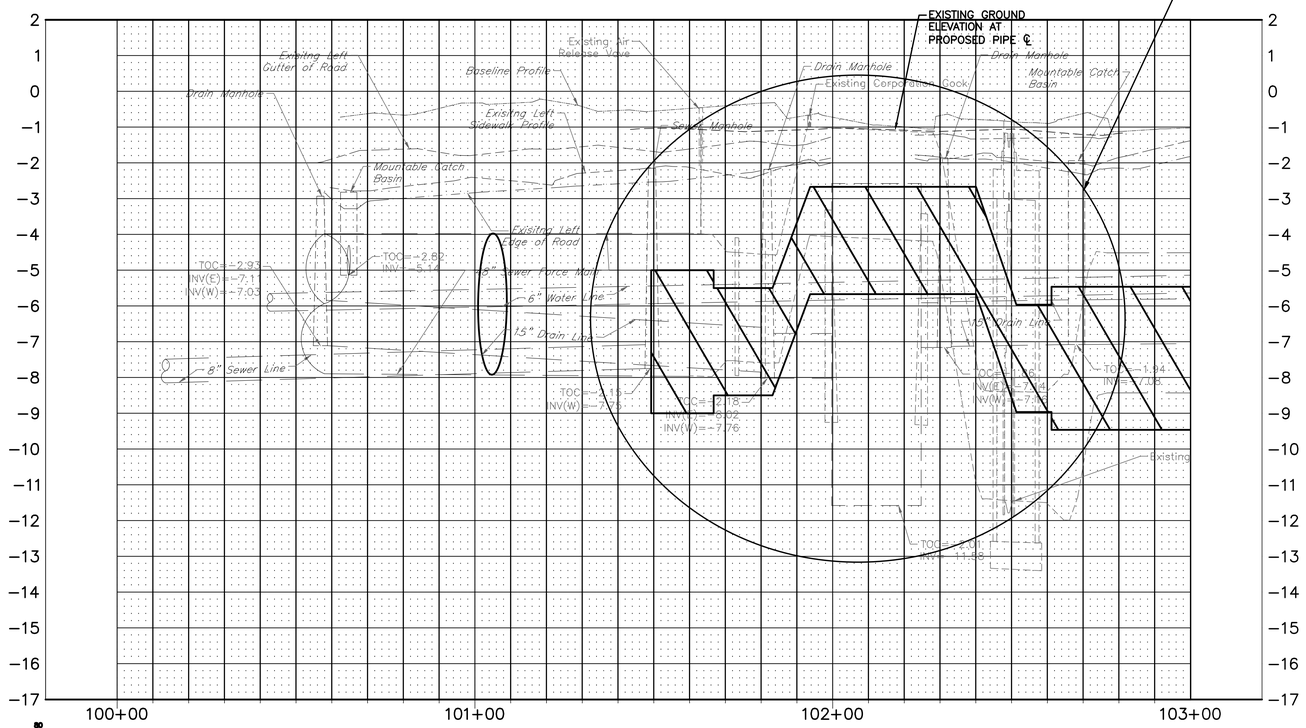
DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 4 OF 32



REFER TO SHEET 18 FOR CULVERT CROSSING REMOVAL DETAILS
REFER TO SHEETS 17 AND 18 FOR CULVERT CROSSING DETAILS

NOTES:

1. ALL CONCRETE PADS SHALL HAVE #3 REBAR AT 12" O.C. SET 3" FROM THE BOTTOM.
2. CONTRACTOR TO FIELD VERIFY TIE-IN LOCATIONS.
3. S&WB ELECTRICAL POWER - THE CONTRACTOR SHALL ADHEAR TO THE S&WB ELECTRICAL SAFETY CLEARANCE PROCEDURE IN THE CONTRACT SPECIFICATIONS.
4. S&WB ACTIVE FEEDER REQUIRES CLEARANCE. POWER CABLE CLEARANCES/OUTAGES ARE REQUIRED WHEN CROSSING ELECTRICAL POWER DUCT BANKS OR ANY WORK WITHIN 10 FEET OF A S&WB ELECTRICAL POWER DUCT BANK. TO SCHEDULE AN OUTAGE CONTACT S&WB CENTRAL CONTROL AT 504-865-0575, SEE GENERAL NOTES 5.11, 5.12, AND 5.13 FOR ELECTRICAL FEEDER LINES. A MINIMUM OF 24 HOURS IN ADVANCE. OUTAGE REQUEST MAY REQUIRE RESCHEDULING, AS WEATHER CONDITIONS OR OPERATIONAL CIRCUMSTANCES ARE UNPREDICTABLE. THERE IS NO DIRECT PAY FOR SCHEDULING/RESCHEDULING OUTAGES.
5. S&WB ABANDONED FEEDER/UTILITY. CONTACT S&WB CENTRAL CONTROL AT 504-865-0575 A MINIMUM OF 24 HOURS IN ADVANCE.
6. CONTRACTOR SHALL FURNISH A TEMPORARY TRAFFIC CONTROL PLAN SIGNED BY A LOUISIANA LICENSED TRAFFIC CONTROL PROFESSIONAL ENGINEER.
7. THE CONTRACTOR SHALL EMPLOY THE SERVICES OF A PROFESSIONAL ENGINEER, LICENSED BY THE STATE OF LOUISIANA, WHO HAS BACKGROUND IN TRAFFIC FLOW AND CONTROL, TO PREPARE AND SUBMIT A DETAILED TRAFFIC CONTROL PLAN ON BEHALF OF THE CONTRACTOR FOR REVIEW AND APPROVAL BY THE DIRECTOR. THE DETAILED TRAFFIC CONTROL PLAN IS REQUIRED ON ALL STREETS AND SIDEWALKS WHERE ACCESS WILL BE IMPEDED BY WORK, EXCEPT AS DESIGNATED BY THE DIRECTOR.
8. CONTRACTOR SHALL NOTIFY REGIONAL TRANSIT AUTHORITY ABOUT WORK BEING PERFORMED IN THE AREA
9. FOR HDPE PIPE BACKFILL DETAILS REFER TO S&WB DETAIL NO. 4697-E5-A ON SHEET 20. (1)
10. FOR DI PIPE BACKFILL DETAILS REFER TO S&WB DETAIL NO. D-3809 AND D-3810 ON SHEET 20.



SCALE 1" = 20'-0" HORIZ.
1" = 2'-0" VERT.

Derek Kelly
License No. 43211
8/21/25
PROFESSIONAL ENGINEER
STATE OF LOUISIANA

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

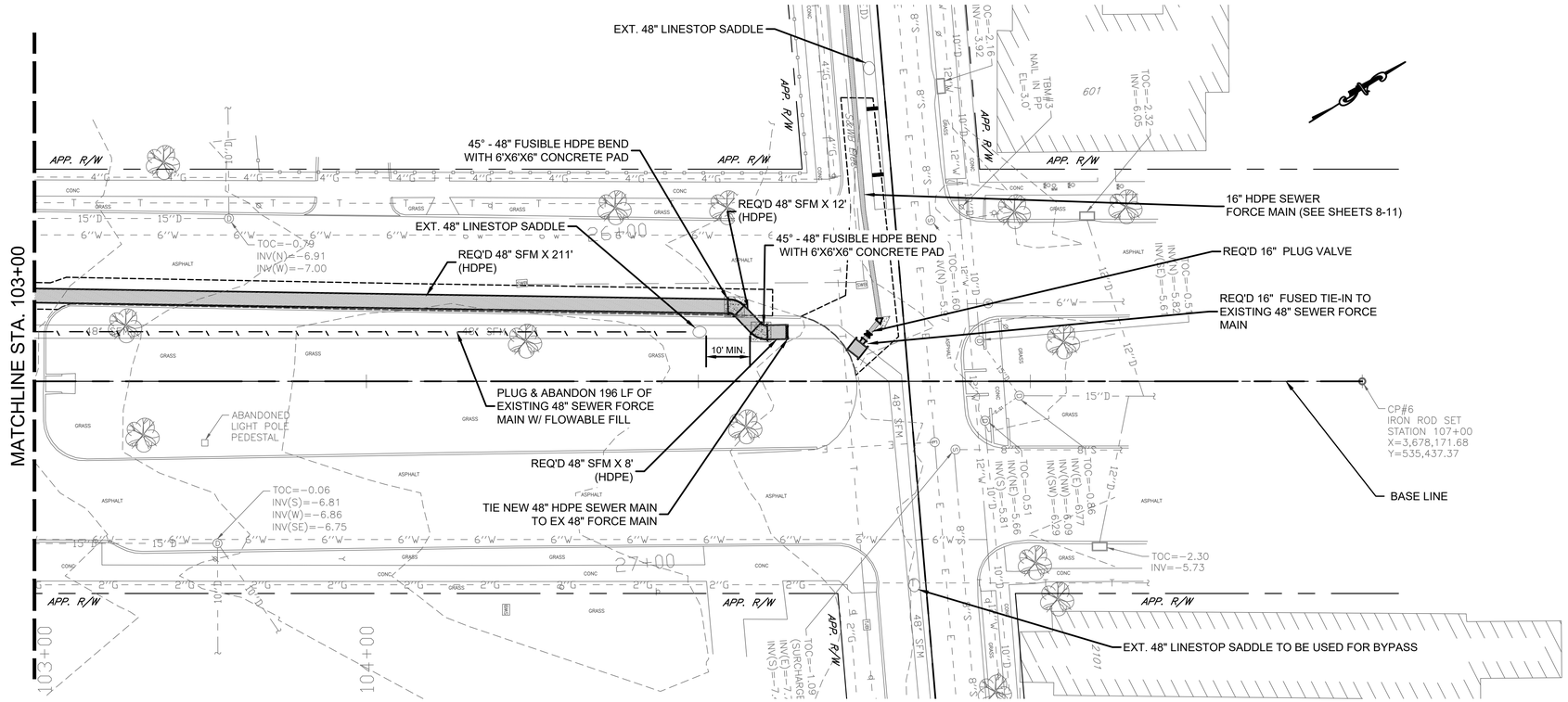
SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

GALVEZ ST
P&P1

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 5 OF 32



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1" = 2'-0" VERT.

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10. FOR DI PIPE BACKFILL DETAILS REFER TO S&WB DETAIL NO. D-3809 AND D-3810 ON SHEET 20.

1

"STATE OF LOUISIANA" Derek Kelly License No. 45211 PROFESSIONAL ENGINEER 8/21/25

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

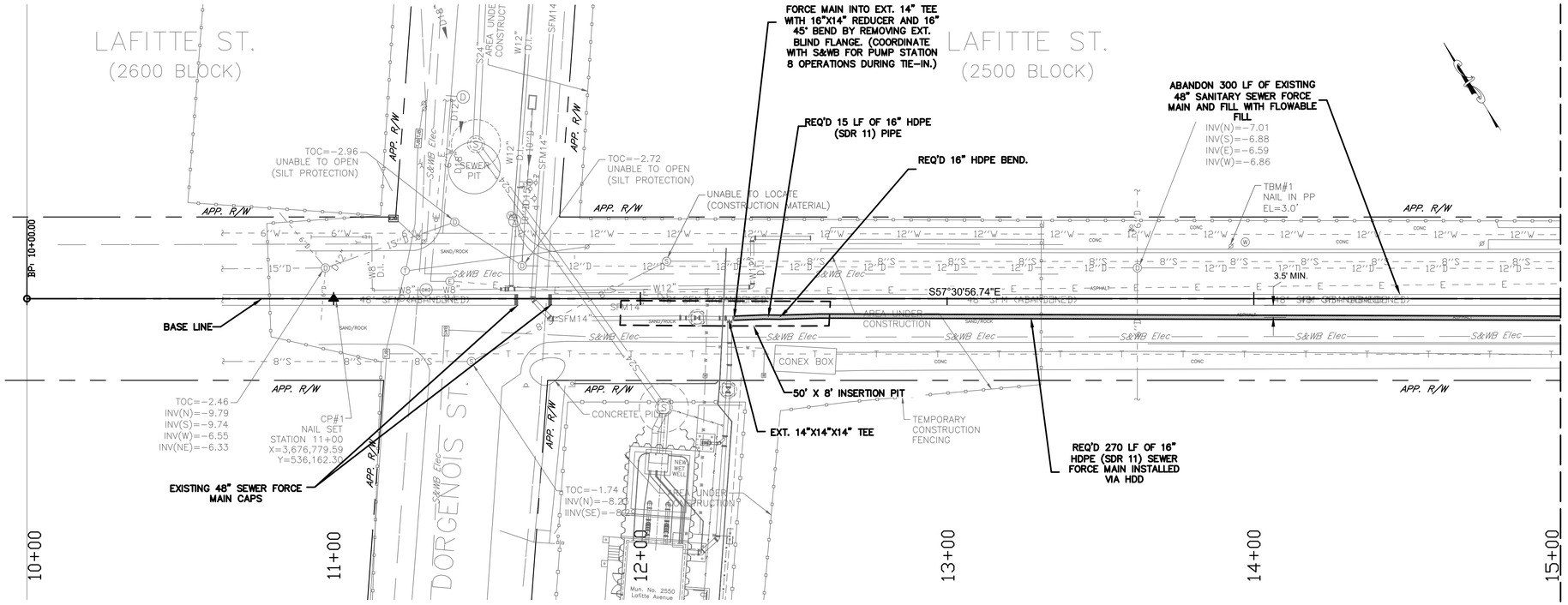
CONTRACT 30266

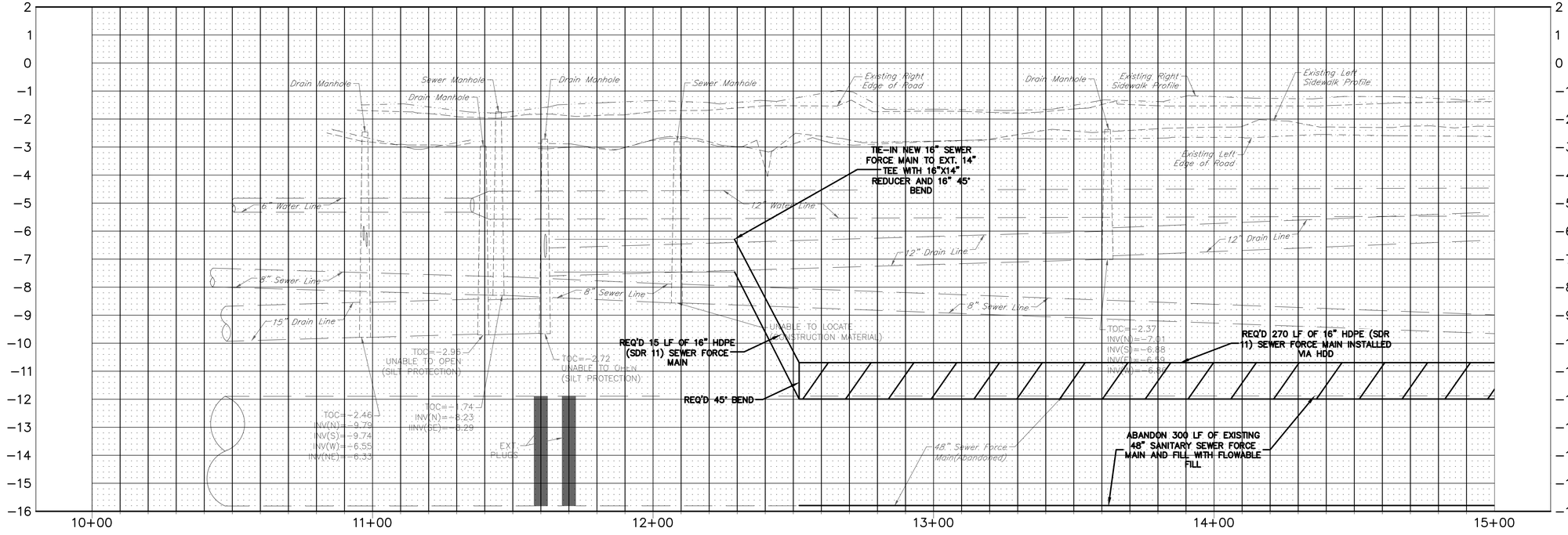
NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

GALVEZ ST
P&P 2

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO.

SHEET NO. 6 OF 32





SCALE 1" = 20'-0" HORIZ.
1" = 2'-0" VERT.

NOTES:

1. ALL DUCTILE IRON TO HDPE ADAPTORS SHALL BE EBAA MEGAFLANGE SERIES 2100 RESTRAINED FLANGE ADAPTOR (OR APPROVED EQUAL)
2. ALL DUCTILE IRON PIPE AND FITTINGS FOR WASTEWATER SHALL BE LINED WITH "PROTECTO 401 CERAMIC EPOXY LINING" OR APPROVED EQUAL
3. HDD INSTALLATIONS SHALL OPERATE IN THE WEEKENDS OR NIGHTS.
4. CONTRACTOR TO FIELD VERIFY TIE-IN LOCATIONS.
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12. FOR DI PIPE BACKFILL DETAILS REFER TO S&WB DETAIL NO. D-3809 AND D-3810 ON SHEET 20.

1

STATE OF LOUISIANA
Derek Kelly
License No. 37211
8/3/25
PROFESSIONAL ENGINEER

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

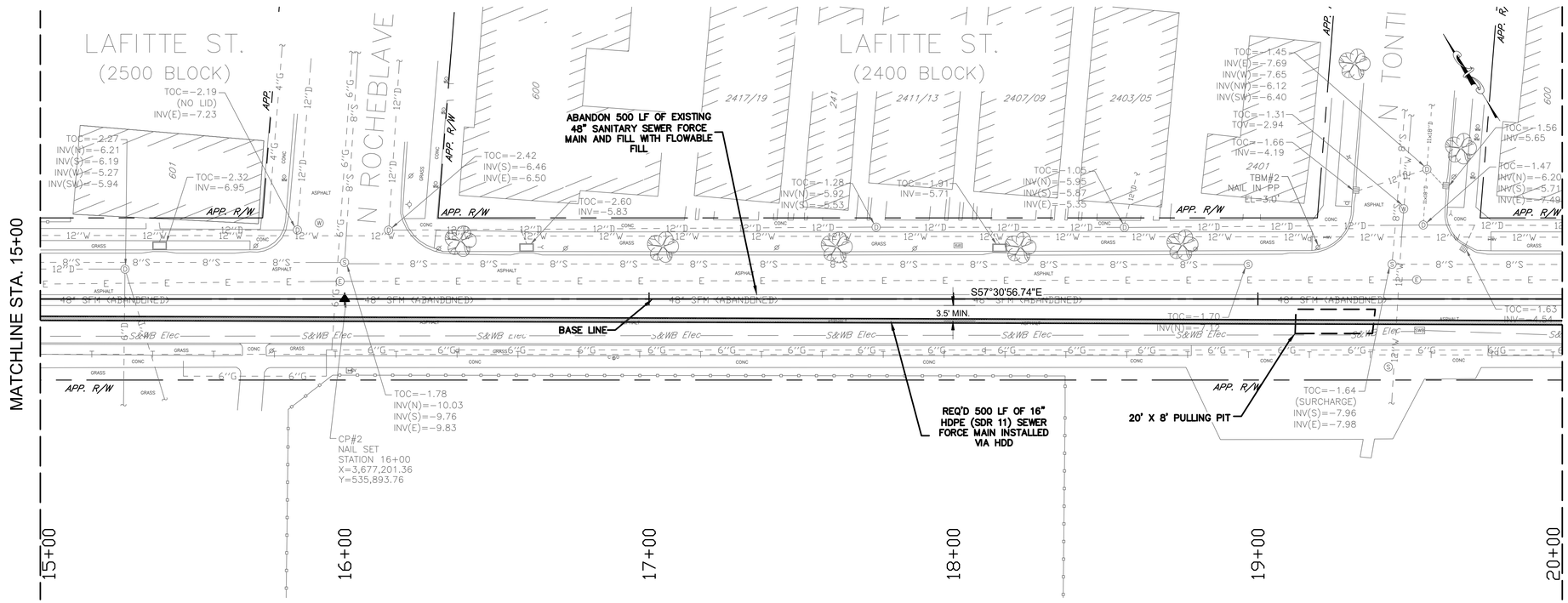
NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

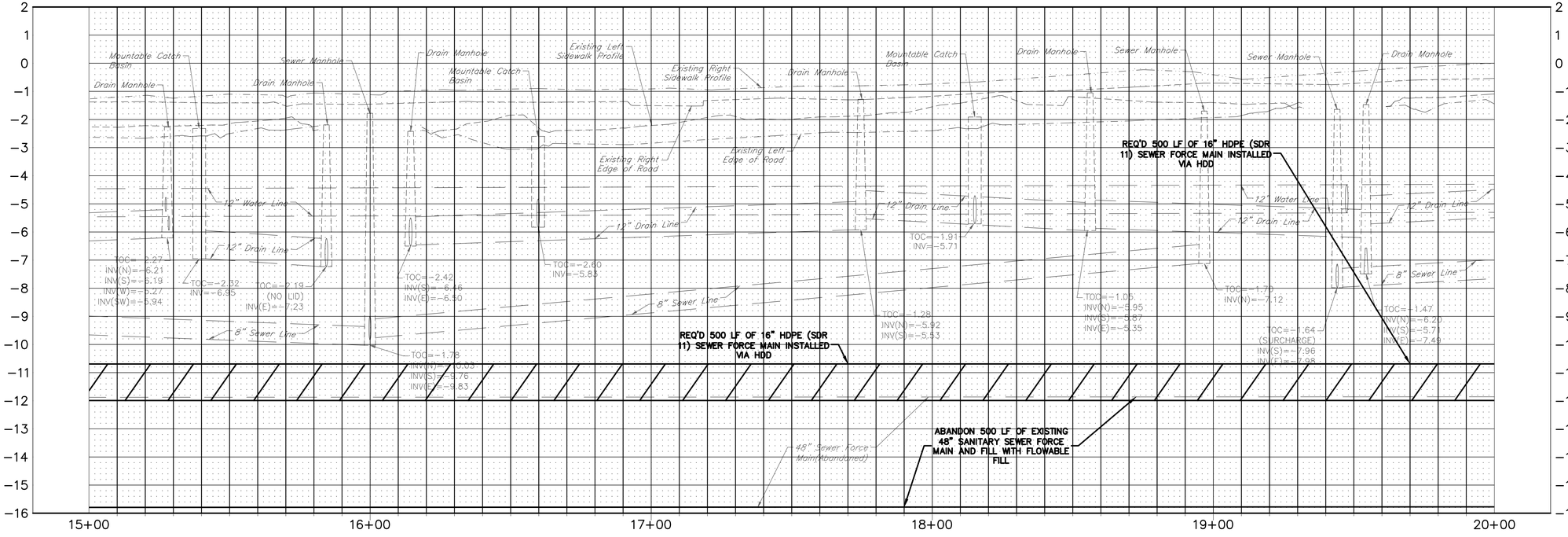
LAFITTE ST P&P 1

DR.	DK
TRC.	DK
CK.	RI
AP.	XX
SCALE:	
DATE:	3/20/2025

SET NO.

SHEET NO. 7 OF 32





SCALE 1" = 20'-0" HORIZ.
1" = 2'-0" VERT.

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STATE OF LOUISIANA
Derek Kelly
License No. 49211
8/1/25
PROFESSIONAL ENGINEER

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

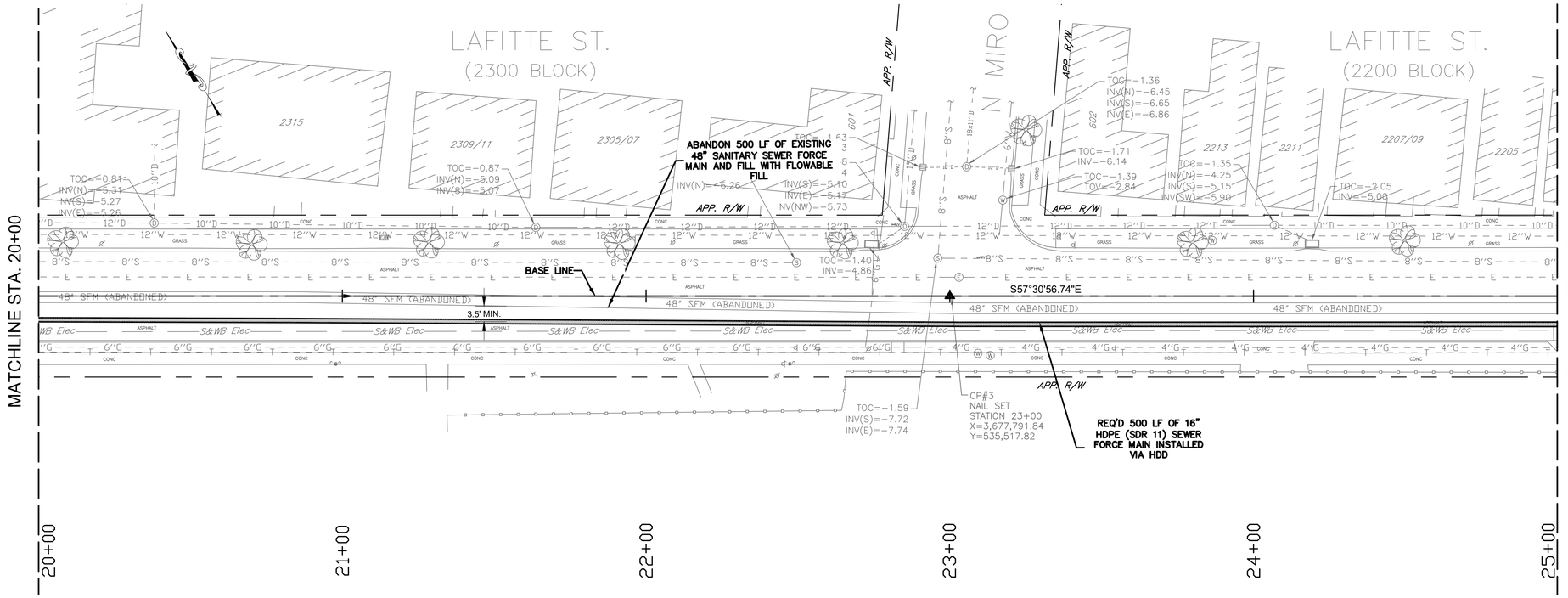
SEWERAGE AND WATER BOARD OF NEW ORLEANS

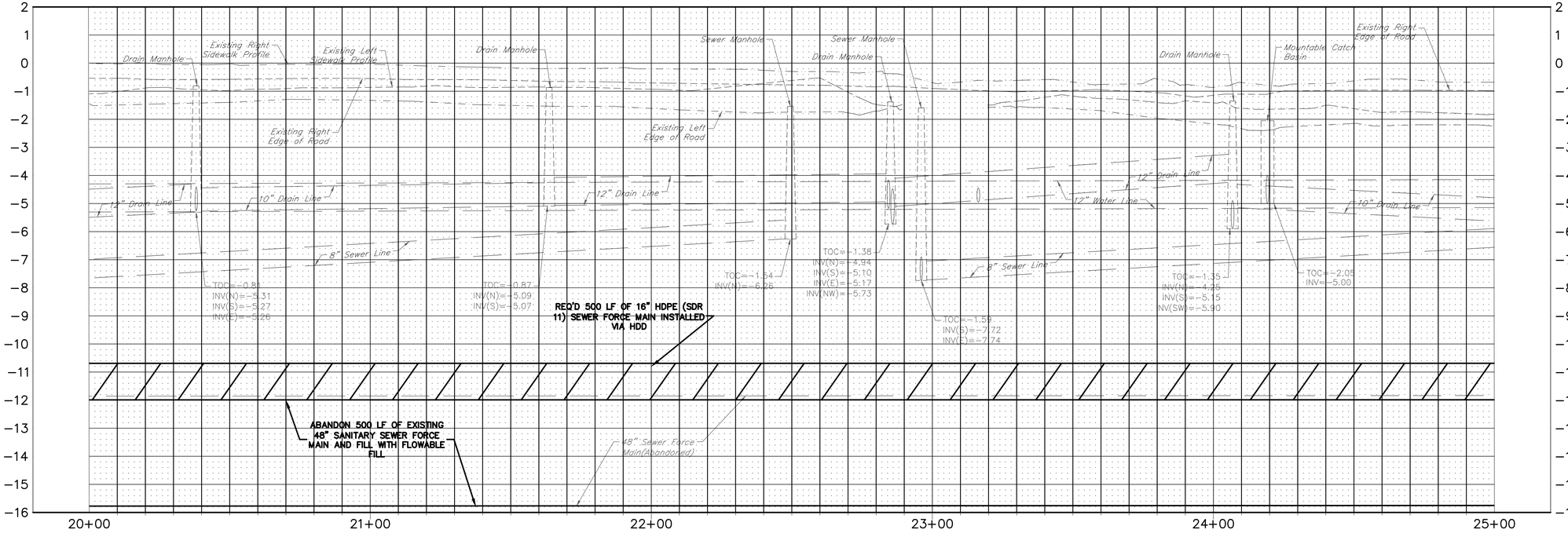
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

LAFITTE ST P&P 2

DR. DK	
TRC DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 8 OF 32





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1

STATE OF LOUISIANA
Derek Kelly
License No. 40211
8/13/25
PROFESSIONAL ENGINEER

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

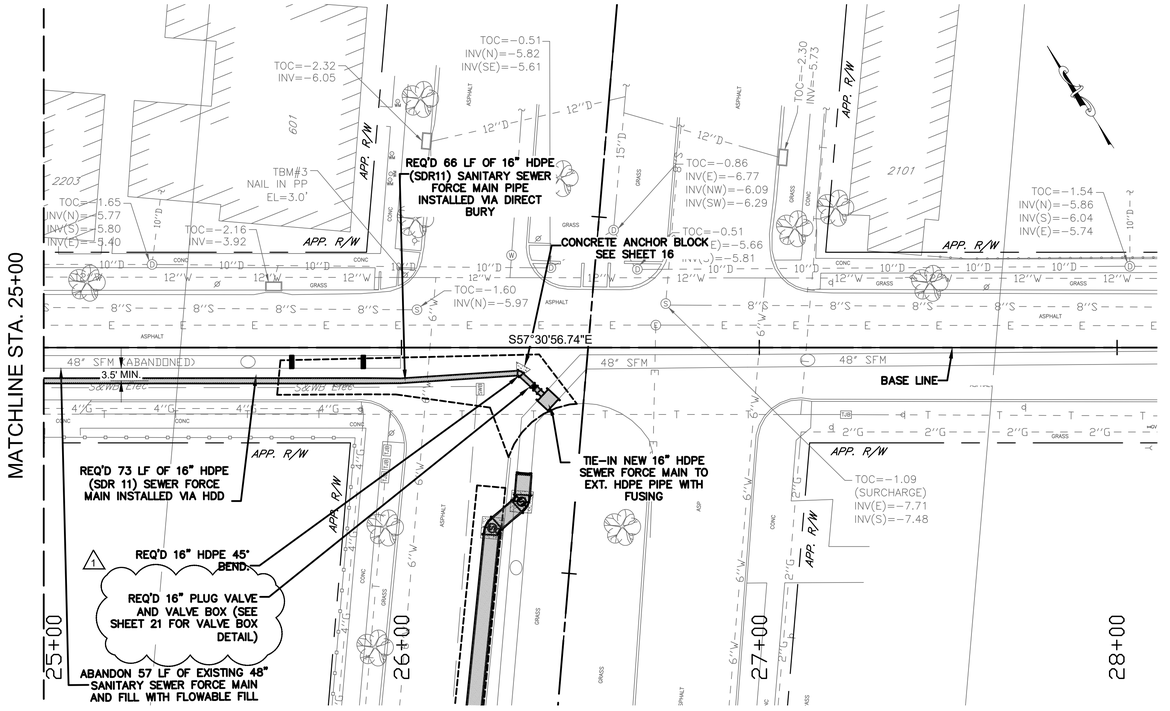
SEWERAGE AND WATER BOARD OF NEW ORLEANS

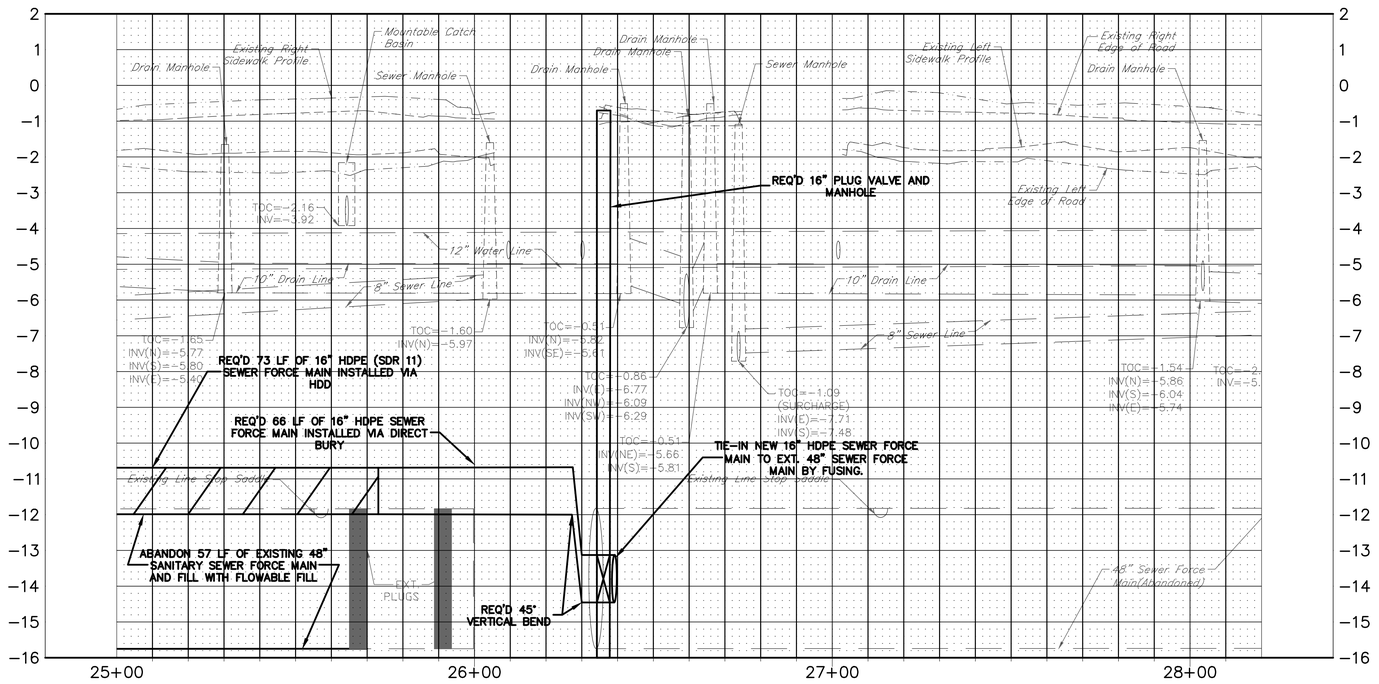
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

LAFITTE ST P&P 3

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 9 OF 32





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STATE OF LOUISIANA
Derek Kelly
License No. 45211
PROFESSIONAL ENGINEER
9/24/25

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

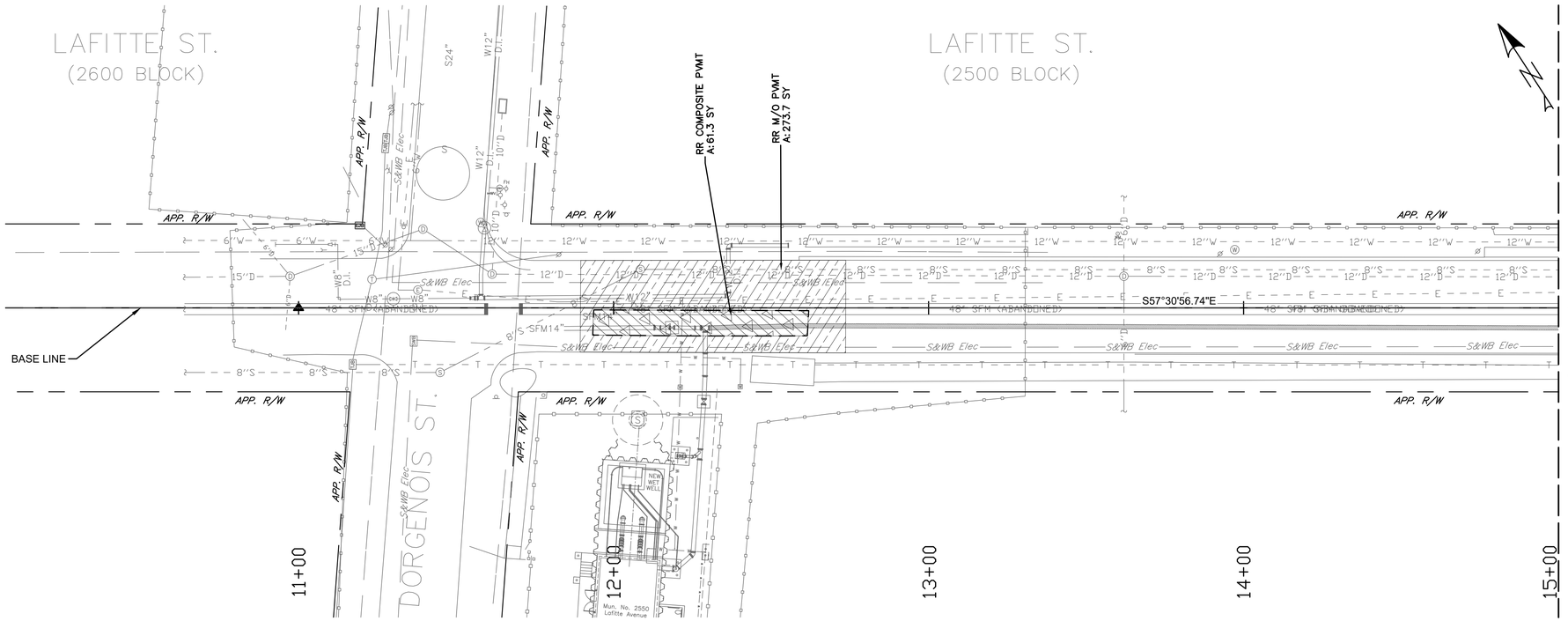
SEWERAGE AND WATER BOARD OF NEW ORLEANS

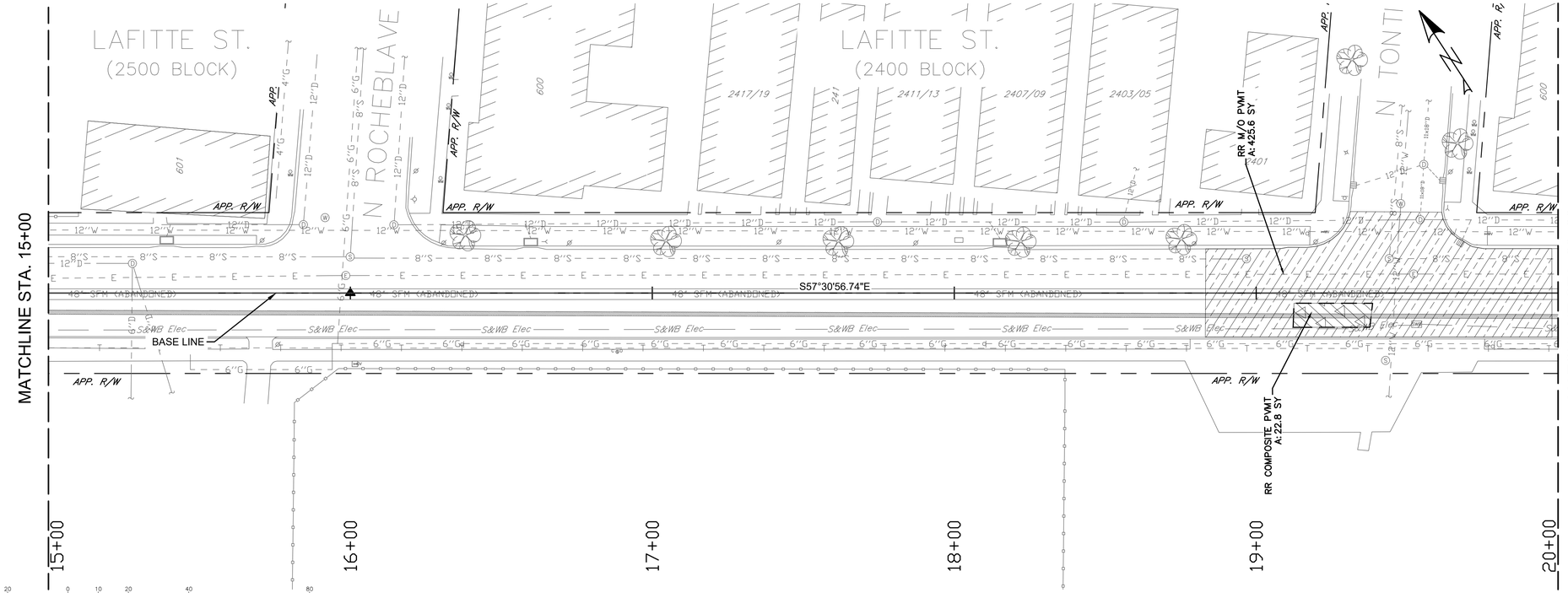
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

LAFITTE ST P&P 4

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 10 OF 32





1 NOTES:

1. DEPARTMENT OF PUBLIC WORKS GENERAL SPECIFICATIONS FOR STREET PAVING, CITY OF NEW ORLEANS (LATEST EDITION) SHALL GOVERN ON THIS PROJECT EXCEPT AS AMENDED BY SPECIAL PROVISIONS AND/OR SUPPLEMENTAL SPECIFICATIONS. SEE PAVEMENT DETAILS ON SHEET 23.
2. CONTRACTOR SHALL REPLACE ALL DISTURBED TRAFFIC STRIPPING AND TRAFFIC SIGNS PER DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS (LATEST EDITION)
3. CONTRACTOR SHALL PROTECT EXISTING TREES PER PARK & PARKWAYS STANDARD DETAILS.

STATE OF LOUISIANA
Derek Kelly
License No. 43211
8/3/25
PROFESSIONAL ENGINEER

REQUIRED REMOVAL AND/OR PLACEMENT OF CONCRETE PAVEMENT, SIDEWALK, OR ADA RAMP CNO DPW (HEX)

REQUIRED REMOVAL AND/OR PLACEMENT OF CONCRETE PAVEMENT, SIDEWALK, OR ADA RAMP SWBNO (TRIANG)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT ROADWAY CNO DPW (ANSI 131)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT ROADWAY SWBNO (ANSI 131)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT/CONCRETE COMPOSITE ROADWAY CNO DPW (ANSI 131/HEX)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT/CONCRETE COMPOSITE ROADWAY SWBNO (ANSI 131/HEX)

REQUIRED COLD MILL/COLD PLANING AND PLACEMENT OF ASPHALT SURFACE COURSE CNO DPW (ANSI 133)

REQUIRED COLD MILL/COLD PLANING AND PLACEMENT OF ASPHALT SURFACE COURSE SWBNO(ANSI 133)

REQUIRED REMOVAL AND PLACEMENT OF ASPHALT OR CONCRETE ROADWAY FOR SWBNO ESSA

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

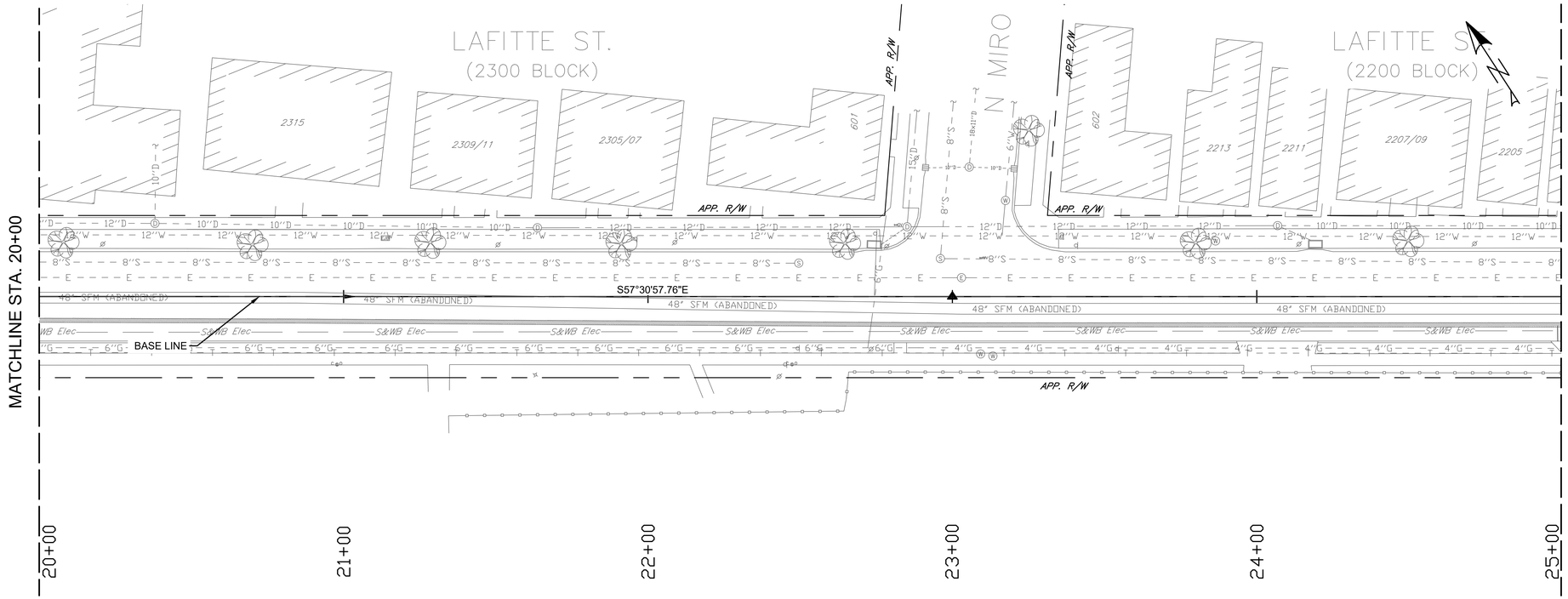
SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

LAFITTE PAVEMENT 1

DR. DK	
TRC DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 11 OF 32



NOTES:

1. DEPARTMENT OF PUBLIC WORKS GENERAL SPECIFICATIONS FOR STREET PAVING, CITY OF NEW ORLEANS (LATEST EDITION) SHALL GOVERN ON THIS PROJECT EXCEPT AS AMENDED BY SPECIAL PROVISIONS AND/OR SUPPLEMENTAL SPECIFICATIONS. SEE PAVEMENT DETAILS ON SHEET 23.
2. CONTRACTOR SHALL REPLACE ALL DISTURBED TRAFFIC STRIPPING AND TRAFFIC SIGNS PER DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS (LATEST EDITION)
3. CONTRACTOR SHALL PROTECT EXISTING TREES PER PARK & PARKWAYS STANDARD DETAILS.

STATE OF LOUISIANA
Derek Kelly
License No. 43211
8/3/25
PROFESSIONAL ENGINEER

REQUIRED REMOVAL AND/OR PLACEMENT OF CONCRETE PAVEMENT, SIDEWALK, OR ADA RAMP CNO DPW (HEX)

REQUIRED REMOVAL AND/OR PLACEMENT OF CONCRETE PAVEMENT, SIDEWALK, OR ADA RAMP SWBNO (TRIANG)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT ROADWAY CNO DPW (ANSI 131)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT ROADWAY SWBNO (ANSI 131)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT/CONCRETE COMPOSITE ROADWAY CNO DPW (ANSI 131/HEX)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT/CONCRETE COMPOSITE ROADWAY SWBNO (ANSI 131/HEX)

REQUIRED COLD MILL/COLD PLANING AND PLACEMENT OF ASPHALT SURFACE COURSE CNO DPW (ANSI 133)

REQUIRED COLD MILL/COLD PLANING AND PLACEMENT OF ASPHALT SURFACE COURSE SWBNO(ANSI 133)

REQUIRED REMOVAL AND PLACEMENT OF ASPHALT OR CONCRETE ROADWAY FOR SWBNO ESSA

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

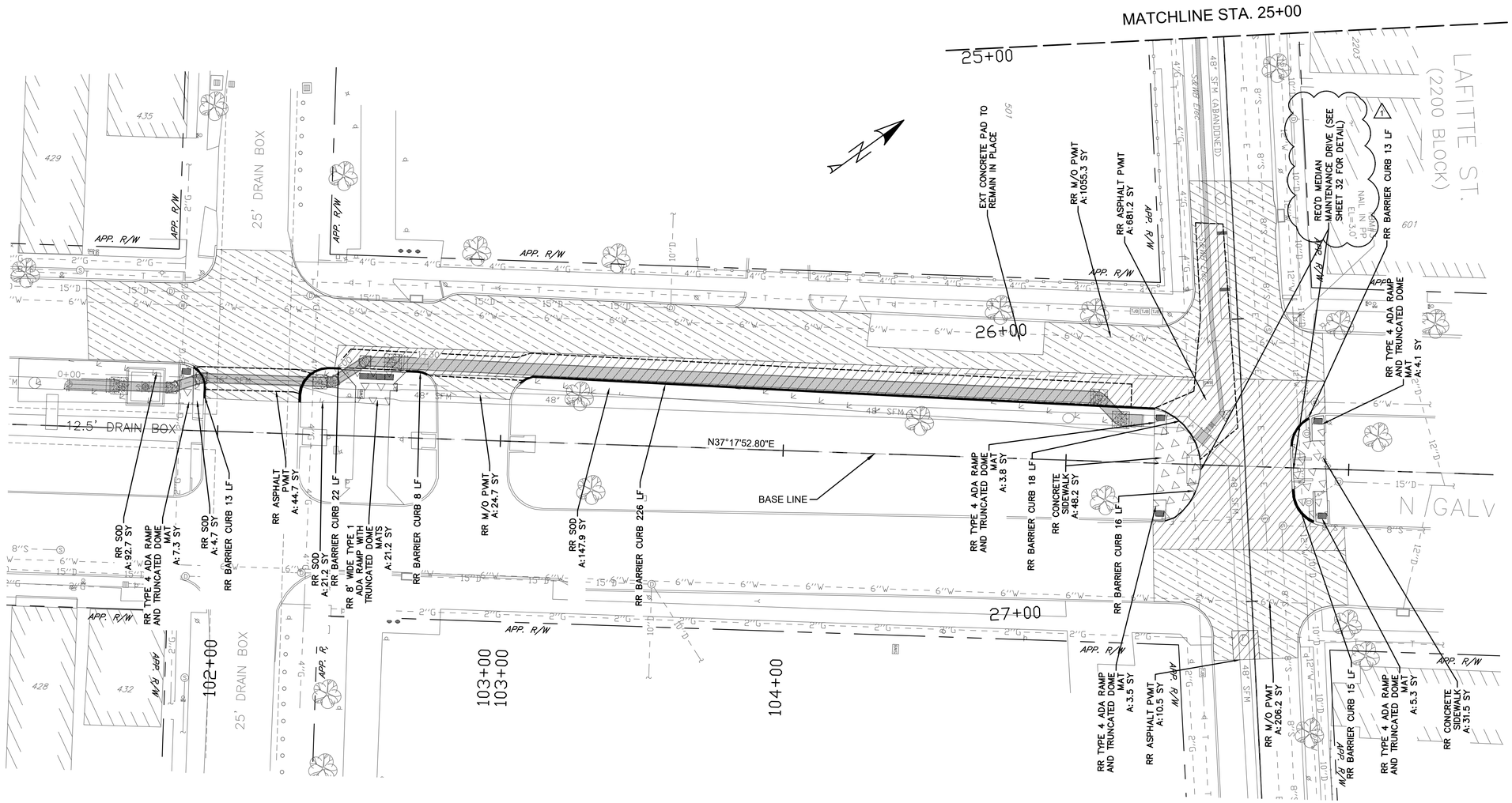
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

LAFITTE PAVEMENT 2

SCALE 1" = 20'-0" HORIZ.

DR. DK	
TRC DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 12 OF 32



NOTES:

1. DEPARTMENT OF PUBLIC WORKS GENERAL SPECIFICATIONS FOR STREET PAVING, CITY OF NEW ORLEANS (LATEST EDITION) SHALL GOVERN ON THIS PROJECT EXCEPT AS AMENDED BY SPECIAL PROVISIONS AND/OR SUPPLEMENTAL SPECIFICATIONS. SEE PAVEMENT DETAILS ON SHEET 23.
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3. CONTRACTOR SHALL PROTECT EXISTING TREES PER PARK & PARKWAYS STANDARD DETAILS.

REQUIRED REMOVAL AND/OR PLACEMENT OF CONCRETE PAVEMENT, SIDEWALK, OR ADA RAMP CNO DPW (HEX)

REQUIRED REMOVAL AND/OR PLACEMENT OF CONCRETE PAVEMENT, SIDEWALK, OR ADA RAMP SWBNO (TRIANG)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT ROADWAY CNO DPW (ANSI 131)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT ROADWAY SWBNO (ANSI 131)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT/CONCRETE COMPOSITE ROADWAY CNO DPW (ANSI 131/HEX)

REQUIRED REMOVAL AND/OR REPLACEMENT OF ASPHALT/CONCRETE COMPOSITE ROADWAY SWBNO (ANSI 131/HEX)

REQUIRED COLD MILL/COLD PLANING AND PLACEMENT OF ASPHALT SURFACE COURSE CNO DPW (ANSI 133)

REQUIRED COLD MILL/COLD PLANING AND PLACEMENT OF ASPHALT SURFACE COURSE SWBNO(ANSI 133)

REQUIRED REMOVAL AND PLACEMENT OF ASPHALT OR CONCRETE ROADWAY FOR SWBNO ESSA

Derek Kelly
License No. 43211
8/3/25
PROFESSIONAL ENGINEER

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

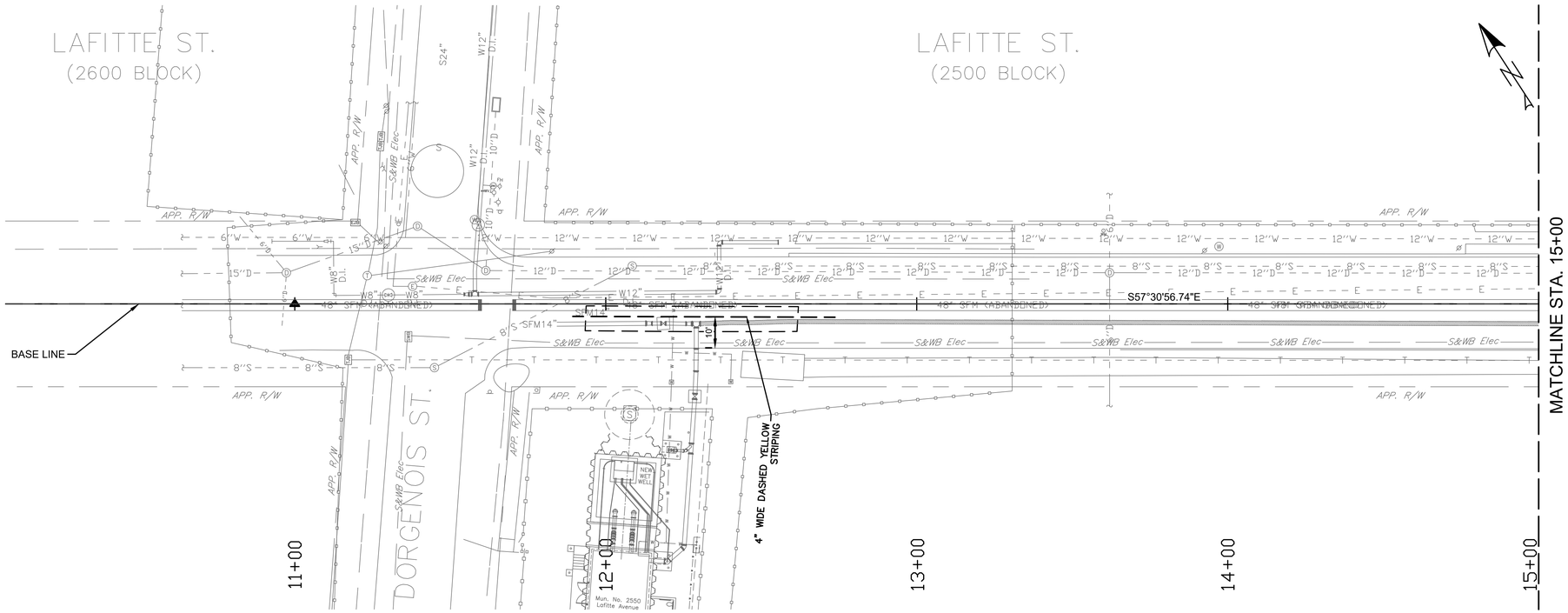
CONTRACT 30266

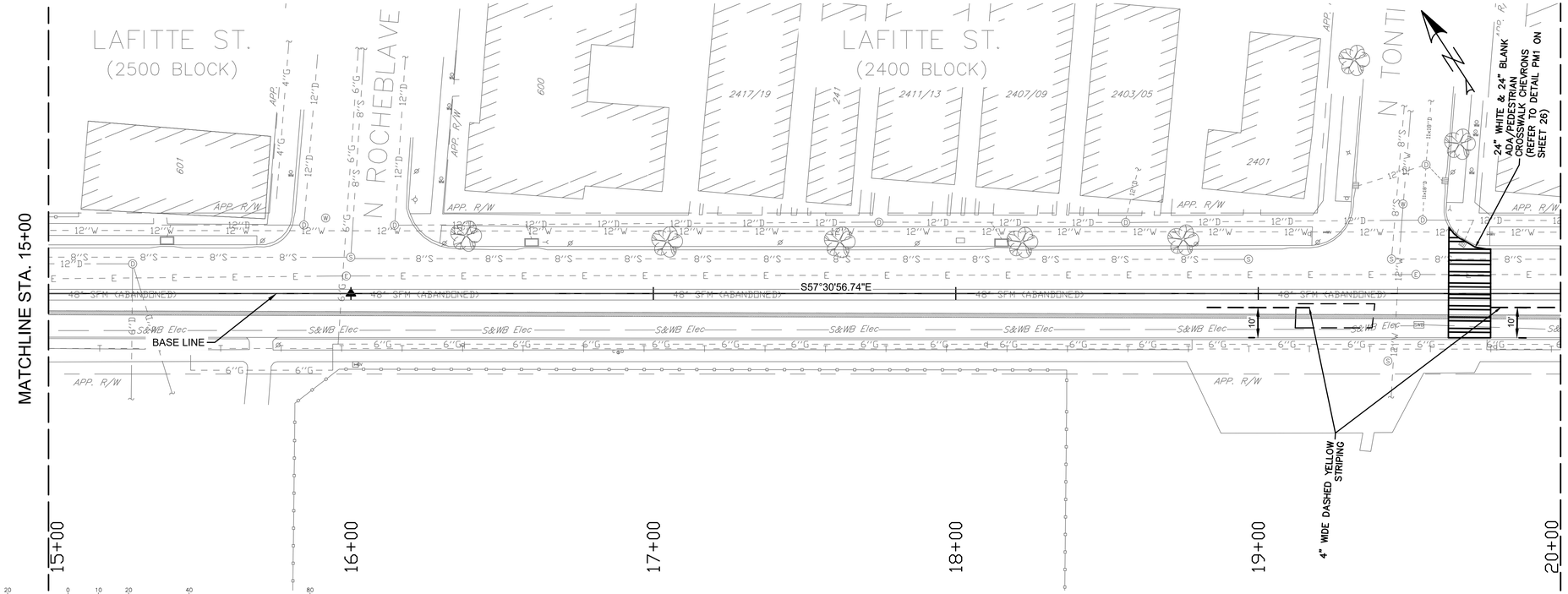
NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

GALVEZ PAVEMENT

DR. DK	
TRC DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO.

SHEET NO. 13 OF 32





NOTES:

1. DEPARTMENT OF PUBLIC WORKS GENERAL SPECIFICATIONS FOR STREET PAVING, CITY OF NEW ORLEANS (LATEST EDITION) SHALL GOVERN ON THIS PROJECT EXCEPT AS AMENDED BY SPECIAL PROVISIONS AND/OR SUPPLEMENTAL SPECIFICATIONS.
2. CONTRACTOR SHALL REPLACE ALL DISTURBED TRAFFIC STRIPING AND TRAFFIC SIGNS PER DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS (LATEST EDITION)
3. CONTRACTOR SHALL PROTECT EXISTING TREES PER PARK & PARKWAYS STANDARD DETAILS.

STATE OF LOUISIANA
Derek Kelly
License No. 42011
PROFESSIONAL ENGINEER
3/5/25

REV.	DATE	DESCRIPTION	BY

SEWERAGE AND WATER BOARD OF NEW ORLEANS

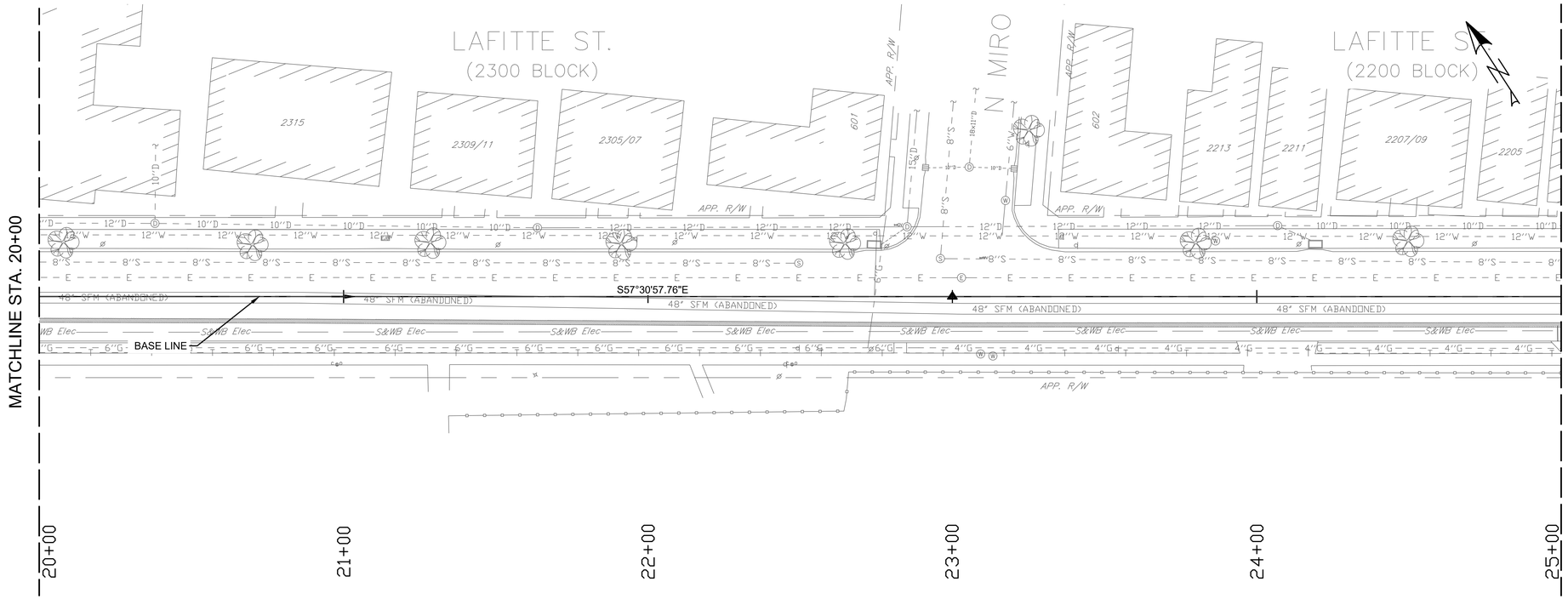
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

LAFITTE STRIPING 1

DR. DK	
TRC DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO.

SHEET NO. 14 OF 32



NOTES:

1. DEPARTMENT OF PUBLIC WORKS GENERAL SPECIFICATIONS FOR STREET PAVING, CITY OF NEW ORLEANS (LATEST EDITION) SHALL GOVERN ON THIS PROJECT EXCEPT AS AMENDED BY SPECIAL PROVISIONS AND/OR SUPPLEMENTAL SPECIFICATIONS.
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3. CONTRACTOR SHALL PROTECT EXISTING TREES PER PARK & PARKWAYS STANDARD DETAILS.

SCALE 1" = 20'-0" HORIZ.

STATE OF LOUISIANA
Derek Kelly
License No. 42311
8/3/2025
PROFESSIONAL ENGINEER

REV.	DATE	DESCRIPTION	BY

SEWERAGE AND WATER BOARD OF NEW ORLEANS

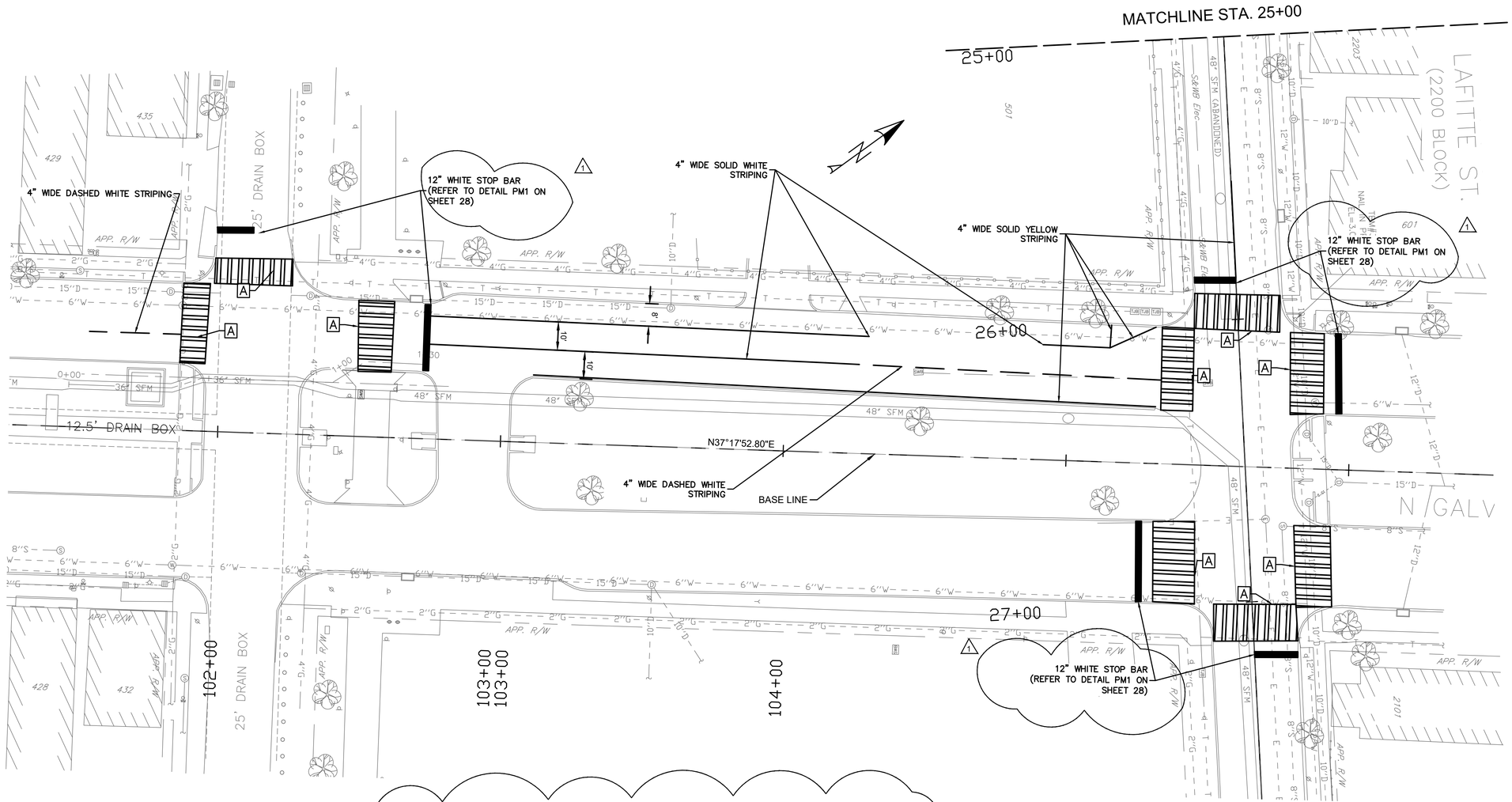
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

LAFITTE STRIPING 2

DR. DK	
TRC DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO.

SHEET NO. 15 OF 32



A = 24" WHITE & 24" BLANK ADA/PEDESTRIAN CROSSWALK CHEVRONS (REFER TO DETAIL PM1 ON SHEET 28)

20 0 10 20 40 80

SCALE 1" = 20'-0" HORIZ.

NOTES:

1. DEPARTMENT OF PUBLIC WORKS GENERAL SPECIFICATIONS FOR STREET PAVING, CITY OF NEW ORLEANS (LATEST EDITION) SHALL GOVERN ON THIS PROJECT EXCEPT AS AMENDED BY SPECIAL PROVISIONS AND/OR SUPPLEMENTAL SPECIFICATIONS.
2. CONTRACTOR SHALL REPLACE ALL DISTURBED TRAFFIC STRIPING AND TRAFFIC SIGNS PER DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS (LATEST EDITION)
3. CONTRACTOR SHALL PROTECT EXISTING TREES PER PARK & PARKWAYS STANDARD DETAILS.

STATE OF LOUISIANA
Derek Kelly
License No. 43011
8/5/2025
PROFESSIONAL ENGINEER

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

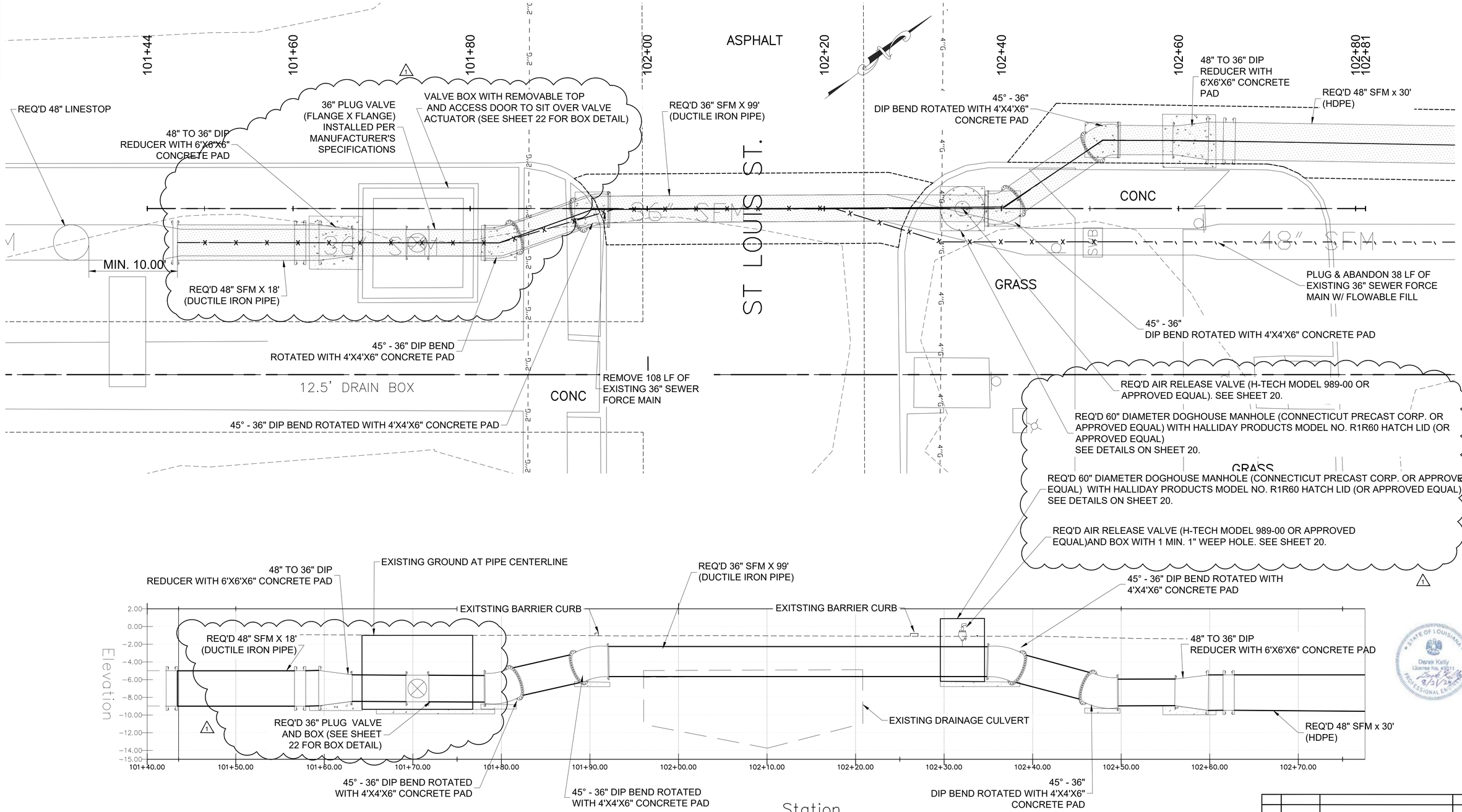
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

GALVEZ STRIPING

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO.

SHEET NO. 16 OF 32



NOTES:

1. ALL DUCTILE IRON TO HDPE ADAPTORS SHALL BE EBAA MEGAFLANGE SERIES 2100 RESTRAINED FLANGE ADAPTOR (OR APPROVED EQUAL)
2. ALL DUCTILE IRON PIPE AND FITTINGS FOR WASTEWATER SHALL BE LINED WITH "PROTECTO 401 CERAMIC EPOXY LINING" OR APPROVED EQUAL
3. ALL CONCRETE PADS SHALL HAVE #3 REBAR AT 12" O.C. SET 3" FROM THE BOTTOM.
4. CONTRACTOR TO FIELD VERIFY TIE-IN LOCATIONS.
5. S&WB ELECTRICAL POWER - THE CONTRACTOR SHALL ADHEAR TO THE S&WB ELECTRICAL SAFETY CLEARANCE PROCEDURE IN THE CONTRACT SPECIFICATIONS.
6. S&WB ACTIVE FEEDER REQUIRES CLEARANCE. POWER CABLE CLEARANCES/OUTAGES ARE REQUIRED WHEN CROSSING ELECTRICAL POWER DUCT BANKS OR ANY WORK WITHIN 10 FEET OF A S&WB ELECTRICAL POWER DUCT BANK. TO SCHEDULE AN OUTAGE CONTACT S&WB CENTRAL CONTROL AT 504-865-0575, SEE GENERAL NOTES 5.11, 5.12, AND 5.13 FOR ELECTRICAL FEEDER LINES. A MINIMUM OF 24 HOURS IN ADVANCE. OUTAGE REQUEST MAY REQUIRE RESCHEDULING, AS WEATHER CONDITIONS OR OPERATIONAL CIRCUMSTANCES ARE UNPREDICTABLE. THERE IS NO DIRECT PAY FOR SCHEDULING/RESCHEDULING OUTAGES.
7. S&WB ABANDONED FEEDER/UTILITY. CONTACT S&WB CENTRAL CONTROL AT 504-865-0575 A MINIMUM OF 24 HOURS IN ADVANCE.

SCALE:
1" = 5'
5 0 5 10

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

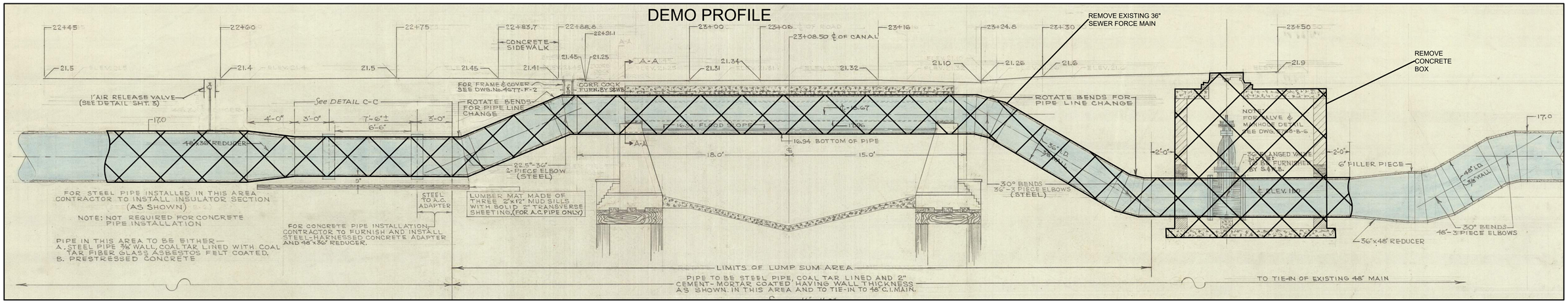
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

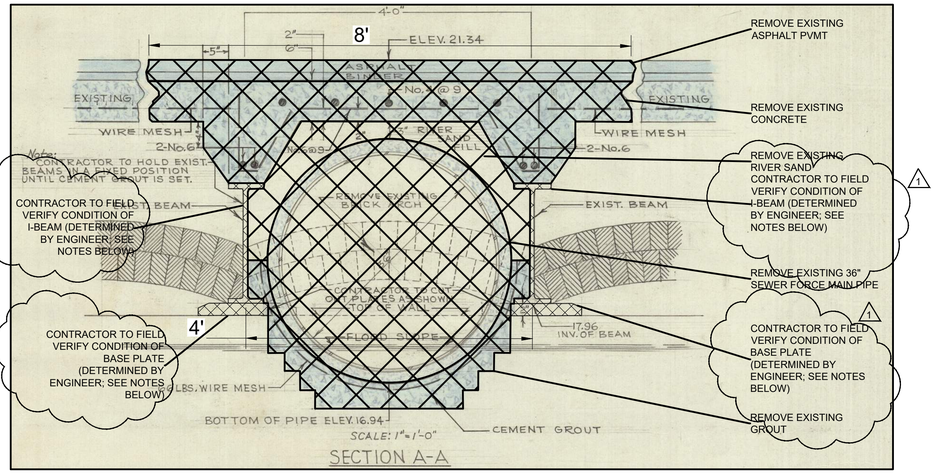
CULVERT CROSSING DETAIL

DR. DK
TRC DK
CK. RI
AP. XX
SCALE:
DATE: 3/20/2025
SET NO.
SHEET NO. 17 OF 32

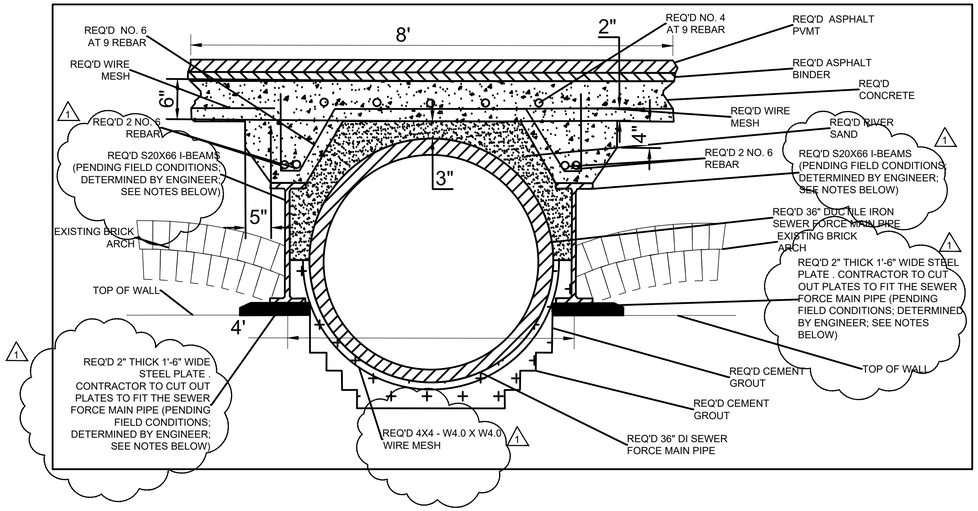
DEMO PROFILE



DEMO X-SECTION



PROPOSED X-SECTION



1

NOTES:
1. CONTRACTOR SHALL CONSULT WITH ENGINEER PRIOR TO EXISTING I-BEAM REMOVAL. ENGINEER WILL DETERMINE IF EXISTING I-BEAM AND STEEL PLATES NEED REPLACING BASED ON CONTRACTOR'S INPUT AND ENGINEERING DECISION.
2. EXISTING BRICK ARCHES SHALL BE PROTECTED. CONTRACTOR SHALL CONSULT WITH ENGINEER IF EXISTING BRICK ARCHES NEED TO BE DISTURBED.

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

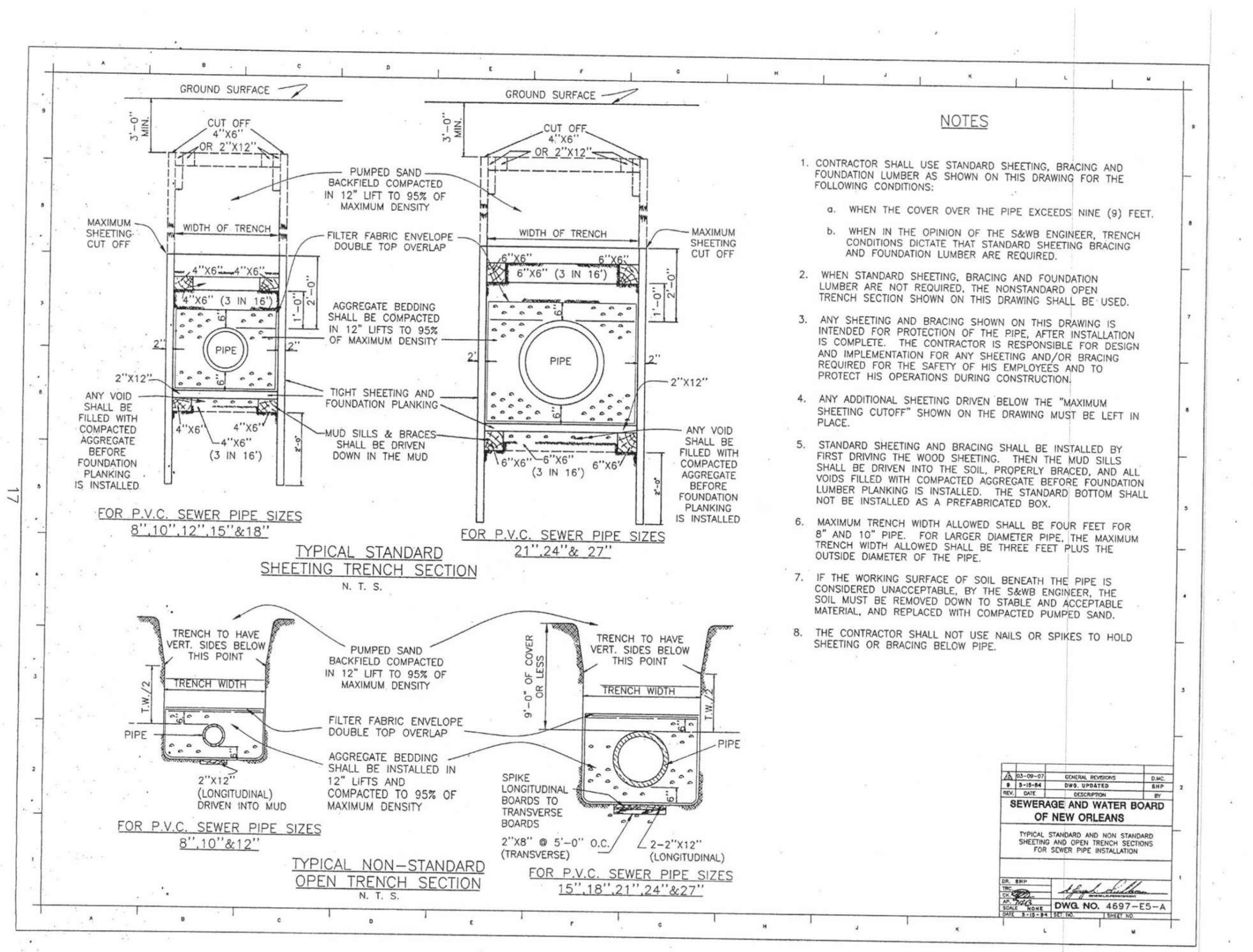
SEWERAGE AND WATER BOARD OF NEW ORLEANS

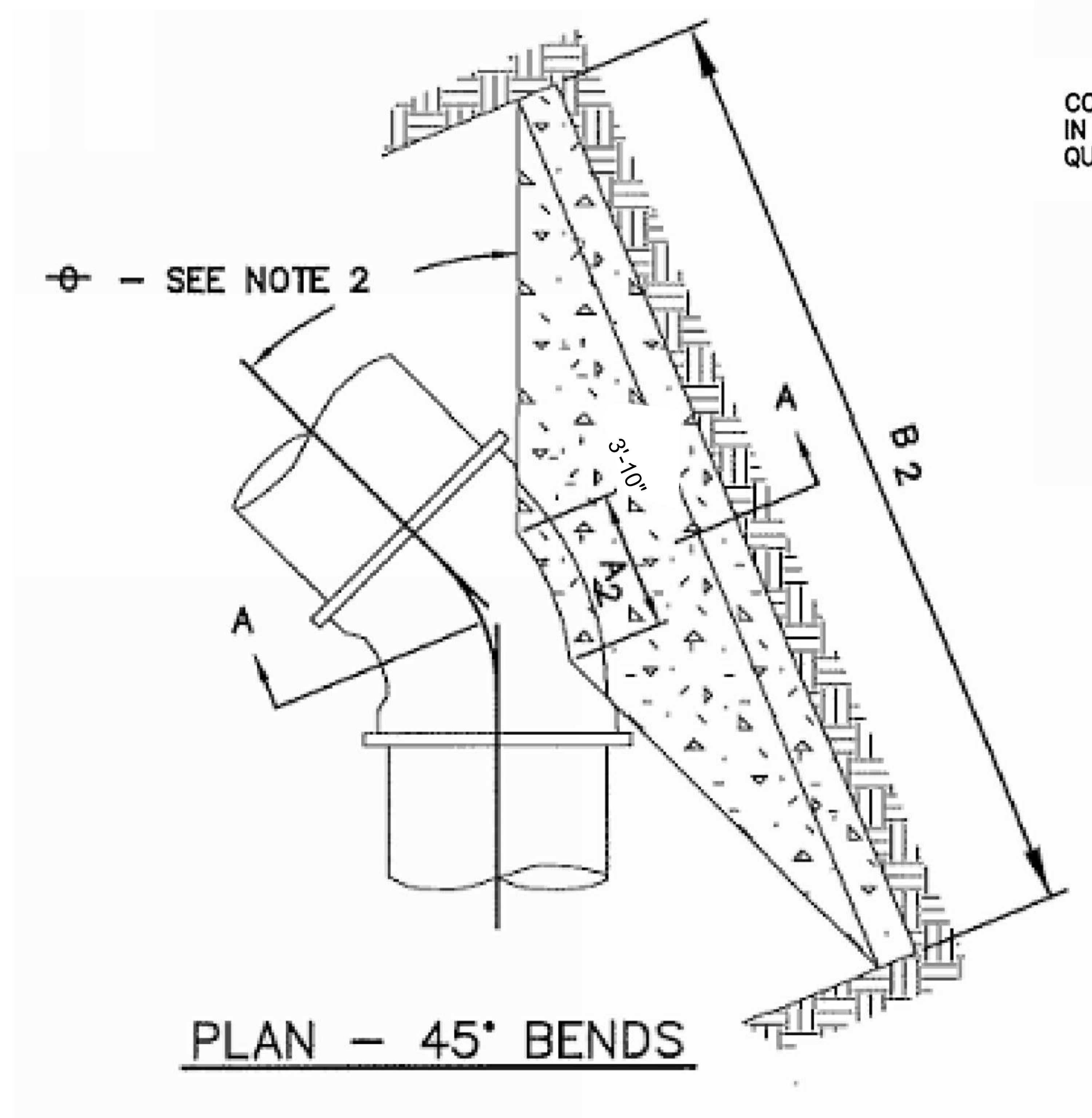
CONTRACT 30266

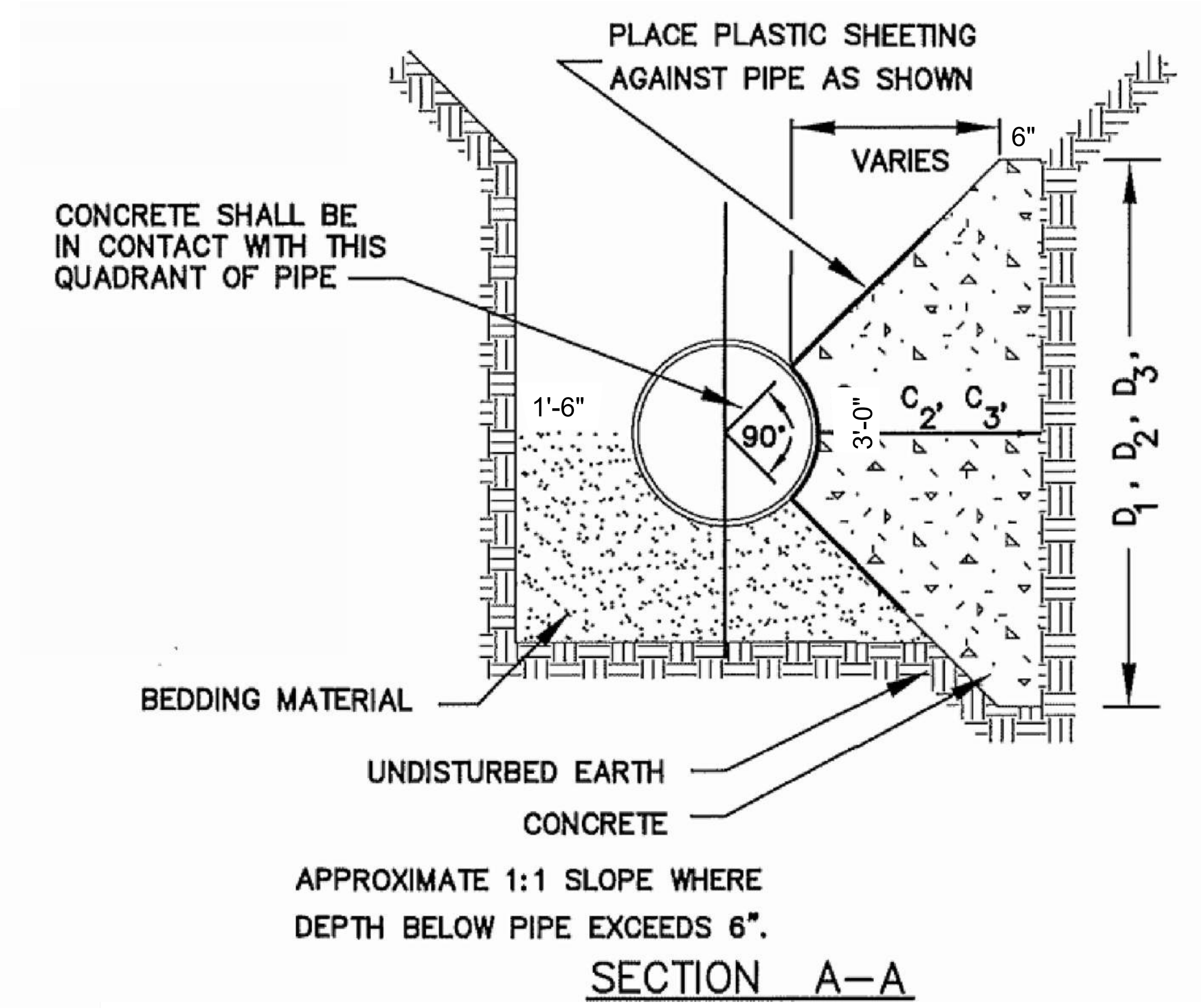
NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

CULVERT REMOVAL DETAIL

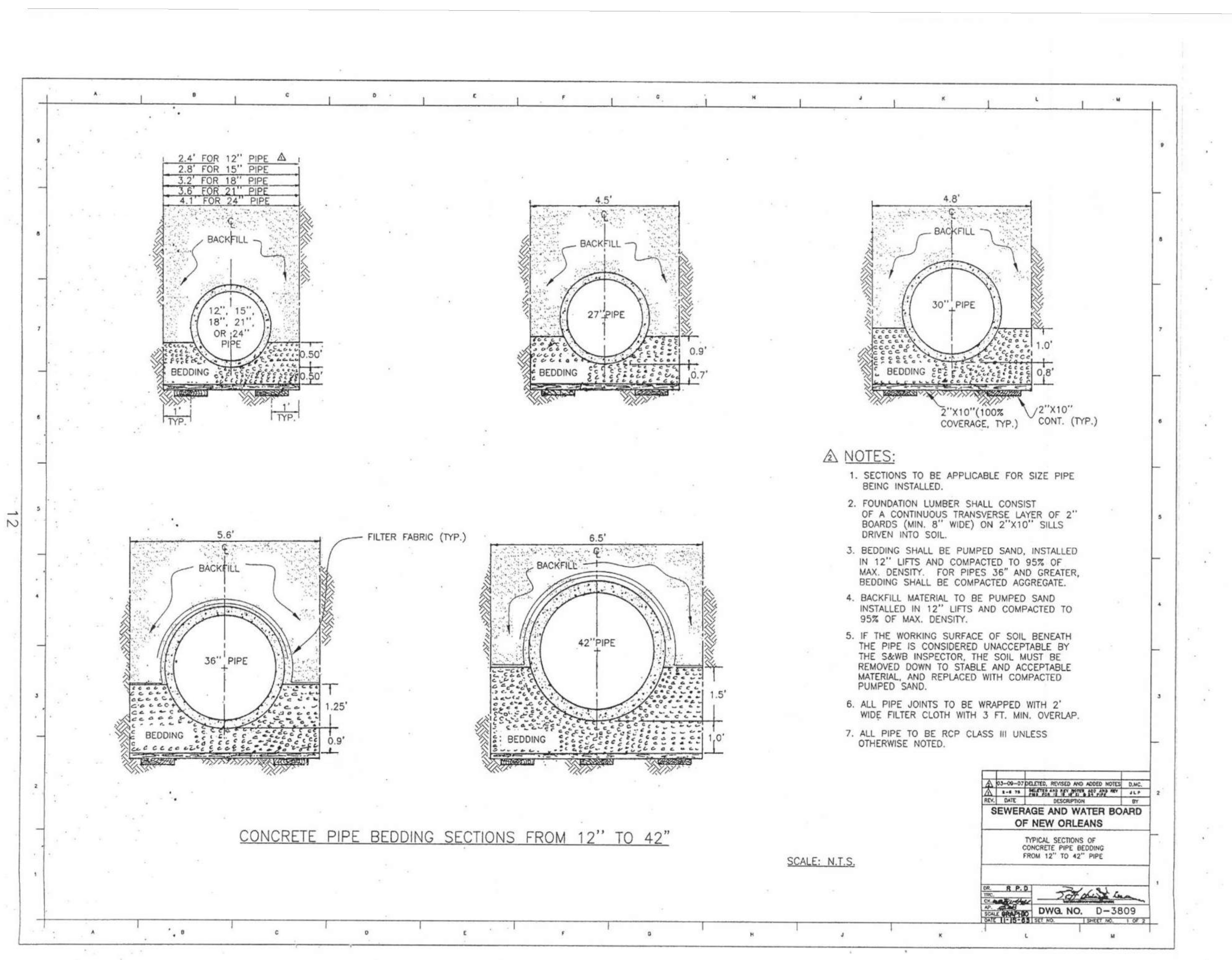
DR. DK	
TRC DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. — SHEET NO. 18 OF 32

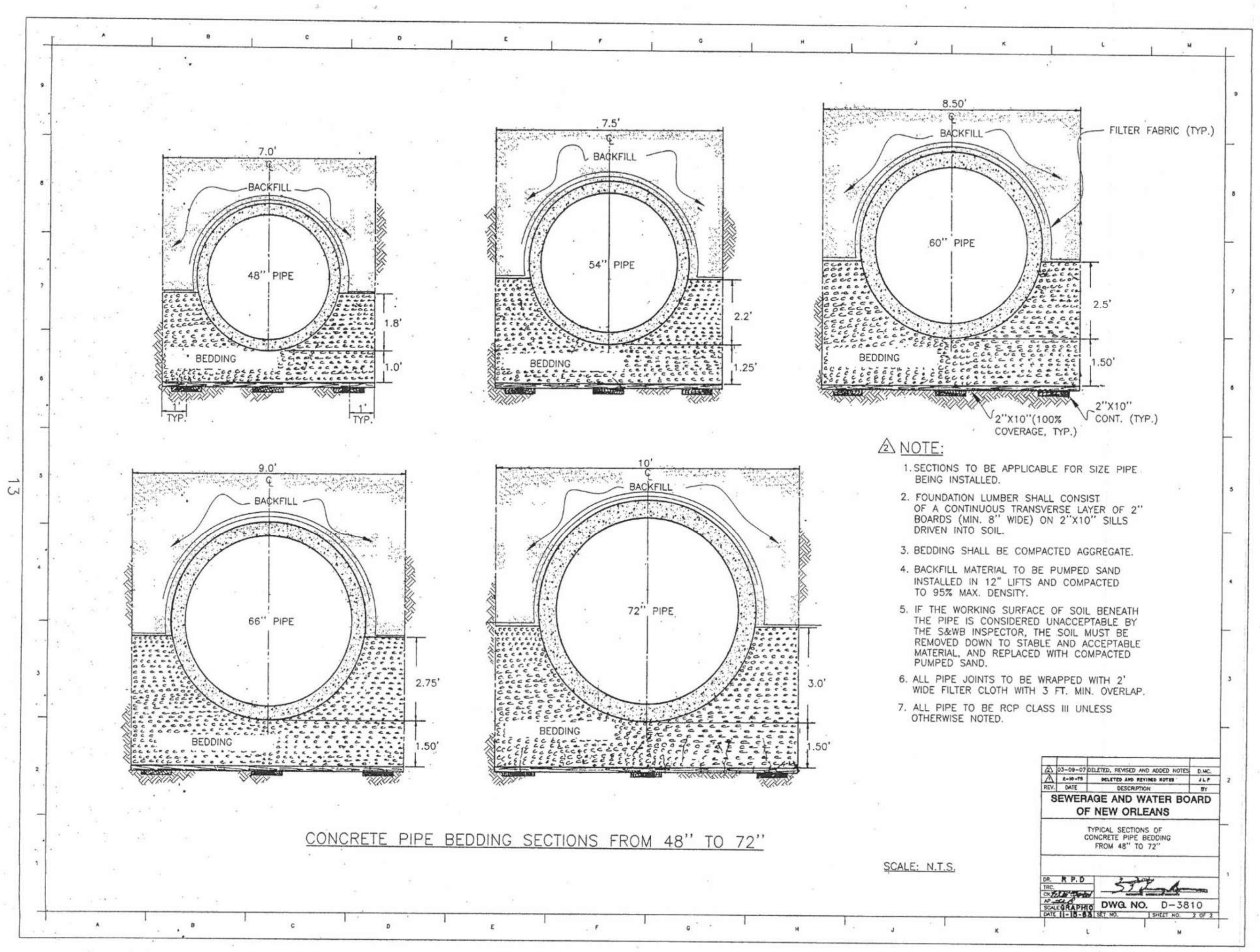






MINIMUM THRUST BLOCK DIMENSIONS	
DIMENSIONS	FOR 16" DIAMETER PIPE
B (WIDTH)	3 FEET 10 INCHES
C (DEPTH)	3 FEET
D (HEIGHT)	3 FEET 3 INCHES





REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

SWB DETAILS 1

DR. DK
TRC. DK
CK. RI
AP. XX
SCALE:
DATE: 3/20/2025 SET NO. SHEET NO. 19 OF 32

SERIES R1R ACCESS DOOR

STANDARD FEATURES:

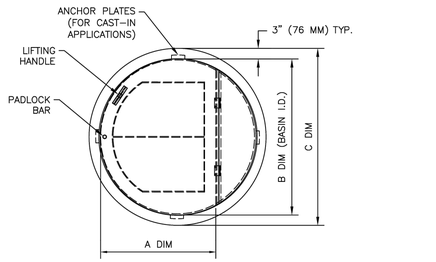
- 300 LBS. PER SQ. FT. LOAD RATING (1464 KG PER SQ. METER LOAD RATING)
- EXTRUDED ALUMINUM ANGLE FRAME
- SINGLE LEAF CONSTRUCTION FOR MAXIMUM ACCESS (TWO LEAF OPTIONAL)
- AUTO-LOCK T-316 STAINLESS STEEL HOLD OPEN ARM WITH RELEASE HANDLE
- T-316 STAINLESS STEEL HINGES AND ATTACHING HARDWARE
- NON-CORROSIVE PADLOCK BAR
- ANCHOR PLATES (ORDER WITHOUT FOR FIBERGLASS OR BOLT-IN APPLICATIONS)
- RECESSED LIFTING HANDLE
- LIFETIME GUARANTEE
- LARGER SIZES AVAILABLE

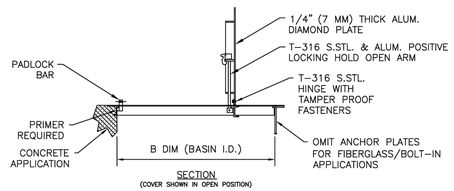
HALLIDAY PRODUCTS

www.HalldayProducts.com
Phone: (800) 298-1027
Local: (407) 298-4470
Sales@HalldayProducts.com

STANDARD SIZES

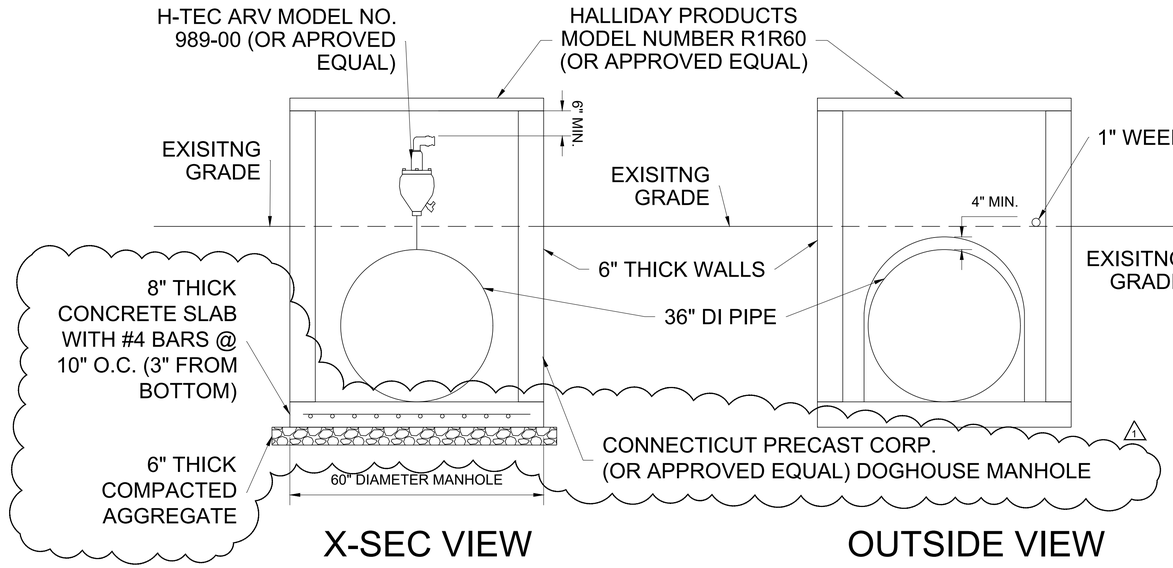
QTY.	MODEL NO.	A DIM INCHES (MM)	B DIM INCHES (MM)	C DIM INCHES (MM)	UNIT WT. LBS. (KG)
	R1R36	24 (610)	36 (914)	42 (1067)	62 (28)
	R1R48	32 (813)	48 (1219)	54 (1372)	86 (39)
	R1R60	40 (1016)	60 (1524)	66 (1676)	136 (62)
	R1R72	48 (1219)	72 (1829)	78 (1981)	175 (79)





SECTION
(COVER SHOWN IN OPEN POSITION)

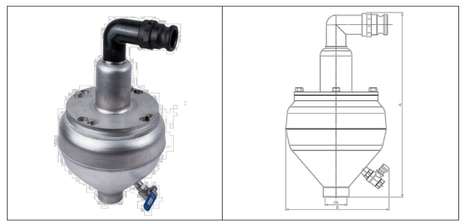
R1R SERIES RO



DOGHOUSE MANHOLE DETAIL

Automatic Air and Vacuum Valve for Waste Water

Model 989-00
Automatic air release and vacuum valve, short body, ss 316,
for operating ranges: 0 – 150 PSI (10 Bar), outdoor application possible



Type	Size ANSI	Range Of Pressure PSI/Bar	Overall Height A Inch/mm	Overall Width B Inch/mm	Weight lbs./Kg
Thread	2" FNPT	0 – 150 PSI 0 – 10 Bar	18.9" 480 mm	10.4" 265 mm	21.6 lbs. 9.8 Kg

Features:

Automatic and infinitely variable air valve for waste water applications.
Recommended for outdoor application in frost-free areas.
Maximum Operating Pressure: 150 PSI (10 Bar)
Operating Range: 0 – 150 PSI (0 - 10 Bar)
Valve body of stainless steel 316
Valve seat does not contact the medium (air cushion).
All mechanical parts are manufactured of corrosion-resistant materials.

Valve Maintenance:

Air valves must be tested for function and maintained at least once per year.

1061 Triad Court, West Oak Business Park II, Suite 5 - Marietta, GA 30062 - Phone: +1 770-818-0670 – www.h-tec.us

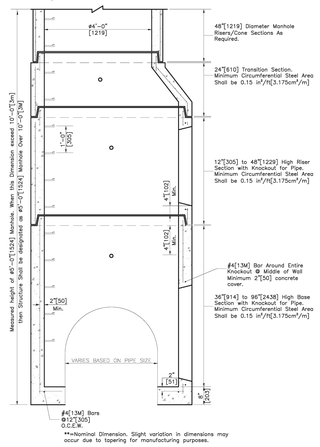
CONNECTICUT PRECAST CORP.
(OR APPROVED EQUAL)

Connecticut Precast Corp.
Manufacturers of Concrete Products
555 Fan Hill Road, Monroe, CT 06468
Telephone (203) 268-8688 Fax (203) 452-1007 www.ctprecast.com

Manholes
60"[1524] Diameter

PRECAST CONCRETE
W/DOGHOUSE STRAIGHT BASE SLAB
TRANSITION CONSTRUCTION

VERTICAL WALL VERSION



**Nominal Dimension. Slight variation in dimensions may occur due to tapering for manufacturing purposes.

Connecticut Precast Corp.

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

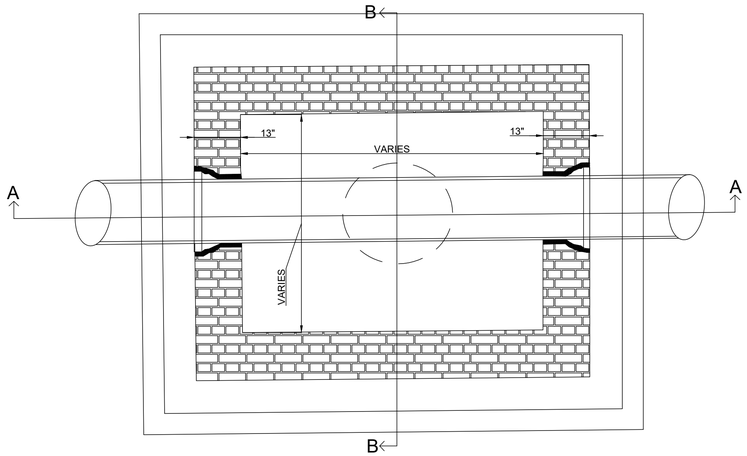
NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

SWB DETAILS 2

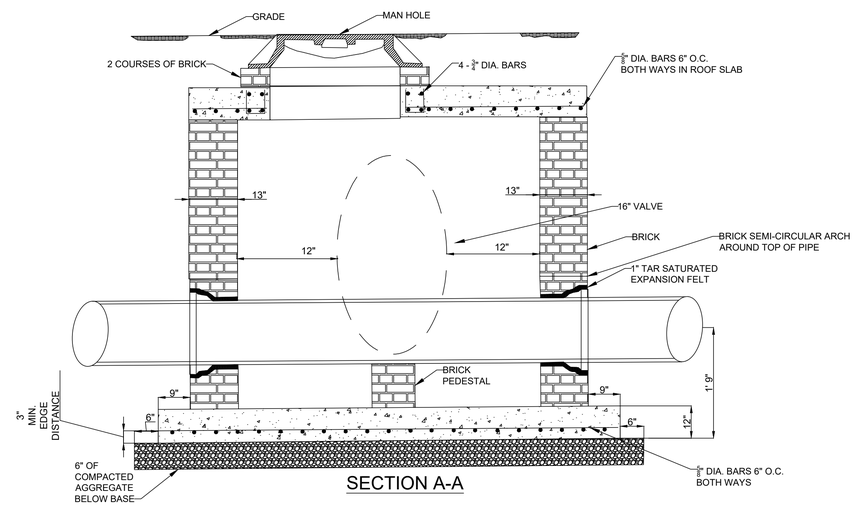
DR.	DK
TRC.	DK
CK.	RI
AP.	XX
SCALE:	
DATE:	3/20/2025

SET NO.

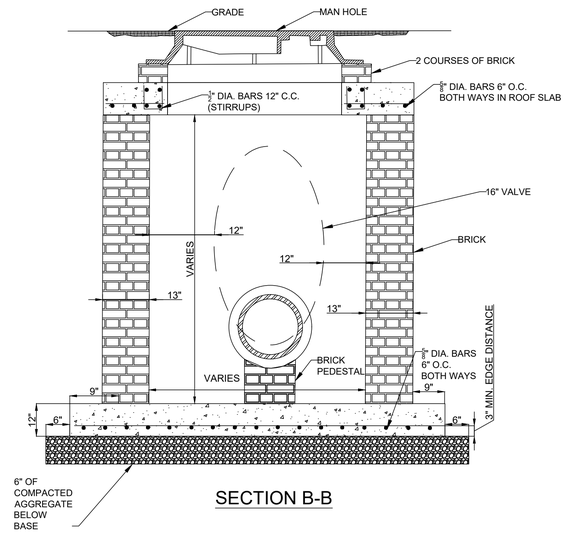
SHEET NO. 20 OF 32



16" VALVE BOX PLAN



SECTION A-A



SECTION B-B

Derek Kelly
License No. 43211
8/1/25
PROFESSIONAL ENGINEER
STATE OF LOUISIANA

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

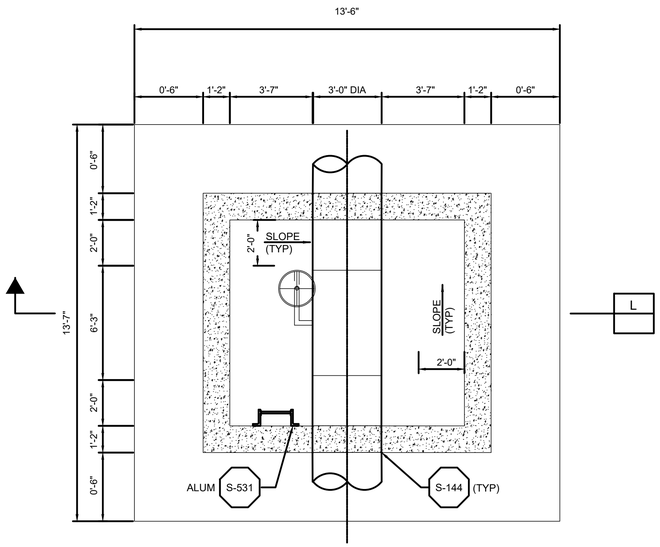
SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

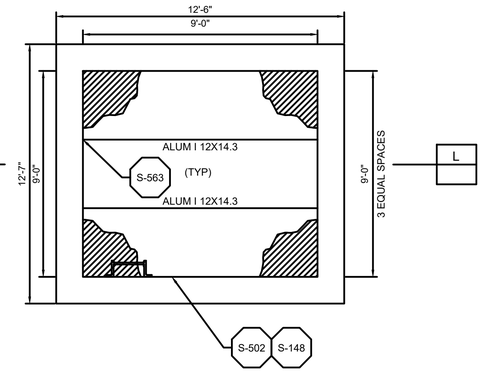
NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

SWB DETAILS 3

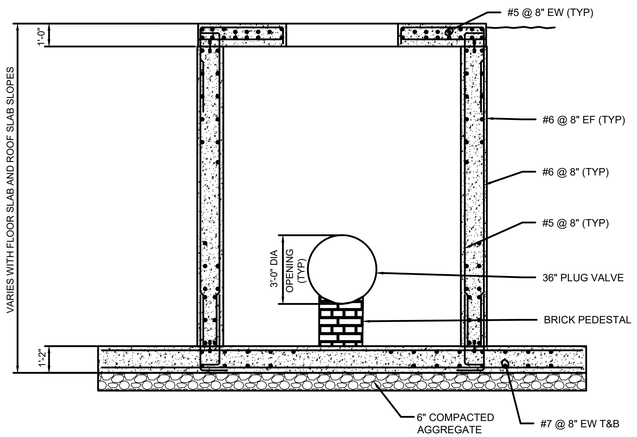
DR.	DK
TRC	DK
CK.	RI
AP.	XX
SCALE:	
DATE:	3/20/2025
SET NO.	
SHEET NO.	21 OF 32



VALVE VAULT FOUNDATION PLAN
N.T.S.



VALVE VAULT TOP PLAN
N.T.S.



SECTION L
N.T.S.

Derek Kelly
License No. 42311
8/1/25
PROFESSIONAL ENGINEER
STATE OF LOUISIANA

REV.	DATE	DESCRIPTION	BY
1	6/26/2025	ADDENDUM 1	

SEWERAGE AND WATER BOARD OF NEW ORLEANS

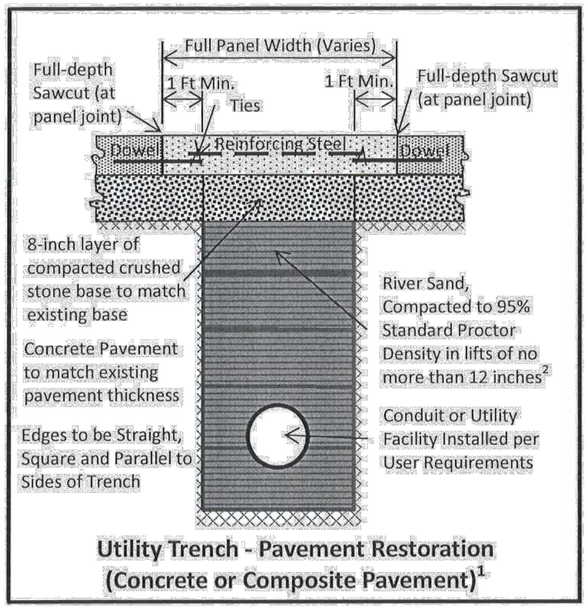
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

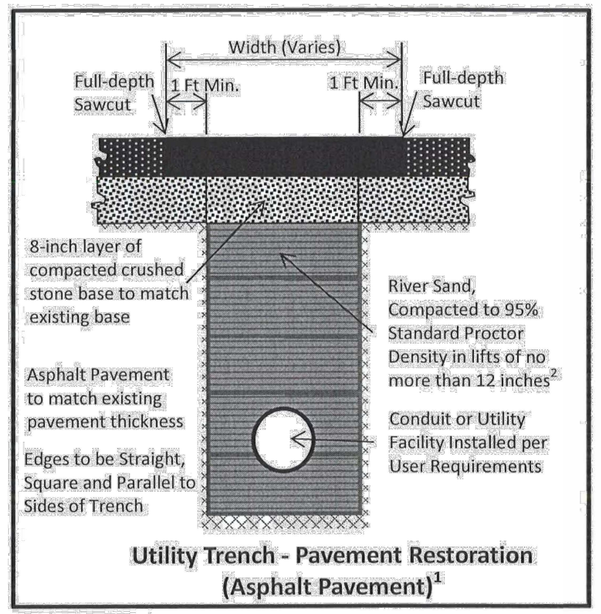
SWB DETAILS 4

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO.

SHEET NO. 22 OF 32



Utility Trench - Pavement Restoration (Concrete or Composite Pavement)[1]



Utility Trench - Pavement Restoration (Asphalt Pavement)[1]

CONCRETE PAVEMENT

. Restoration of concrete pavements and pavements with a bituminous wearing surface and concrete foundation. (Sections 146-448, 146-450, and 146-451 of the City Code)

A. The concrete for restoration of service cuts shall have a compressive strength of at least 4,500 pounds per square inch at 72 hours. On streets with a concrete base or full depth concrete paving, dowelling into the existing concrete pavement shall be employed.

B. The pavement must be restored by replacement of the full concrete panel in which the cut or part of the cut is made, unless otherwise approved/directed by the DPW Director or his designee. A panel is defined as a homogenous section bound by full original construction joints on each side.

C. The permit holder shall saw cut and remove the concrete and any wearing surface on top of the concrete base, to a depth equal to that of the pavement to be restored, unless otherwise directed by the DPW Director (in some cases, a full panel replacement may be required).

D. Cutouts outside of the trench lines must be normal or parallel to the trench line. Pavement edges shall have vertical face and be neatly aligned with the center.

E. If the extent of the cut(s) and subsequent pavement restoration is seventy-five percent (75%) or more of the pavement surface area of the street block in which the cut was made, the entire street block from intersection to intersection shall be repaved, unless otherwise approved/directed by the DPW Director.

ASPHALT PAVEMENT

. Restoration of asphalt pavements. (Section 146-455 of the City Code) NOTE: The language in this section III references language in section 146-455 of the City Code that is not consistent.

A. On streets having an asphalt pavement, the existing pavement shall be saw cut and removed in a manner that does not damage the base that is to remain in place, for a distance of at least 12 inches on each side of the width of the trench and 12 inches at each end thereof.

B. In addition to the full-depth restoration of the utility service cut, the street's wearing surface to a minimum depth of 2-1/2 inches shall be removed and replaced on the entire street block, as measured from beginning of intersection to the beginning of intersection, as part of the pavement restoration, unless otherwise approved/directed by the DPW Director, if:

1) The roadway pavement and one or more major utility lines (water, sewer, drainage) have been constructed or reconstructed within the last 5 years (3 years, if the roadway was only resurfaced) and the service cut and subsequent pavement restoration runs for more than 100 linear feet along the length of the block or covers 25% or more of the pavement surface area of the block;
2) The service cut and subsequent pavement restoration runs for more than 150 linear feet along the length of the block or covers 50% or more of the pavement surface area of the block, regardless of the age of the pavement; or
3) For purposes of this determination, the restoration of more than one separate cut made within a 12-month period shall be considered as one combined restoration effort.

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

REV.	DATE	DESCRIPTION	BY

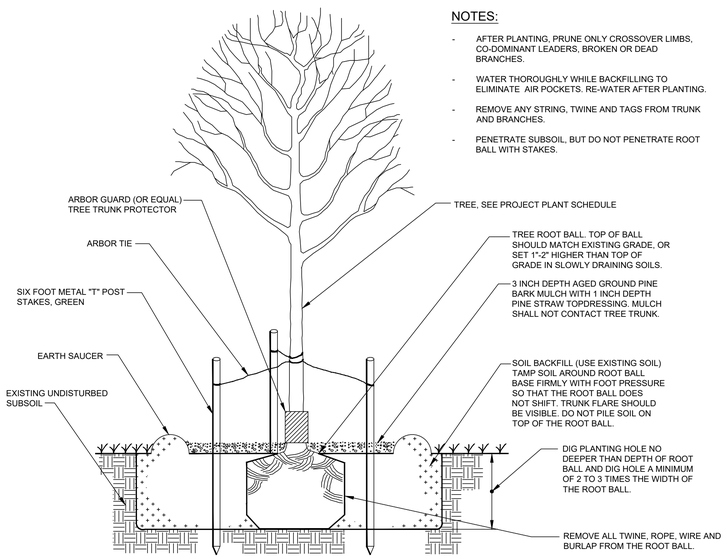
SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

DPW DETAILS 1

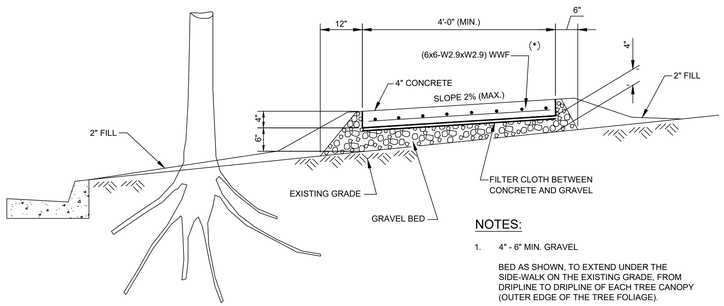
DR. DK	
TRC DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 23 OF 32



NOTES:

- AFTER PLANTING, PRUNE ONLY CROSSOVER LIMBS, CO-DOMINANT LEADERS, BROKEN OR DEAD BRANCHES.
- WATER THOROUGHLY WHILE BACKFILLING TO ELIMINATE AIR POCKETS. RE-WATER AFTER PLANTING.
- REMOVE ANY STRING, TWINE AND TAGS FROM TRUNK AND BRANCHES.
- PENETRATE SUBSOIL, BUT DO NOT PENETRATE ROOT BALL WITH STAKES.

TREE PLANTING DETAIL
N.T.S.

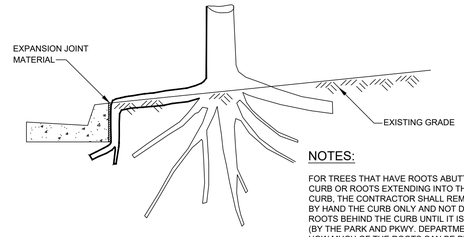


NOTES:

1. 4" - 6" MIN. GRAVEL BED AS SHOWN, TO EXTEND UNDER THE SIDE-WALK ON THE EXISTING GRADE, FROM DRIPLINE TO DRIPLINE OF EACH TREE CANOPY (OUTER EDGE OF THE TREE FOLIAGE).
2. NO MORE THAN 1.5" - 2.0" OF FILL TO BE PLACED UNDER ANY TREE CANOPY.
3. NO EXPANSION JOINTS TO BE PLACED OVER ROOTS. ONLY "WEAKENED PLANES" SHALL BE ALLOWED.

(*) WITH 1.5" - 2.0" COVER

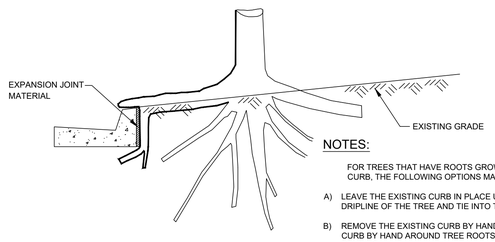
SIDEWALK GRAVEL BED
REQ'D. AT EACH TREE LOCATION
N.T.S.



NOTES:

FOR TREES THAT HAVE ROOTS ABUTTING THE CURB OR ROOTS EXTENDING INTO THE PROPOSED CURB, THE CONTRACTOR SHALL REMOVE BY HAND THE CURB ONLY AND NOT DISTURB TREE ROOTS BEHIND THE CURB UNTIL IT IS DETERMINED (BY THE PARK AND PKWY. DEPARTMENT) HOW MUCH OF THE ROOTS CAN BE PRUNED. ONCE MARKED, THE ROOTS CAN BE PRUNED BY A LICENSED ARBORIST. ELIMINATE 12" OF ROADWAY BASE BEHIND NEW CURB WHERE ROOTS ARE ENCOUNTERING THE CURB. (SEE DETAIL "A")

TYPICAL DIAGRAM NO. 1
TREE ROOTS GROWING BEHIND
EXISTING OR PROPOSED CURBS
N.T.S.



NOTES:

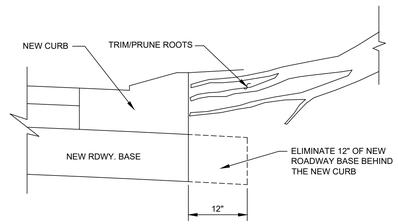
FOR TREES THAT HAVE ROOTS GROWING OVER THE CURB, THE FOLLOWING OPTIONS MAY BE POSSIBLE:

A) LEAVE THE EXISTING CURB IN PLACE UNDER THE DRIPLINE OF THE TREE AND TIE INTO THE NEW CURB.

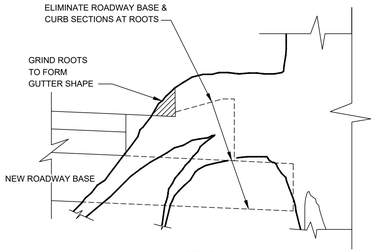
B) REMOVE THE EXISTING CURB BY HAND AND FORM NEW CURB BY HAND AROUND TREE ROOTS WITHOUT ROOT PRUNING.

C) REMOVE THE EXISTING CURB BY HAND, PRUNE ROOTS AS MARKED BY THE DEPARTMENT OF PARKS & PARKWAYS. FORM AND POUR NEW CURB.

TYPICAL DIAGRAM NO. 2
TREE ROOTS GROWING OVER CURB
N.T. S.



DETAIL "A"
DETAIL FOR ROOT PRUNING AT CURBS
REFER TO "TYPICAL DIAGRAM NO. 1"
N.T.S.



NOTES:

WHERE BIG ROOTS EXTEND INTO ROADWAY SECTION, ELIMINATE ROADWAY BASE AND CURB SECTIONS AT ROOTS, AND GRIND ROOTS TO FORM GUTTER SHAPE MATCHING ADJOINING CONCRETE GUTTERS AS PER DIRECTION OF THE DEPARTMENT OF PARKS & PARKWAYS.

TYPICAL DIAGRAM NO. 3
TREE ROOTS EXTENDING INTO
PROPOSED ROADWAY SECTION
N.T.S.

GENERAL NOTES:

(1) THE CONTRACTOR IS RESPONSIBLE FOR HIRING A LICENSED ARBORIST TO PRUNE TREE ROOTS ON CITY TREES. ALL TREE ROOTS OF CITY OWNED TREES, DAMAGED DURING REMOVAL OF CURBS, SIDEWALKS AND DRIVEWAYS SHALL BE ROOT PRUNED. ALL TREE ROOTS DAMAGED DURING ANY EXCAVATION OPERATIONS, YARD DRAINS, COLLECTOR LINES, ETC. SHALL BE ROOT PRUNED.

(2) ALL PROJECTS REQUIRE ON-SITE INSPECTION BY THE DEPARTMENT OF PARKS & PARKWAYS AND THE ARBORIST TO DETERMINE THE EXTENT OF ROOT PRUNING THAT WILL BE REQUIRED OR ALLOWED.

(3) FERTILIZATION - ONLY IF SPECIFIED BY DEPARTMENT OF PARKS & PARKWAYS ARBORIST, THE TREE ROOTS PRUNED DUE TO CONSTRUCTION SHALL BE FERTILIZED USING A WATER SOLUBLE FERTILIZER INJECTED INTO THE SOIL. THE MINIMUM ACCEPTABLE N-P-K RATIO SHALL BE 30-5-5. THE NUTRIENT COMPLEX AND RATIO (GAL/SQ. FT.) MUST BE APPROVED BY THE URBAN FORESTER OVERSEEING THE PROJECT.

(4) ONLY IF SPECIFIED BY THE DEPARTMENT OF PARKS & PARKWAYS, MYCOORHIZAL FUNGAL INOCULATE TREATMENT SHALL BE APPLIED TO CONSTRUCTION DAMAGED TREE ROOT ZONES AS APPROVED BY THE URBAN FORESTER FROM THE PARK AND PARKWAYS DEPARTMENT.

(5) TERMITE TREATMENT - ALL TREE ROOTS PRUNED DUE TO CONSTRUCTION SHALL BE TREATED FOR TERMITES WITH A TERMITICIDE APPROVED BY THE URBAN FORESTER.

(6) ALL TREES SHALL BE IRRIGATED AND MULCHED AS INDICATED IN THE SECTION 02480, "LANDSCAPE PROTECTION DURING CONSTRUCTION".

(7) ONLY IF SPECIFIED BY THE DEPARTMENT OF PARKS & PARKWAYS, CAMBISTAT GROWTH REGULATOR OR EQUIVALENT SHALL BE APPLIED TO THE TREES AS PER THE DIRECTION OF THE URBAN FORESTER OVERSEEING THE PROJECT.

CITY OF NEW ORLEANS
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

MISCELLANEOUS DETAILS FOR
TREE PLANTING & ROOT PRUNING

DRAWING No.

MC3

2/3/2015 SCALE AS NOTED

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

REV.	DATE	DESCRIPTION	BY

SEWERAGE AND WATER BOARD
OF NEW ORLEANS

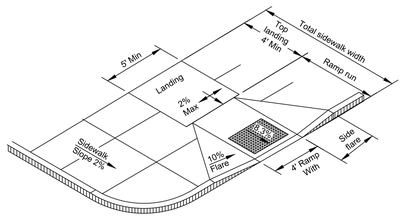
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

DPW DETAILS 2

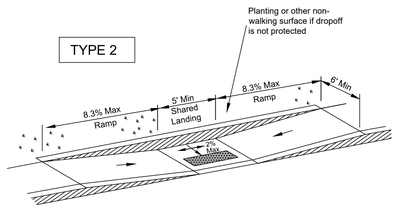
DR. DK	
TRC DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 24 OF 32

TYPE 1



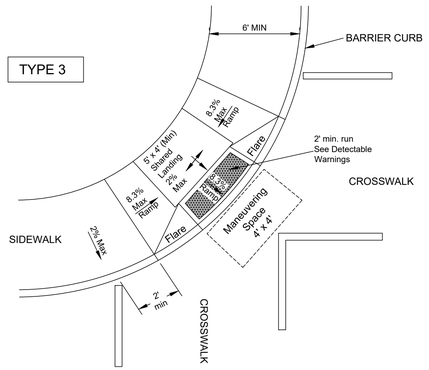
PERPENDICULAR CURB RAMP

TYPE 2



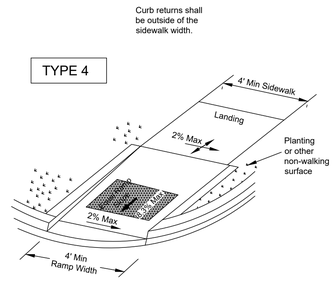
PARALLEL CURB RAMP
(Use only where water will not pond in the landing)

TYPE 3



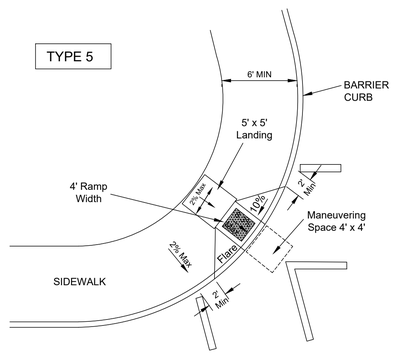
DIAGONAL COMBINATION CURB RAMP
Perpendicular to the Tangent of the Curb
Radius and Contained in Crosswalk

TYPE 4



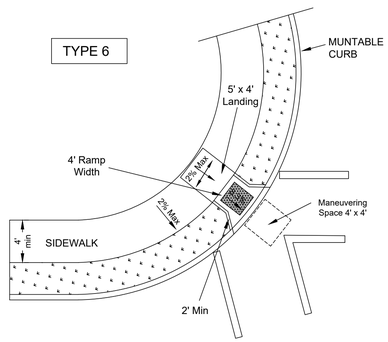
DIRECTIONAL RAMP WITHIN RADIUS
(Sidewalk set back from curb)

TYPE 5



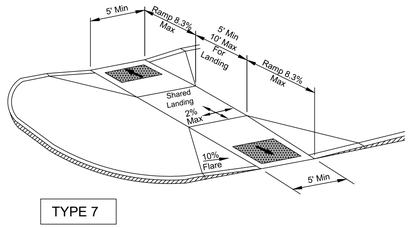
DIAGONAL CURB RAMP (FLARED SIDES)
(PERMISSION FROM CHIEF ENGINEER REQ'D)

TYPE 6

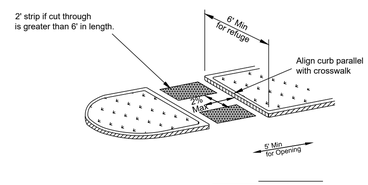


DIAGONAL CURB RAMP (RETURNED CURB)
(PERMISSION FROM CHIEF ENGINEER REQ'D)

TYPE 7



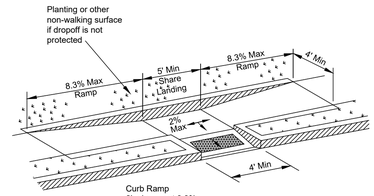
TYPE 8



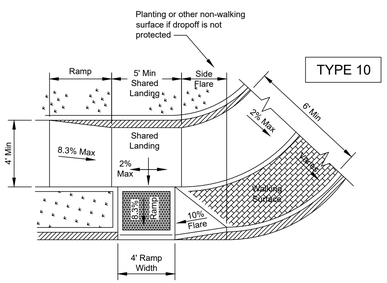
Detectable warning to be located at Face of Curb for Type 8

CURB RAMPS AT MEDIAN ISLANDS

TYPE 9

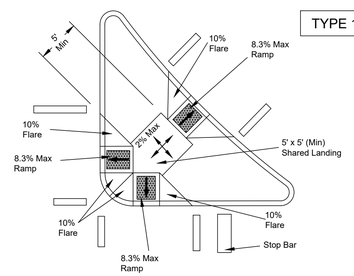


TYPE 10



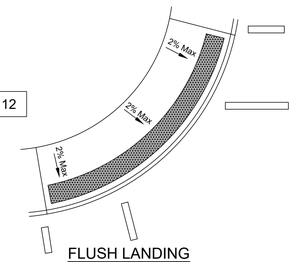
PERPENDICULAR SIDEWALK RAMP
WITH SINGLE FLARE DETAIL

TYPE 11



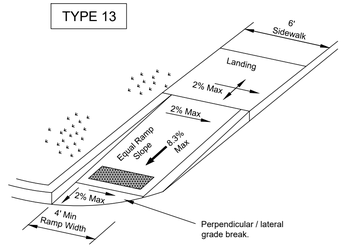
COMBINATION ISLAND RAMPS

TYPE 12



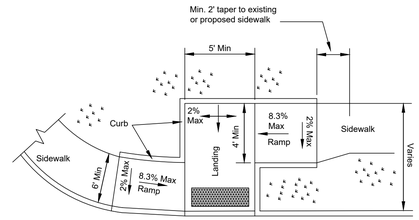
FLUSH LANDING

TYPE 13



DIRECTIONAL RAMP WITHIN RADIUS
(Sidewalk adjacent to curb)

TYPE 14

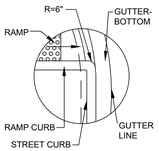


OFFSET PARALLEL CURB RAMP

NOTES:

1. See General Notes on sheet ADA2 for more information.

2. Cross slope not to exceed 2% on any portion of ramp or transition to street.



CURB RADIUS DETAIL
N.T.S.

Denotes planting or non-walking surface.

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

CITY OF NEW ORLEANS
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

CURB RAMPS
FOR
STREET CONSTRUCTION

DRAWING No.

ADA1

2/3/2015 SCALE AS NOTED

REV.	DATE	DESCRIPTION	BY

SEWERAGE AND WATER BOARD
OF NEW ORLEANS

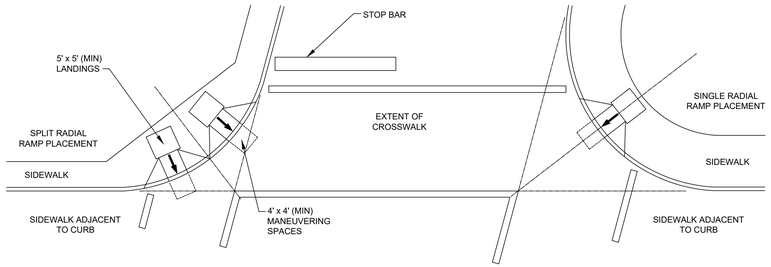
CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

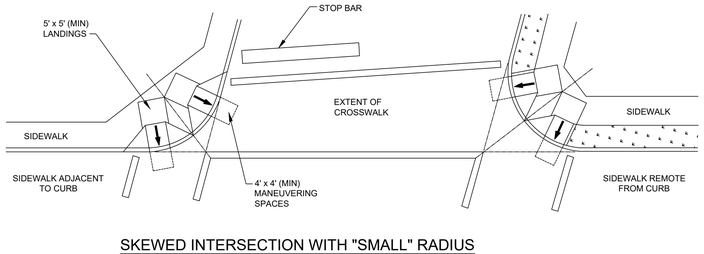
DPW DETAILS 3

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO.

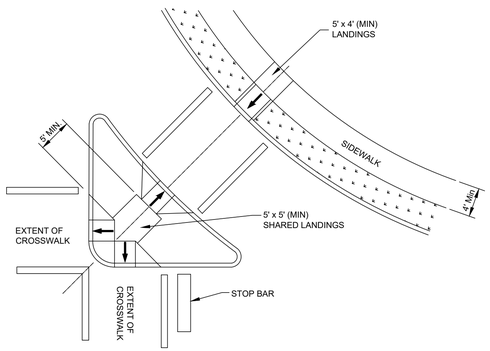
SHEET NO. 25 OF 32



SKEWED INTERSECTION WITH "LARGE" RADIUS



SKEWED INTERSECTION WITH "SMALL" RADIUS



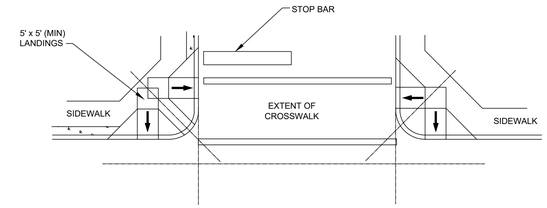
AT INTERSECTION
W/FREE RIGHT TURN & ISLAND

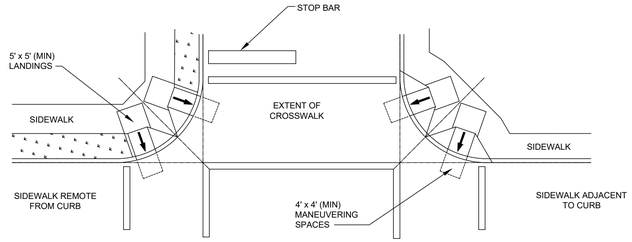
General Note:

Ramps are shown here without detectable warnings for simplicity. Detectable warnings are required at the locations shown on Sheet ADA1 and in accordance with the details shown elsewhere herein below.

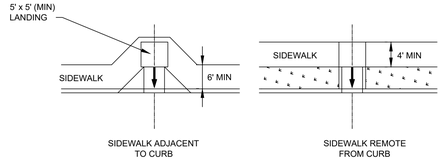
Striping (Crosswalk and stop bars) is shown for reference only.

See PM1 for Striping Layout.





NORMAL INTERSECTION



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

CITY OF NEW ORLEANS
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

INTERSECTION LAYOUT
FOR
STREET CONSTRUCTION

DRAWING No.

ADA3

2/3/2015 SCALE AS NOTED

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

REV.	DATE	DESCRIPTION	BY

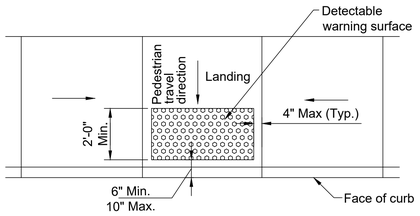
SEWERAGE AND WATER BOARD
OF NEW ORLEANS

CONTRACT 30266

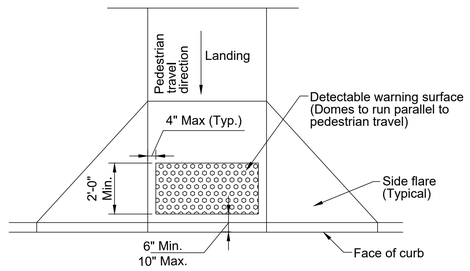
NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

DPW DETAILS 4

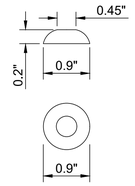
DR. DK		
TRC. DK		
CK. RI		
AP. XX		
SCALE:		
DATE: 3/20/2025	SET NO.	SHEET NO. 26 OF 32



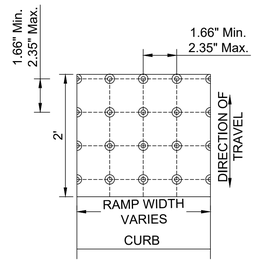
Typical placement of detectable warning surface on landing at street edge.



Typical placement of detectable warning surface on sloping ramp run.



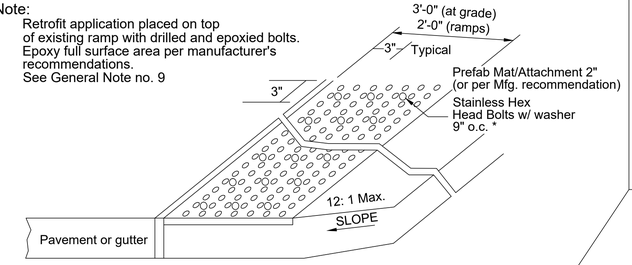
TRUNCATED DOME DETAIL



TRUNCATED DOME TEXTURE PATTERN DETAIL

Note:
Place truncated domes detectable warning texture in the lower 2' of throat of ramp only and a 3' wide pattern at "at-grade" sidewalk intersections with roadways. Domes shall be arranged in a square in-line pattern only as shown.

* Note:
Retrofit application placed on top of existing ramp with drilled and epoxied bolts. Epoxy full surface area per manufacturer's recommendations.
See General Note no. 9



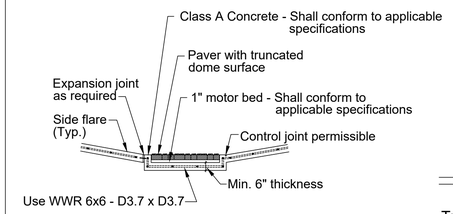
PREFABRICATED MAT OPTION
(INLAID)

Expansion material
Pavement or gutter

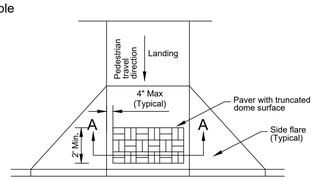
Detectable Warnings General Notes

1. For PROWAG compliance, detectable warning surfaces must be provided on all pedestrian curb ramps, medians and pedestrian refuge islands, railroad crossings and at grade sidewalk intersections with roadways.
2. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with ADA guidelines. The surface must contrast visually with adjoining surfaces, including side flares, in accordance with applicable sections of the Standard Specifications. Color for detectable warning surface shall be gray unless otherwise specified in the plans or by the project engineer.
3. Detectable warning surfaces must be slip resistant and not allow water to accumulate.
4. Align truncated domes in the direction of pedestrian travel when entering the street.
5. Detectable warning surfaces shall be a minimum of 24" in depth in the direction of pedestrian travel and extend the full width of the throat of the curb ramp or landing where the pedestrian access route enters the street.
6. Detectable warning surfaces shall be located so that the edge nearest the curb line is a minimum of 6" and maximum of 10" from the extension of the face of curb. Detectable warning surfaces may be curved along the corner radius. On flush median openings or depressed corners, truncated domes lo be located along face of curb.
7. Detectable warning surfaces (truncated domes) may be stamped, constructed of brick pavers or inlaid prefabricated mats attached by epoxy adhesive and mechanical attachment.
8. For stamped applications, the detectable warning surface will be stamped and stained in accordance with manufacturer's recommendations. However, the following criteria shall be used for the concrete mix design in the overall construction of handicap ramps:

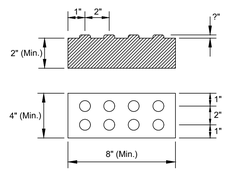
   -Average compressive strength: 4000 psi
   -Aggregate gradation: Type B pavement gradation
   -Minimum cement content: 600 pounds per cubic yard
   -Maximum water /cement ratio: 0.40
   -Total air content: 5% (+/- 2%)
   -Maximum slump: 6 inches
   -Curing: The exposed plain concrete (non-color stained concrete) surface should have a white pigment curing compound applied in such a manner that the surface and any exposed sides are evenly and uniformly covered to resemble a white sheet of paper. In no case should the application of curing compound be less than 1 gallon per 100 square feet.
9. Any retrofit application must have beveled edges on the sides with approach pedestrian traffic.
10. Where the ends of the bottom grade break ore behind the back of curb and distance from either end of the bottom grade break to the back of curb is more than 5' -0", detectable warning surfaces shall be placed on the lower landing at the back of curb.



Section A - A



TYPE A
Truncated Dome Pattern Curb Ramp
DETECTABLE WARNINGS
(Paver Option)



Paver with truncated
dome surface

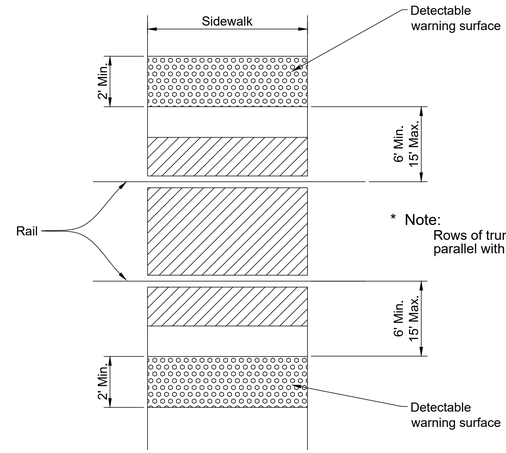
General Notes for Paver Option

Paver units shall meet all requirements of the applicable ASTM standards.
appropriate for size paver used. 4" x 8" pavers shall be laid out in a 2 x 2 basket weave pattern.
12" x 12" pavers shall be laid out in a block pattern.

Paver units shall have a truncated dome top surface for detectable warning to pedestrians.

Paver units shall be saw cut only and any cut unit shall not be less than 25 percent of a full unit.

Truncated Dome System shall be paid for in accordance with the applicable sections of the Standard Specifications.



* Note:
Rows of truncated domes shall be aligned parallel with the direction of wheel chair travel.

LOCATION OF DETECTABLE SURFACE
AT RAILROAD CROSSINGS

CITY OF NEW ORLEANS
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

CURB RAMPS
FOR
STREET CONSTRUCTION

DRAWING No.

ADA4

2/3/2015 SCALE AS NOTED

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

REV.	DATE	DESCRIPTION	BY

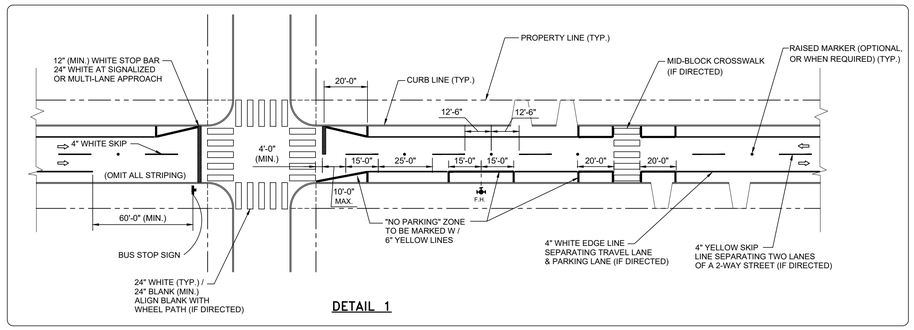
SEWERAGE AND WATER BOARD
OF NEW ORLEANS

CONTRACT 30266

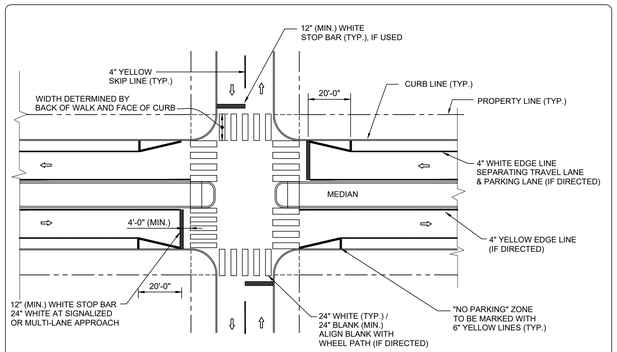
NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

DPW DETAILS 5

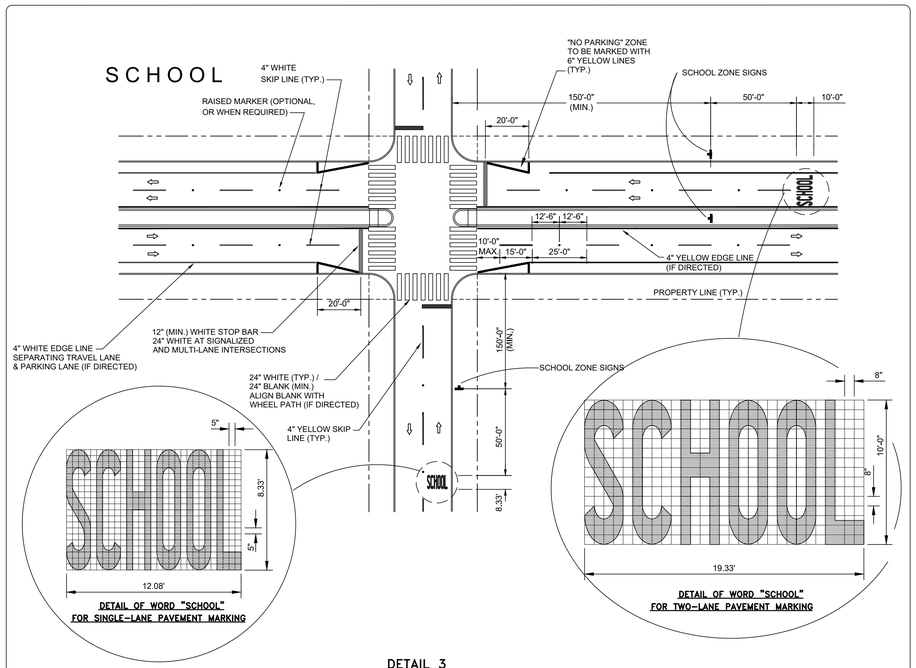
DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. SHEET NO. 27 OF 32



DETAIL 1

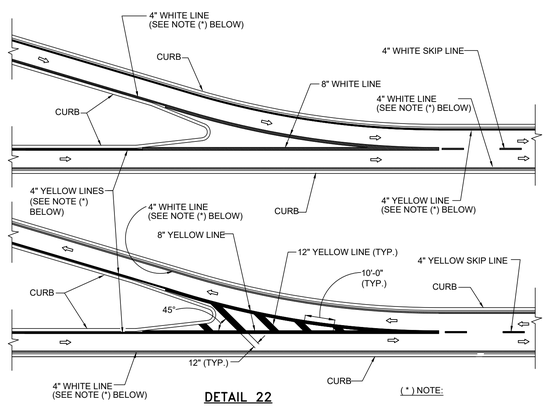


DETAIL 2



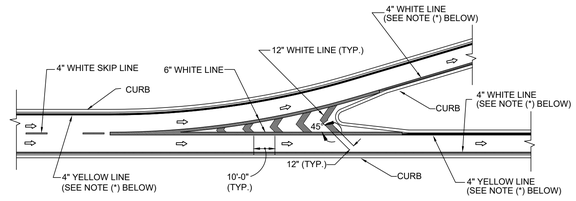
DETAIL 3

DESCRIPTION	COLOR	WIDTH	APPLICATION
SINGLE BROKEN	WHITE	4"	SEPARATION OF TRAVEL LANES IN THE SAME DIRECTION; INDICATE THAT IT IS PERMISSIBLE TO CROSS THE LINE TO CHANGE LANES; i. e., LANE LINES ON MULTILANE ROADWAYS.
	YELLOW	4"	SEPARATION OF TRAVEL LANES IN OPPOSITE DIRECTIONS; INDICATE THAT PASSING IS ALLOWED IN BOTH DIRECTIONS; i e., CENTERLINE ON TWO LANE, TWO WAY ROADWAYS.
SINGLE SOLID	WHITE	4"	SEPARATION OF TRAVEL LANES OR SEPARATION OF TRAVEL LANE AND SHOULDER; INDICATE THAT CROSSING THE LINE IS DISCOURAGED; i. e., LANE LINES AT INTERSECTION APPROACHES OR RIGHT EDGE LINES.
		6"	SEPARATION OF A MOTOR VEHICLE TRAVEL LANE FROM A BIKE TRAVEL LANE.
		8"	DELINEATION OF LOCATION WHICH INDICATES CROSSING IS STRONGLY DISCOURAGED; i. e., SEPARATION OF TURN LANES FROM THROUGH LANES OR GORE AREAS AT RAMP TERMINALS.
	YELLOW	4"	DELINEATION OF LEFT EDGE LINES ON DIVIDED ROADWAYS, ONE-WAY ROADS AND RAMPS.
DOUBLE SOLID	WHITE	4" - 4" - 4"	SEPARATION OF TRAVEL LANES IN THE SAME DIRECTION; INDICATE THAT IT IS PROHIBITED TO CROSS THE LINES; e. g., PROHIBIT LANE CHANGES ON THE APPROACH TO AN OBSTRUCTION IN THE ROADWAY BETWEEN TWO LANES IN THE SAME DIRECTION.
	YELLOW	4" - 4" - 4"	SEPARATION OF TRAVEL LANES IN OPPOSITE DIRECTIONS, WHICH INDICATE THAT PASSING IS NOT ALLOWED IN EITHER DIRECTION. LEFT TURN MANEUVERS ACROSS THIS MARKING ARE PERMITTED. ALSO USED IN ADVANCE OF OBSTRUCTIONS WHICH MAY BE PASSED ONLY ON THE RIGHT SIDE.
SOLID PLUS BROKEN	YELLOW	4" - 2" - 4"	SEPARATION OF TRAVEL LANES IN OPPOSITE DIRECTIONS; INDICATE THAT PASSING IS ALLOWED FOR VEHICLES ADJACENT TO THE BROKEN LINE, BUT PROHIBITED FOR VEHICLES ADJACENT TO SOLID LINE. USED ON TWO-WAY ROADWAYS WITH TWO OR THREE LANES. ALSO USED TO DELINEATE EDGES OF A TWO-WAY LEFT TURN LANES (SOLID ON THE OUTSIDE BROKEN LINES ON THE INSIDE).
DOUBLE BROKEN	YELLOW	4" - 4" - 4"	DELINEATES THE EDGES OF REVERSIBLE LANES.
SINGLE DOTTED	BOTH	4"	AN EXTENSION OF A LANE LINE OR CENTERLINE THROUGH AN INTERSECTION OR A CURVED DOTTED LINE THROUGH AN INTERSECTION TO HELP GUIDE TURNING VEHICLES AS THEY MOVE THROUGH THEIR TURN. MAY EXTEND AN EDGELINE, ESPECIALLY WHERE THE ROAD WIDENS FOR AN ADDED LANE FOR DECELERATION OR FOR TURNING.
	WHITE	8"	SEPARATION OF THROUGH LANE AND AUXILIARY LANE OR DROPPED LANE.
TRANSVERSE	WHITE	6"	CROSSWALK EDGE LINES AT MINOR INTERSECTIONS, IF DIRECTED.
		12"	STOP BARS AT MINOR INTERSECTIONS CROSSWALK EDGE LINES AT MAJOR INTERSECTIONS, IF DIRECTED.
		24"	STOP BARS AT MAJOR INTERSECTIONS HIGH-VISIBILITY, LONGITUDINAL CROSSWALK STRIPING.
DIAGONAL	WHITE	12"	CROSSHATCH MARKINGS, PLACED AT AN ANGLE OF 45° AT VARYING DISTANCES APART, ON SHOULDERS OR CHANNELIZATION ISLANDS TO ADD EMPHASIS TO THESE ROADWAY FEATURES.



DETAIL 22

TYPICAL GORE MARKINGS
FOR ONE-WAY AND TWO-WAY STREETS



(*) NOTE:

4" WHITE & YELLOW EDGE LINES ARE OPTIONAL FOR CITY'S STREETS

CITY OF NEW ORLEANS
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

TYPICAL APPLICATION
OF
PAVEMENT MARKINGS

DRAWING No.

PM1

2/3/2015

SCALE
AS NOTED

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

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DPW DETAILS 6

DR. DK	
TRC. DK	
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SCALE:	
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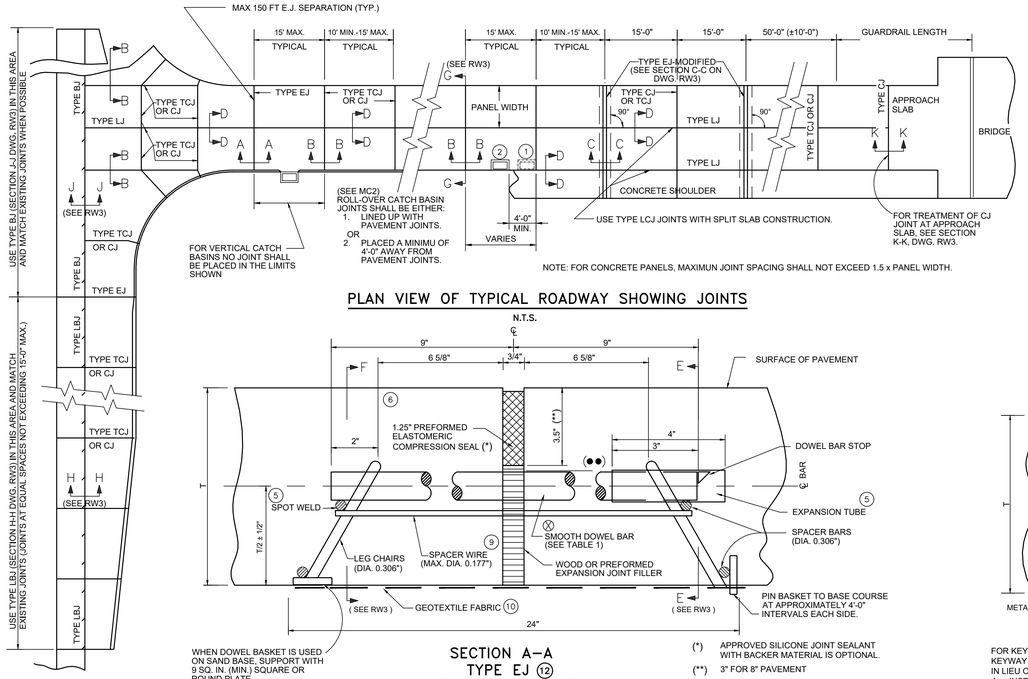


NOTE: FOR CONCRETE PANELS, MAXIMUN JOINT SPACING SHALL NOT EXCEED 1.5 x PANEL WIDTH.

PLAN VIEW OF TYPICAL ROADWAY SHOWING JOINTS

N.T.S.

SECTION A–A
TYPE EJ (12)
(TRANSVERSE EXPANSION JOINT)

N.T.S.

(*) APPROVED SILICONE JOINT SEALANT WITH BACKER MATERIAL IS OPTIONAL.

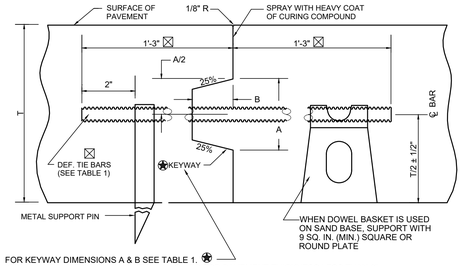
(**) 3" FOR 8" PAVEMENT

(●●) THIS HALF OF DOWEL SHALL BE GREASED.

TABLE 1
(ALL DIMENSIONS IN INCHES)

PAVEMENT THICKNESS	SMOOTH DOWEL BARS ⊗			DEF. TIE BARS ⊠			MINIMUM DEPTH OF JOINT		KEYWAY ❀	
T △	SIZE	LENGTH	SPACING	SIZE	LENGTH	SPACING	TCJ & CJ ±1/4"	LJ ±1/4"	A ±1/4"	B ±1/4"
7 OR LESS	1	18	12	1/2	24	24	2-1/2	2-1/2	ALLOW 7"	
8	1-1/4	18	12	1/2	24	24	3	3	2-1/2	1-1/4
9	1-1/4	18	12	1/2	24	24	3	3-1/2	2-1/2	1-1/4
10	1-1/2	18	12	1/2	24	24	3-1/2	4	2-1/2	1-1/4
11	1-1/2	18	12	5/8	30	24	3-1/2	4	2-1/2	1-1/4
12	1-1/2	18	12	5/8	30	24	4	4-1/2	3	1-1/2
13	1-1/2	18	12	5/8	30	24	4	4-1/2	3	1-1/2
14	1-1/2	18	12	5/8	30	24	4-1/2	5	3	1-1/2

△ FOR CONC. SHOULDERS, " T " IS THE THICKNESS AT PAVEMENT EDGE.



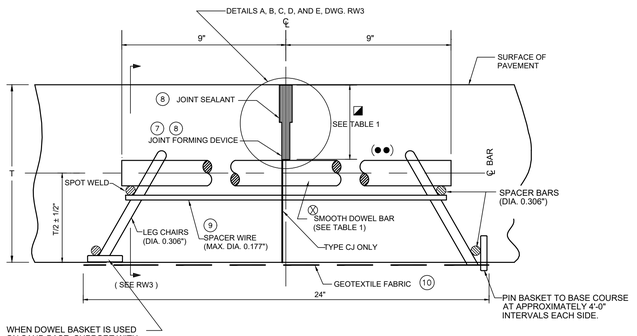
FOR KEYWAY DIMENSIONS A & B SEE TABLE 1. ❀
KEYWAY UTILIZATION SHALL NOT BE ALLOWED FOR PAVEMENT THICKNESS LESS THAN 8".
IN LIEU OF THE KEYWAY, ONE OF THE FOLLOWING OPTIONS WILL BE ALLOWED (FOR ALL CASES):
A. INSTALL TIE BARS OF THE SIZE SHOWN IN TABLE 1 AT 1/2 OF THE SPACING.
B. INSTALL TIE BARS HAVING DIAMETERS 1/4" LARGER THAN THE DIAMETERS SHOWN IN TABLE 1, AT THE SAME SPACING).

TYPE LCJ
(LONGITUDINAL CONSTRUCTION JOINT)

N.T.S.

GENERAL STREET CONSTRUCTION NOTES:

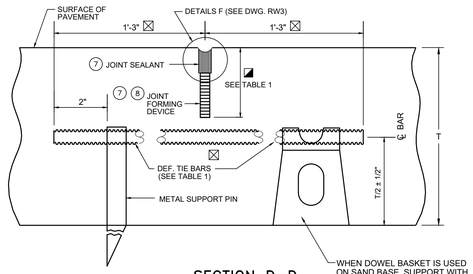
1. PAVEMENT EDGES SHALL BE SLIGHTLY ROUNDED TO APPROXIMATELY 1/4".
2. ASPHALTIC CONCRETE JOINING P.C.C.P. OR ASPHALTIC CONCRETE SHOULDER: THE ASPHALT JOINT SHALL BE SAW CUT AND CONSTRUCTED IN ACCORDANCE WITH SECTION I-I, DRAWING RW3.
3. FOR SECTIONS C-C, E-E, F-F, G-G, H-H, I-I, J-J, AND K-K SEE DRAWING RW3.
4. ALL JOINTS ARE TO BE USED WHERE SHOWN ON THIS SHEET OR AS SHOWN ELSEWHERE IN THE PLANS OR AS OTHERWISE DIRECTED BY THE ENGINEER.
5. ON TYPE EJ JOINTS, SPOT WELD ALTERNATE ENDS OF DOWEL BARS TO DOWEL BASKETS AND PLACE EXPANSION TUBES ON FREE ENDS OF DOWEL BARS. (SECTION A-A)
6. TYPE EJ JOINTS SHALL BE SEALED WITH PREFORMED ELASTOMERIC COM-PRESSION JOINT SEALS CONFORMING TO SUBSECTION 1005.03 OF DOTD "LOUISIANA STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES", LATEST EDITION. THE SEALS SHALL HAVE A NOMINAL WIDTH OF 1-1/4" BEFORE COMPRESSION. JOINTS SHALL BE CLEANED PRIOR TO SEALING.
7. FOR DESIGN SPEEDS OF 45 MPH OR GREATER:
   A. TYPE LJ JOINTS SHALL BE SAW CUT AND CONSTRUCTED AS IN DETAIL "F" DRAWING RW3. THE JOINT SHALL BE SAW CUT AND CLEANED PRIOR TO SEALING WITH A JOINT SEALANT CONFORMING TO SUBSECTION 1005.02(b) OR (c) OF THE AFOREMENTIONED DOTD SPECIFICATIONS.
   B. TYPE TCJ OR CJ SHALL BE SAW CUT AS SHOWN IN DETAIL "C" OR "D" DRAWING RW3 AND TO THE DEPTH SHOWN IN TABLE 1. THE JOINT SHALL BE SAND BLASTED AND CLEANED IMMEDIATELY PRIOR TO SEALING. THE INITIAL CUT SHALL BE MADE WITH 1/8" MINIMUM BLADE. THE SEALANT SHALL BE A PREFORMED ELASTOMERIC SEAL IN AC-CORDANCE WITH SUBSECTION 1005.03 OR A SILICONE SEALANT IN ACCORDANCE WITH SUBSECTION 1005.02(c) OF THE AFOREMENTIONED DOTD SPECIFICATIONS.
8. FOR DESIGN SPEEDS OF LESS THAN 45 MPH:
   A. TYPE LJ JOINTS SHALL BE SAW CUT AS DESCRIBED IN 7(A).
   B. TYPE TCJ OR CJ SHALL BE CONSTRUCTED AS FOLLOWS:
      (1) CONSTRUCTED AS DESCRIBED IN 7(B).
      (2) WITH A REMOVABLE FORMING DEVICE AS SHOWN IN DETAILS "A" AND "B" DRAWING RW3. THE JOINT SHALL BE SAND BLASTED AND CLEANED IMMEDIATELY PRIOR TO SEALING AND MAY REQUIRED SAWING TO ACHIEVE PROPER RESERVOIR DIMENSIONS.
      (3) WITH A COMBINATION JOINT FORMER/SEALER AS SHOWN IN DETAIL "E" DRAWING RW3. THE SEALANT SHALL CONFORM TO SUBSECTION 1005.04 AND BE INSTALLED IN ACCORDANCE WITH SUBSECTION 601.09(c)(3) OF THE AFOREMENTIONED DOTD SPECIFICATIONS AND NO ADDITIONAL SEALANT IS REQUIRED.
9. EXCEPT AS NOTED BELOW, DOWEL BARS & TIE BARS SHALL BE HELD IN PLACE BY SUPPORTS SIMILAR TO THE ONES SHOWN, OR APPROVED EQUALS. APPROVED MECHANICAL PLACEMENT OF DOWEL BARS AND TIE BARS WILL BE ALLOWED WITH ALL PAVING METHODS. WHEN DOWEL BAR BASKETS ARE USED, APPROXIMATELY THE CENTER 7" OF SPACER WIRES, THAT SPANS ACROSS THE JOINT, SHALL BE CLIPPED AND REMOVED AFTER STAKING BASKETS IN PLACE.
10. INSTALL GEOTEXTILE FABRIC UNDER ALL TCJ, CJ, AND EJ JOINTS WHEN CONCRETE PAVEMENT IS PLACED ON UNSTABILIZED OR UNTREATED BASE COURSES OR SUBBASES. WHEN DOWEL BARS ARE MECHANICALLY IMPLANTED, THE GEOTEXTILE FABRIC SHALL BE ANCHORED TO THE BASE COURSE WITH PINS.
11. WHEN CONSTRUCTING CONCRETE CURB AND GUTTER ADJACENT TO NEW P.C.C. PAVEMENT, USE TYPE LCJ JOINT. WHEN ADJACENT TO EXISTING P.C.C. PAVEMENT, USE TYPE LBJ JOINT. THE FIRST LOAD TRANSFER DEVICE SHALL BE INSTALLED 18" FROM THE PAVEMENT EDGE.
12. TRANSVERSE EXPANSION JOINTS SHALL NOT BE USED FOR CONSTRUC-TION JOINTS.
13. CONCRETE SHOULDERS:
   A. CONSTRUCT TCJ JOINTS IN ACCORDANCE WITH SECTION B-B.
   B. CONSTRUCT LCJ JOINTS IN ACCORDANCE WITH TYPE LCJ DETAIL ON THIS SHEET AND LJ JOINTS IN ACCORDANCE WITH SECTION D-D.
   C. USE THE MAXIMUM SHOULDER THICKNESS WHEN DETERMINING DOWEL BAR AND TIE BAR SIZES IN TABLE 1.
   D. WHEN SKEWED JOINTS ARE USED ON MAINLINE PAVING THE SHOULDER TCJ JOINTS MAY BE SKEWED OR CONSTRUCTED AT 90°.
   E. SHOULDER JOINTS AND JOINT MATERIALS WILL MATCH THE MAINLINE.
   F. HEIGHT OF DOWEL BASKETS WILL BE BASED ON THE SHOULDER THICKNESS. ALSO VARYING HEIGHT DOWEL BASKETS WILL BE ALLOWED.
14. TIE BARS SHALL NOT BE PLACED WITHIN 18" OF CONTRACTION OR EXPANSION JOINTS.
15. FOR REINFORCED STEEL, SEE DOTD SPECIFICATIONS SECTION 1009



SECTION B–B
TYPE TCJ OR CJ
(TRANSVERSE CONTRACTION JOINT OR TRANSVERSE CONSTRUCTION JOINT)

N.T.S.

(●●) ALTERNATE ENDS THAT ARE NOT WELDED SHALL BE GREASED.



SECTION D–D
TYPE LJ
(LONGITUDINAL JOINT)
(REQUIRED WHEN PAVEMENT WIDTH EXCEEDS 15')
(SEE NOTE ◯)

N.T.S.

CITY OF NEW ORLEANS
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

TYPICAL ROADWAY SECTIONS FOR STREET CONSTRUCTION

DRAWING No.

RW2

2/3/2015 SCALE AS NOTED

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
CIVIL
7/1/2025

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SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

DPW DETAILS 7

DR. DK	
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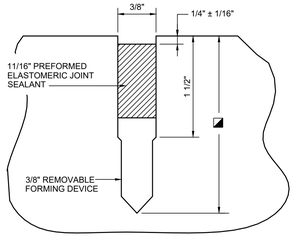
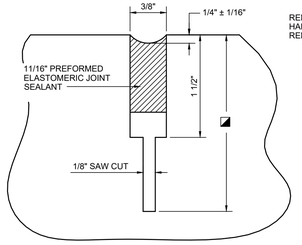
SCALE:	
DATE: 3/20/2025	SET NO. / SHEET NO. 29 OF 32



DETAIL "A"



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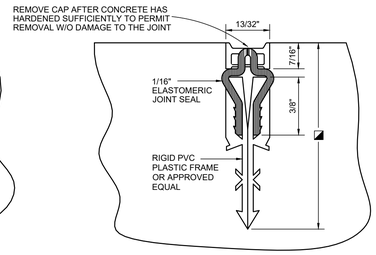
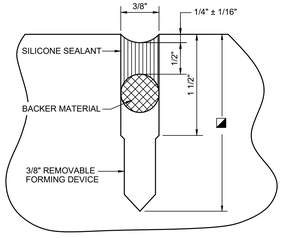


DETAIL "E"



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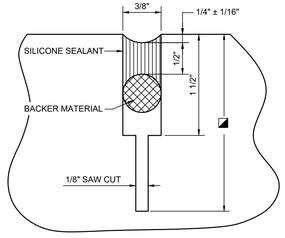
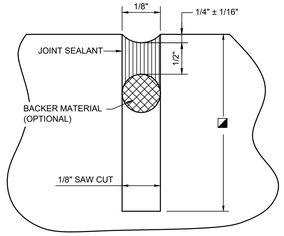


DETAIL "D"



DETAIL "F"

NOTES:

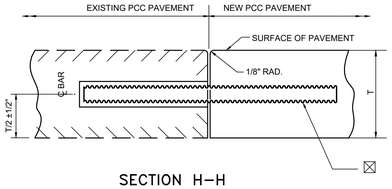
1. USE DETAILS "A" THRU "E" IN CONJUNCTION WITH TYPE TCJ AND CJ JOINTS (SECTION B-B); TYPE BJ JOINTS (SECTION J-J); AND NOTES (7) AND (8) ON DWG. RW2.
2. ◪ SEE TABLE I ON DWG. RW2

DETAILS "A" THRU "F"

N.T.S.

NOTES:

USE DETAIL "F" IN CONJUNCTION WITH TYPE LJ JOINT (SECTION D-D) AND NOTES (7) AND (8) ON DWG. RW2.



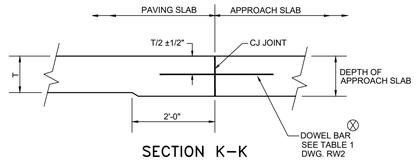
SECTION H-H
TYPE LBJ
(LONGITUDINAL BUTT JOINT)

(DWG. RW2)
N.T.S.

☒ DEFORMED TIE BARS SHALL BE INSTALLED IN EXISTING PAVEMENT BY DRILLING HOLES 1/8" LARGER, IF EPOXY IS USED OR 1/2" LARGER IF GROUT USED, THAN THE DIAMETER OF THE TIE BAR TO A REQUIRED DEPTH OF 1/2 BAR LENGTH. THE HOLES SHALL BE FILLED WITH AN APPROVED ADHESIVE ANCHOR SYSTEM (QPL 52) OR TYPE I, GRADE C EPOXY RESIN BEFORE INSERTION OF THESE BARS. THE TIE BARS SIZE AND SPACING SHALL BE ONE OF THE FOLLOWING:

A. WHEN TIE BARS OF THE SIZE SHOWN IN TABLE 1, DRAWING RW2, ARE USED, THE BARS SHALL BE PLACED AT 1/2 SPACING.

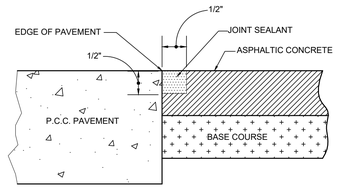
B. WHEN TIE BARS 1/4" LARGER THAN TIE BAR DIAMETER SHOWN IN TABLE 1, ARE USED, THE BARS SHALL BE PLACED AT THE SAME SPACING.



SECTION K-K

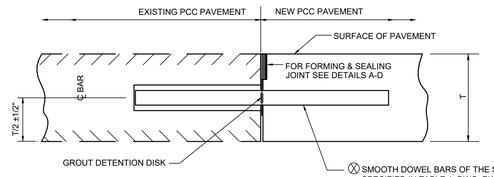
TYPE CJ AT APPROACH SLAB
FOR DETAILS NOT SHOWN SEE TYPE CJ, DWG. RW4
(SECTION B-B AND RELATED DETAILS)

(DWG. RW2)
N.T.S.



SECTION I-I
HOT POURED SEALANT

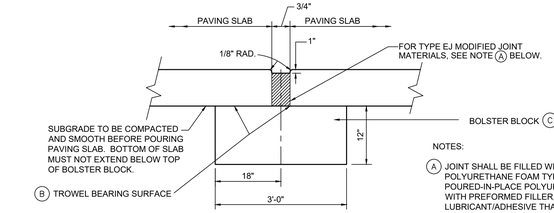
(DWG. RW2)
N.T.S.



SECTION J-J
TYPE BJ
(TRANSVERSE BUTT JOINT)

(DWG. RW2)
N.T.S.

Ⓧ SMOOTH DOWEL BARS OF THE SIZE & LENGTH AS SPECIFIED IN TABLE 1, DWG. RW2, SHALL BE USED. THE BARS SHALL BE PLACED IN THE EXISTING PAVEMENT BY DRILLING HOLES 1/8" LARGER THAN THE DIA. OF THE DOWEL BAR TO A DEPTH OF 1/2 THE BAR LENGTH AND FILLING THE HOLES WITH APPROVED TYPE I, GRADE C EPOXY RESIN BEFORE INSERTING THE DOWEL BARS. (SEE TABLE 1, DWG. RW2).



SECTION C-C
DWG. RW2
TYPE EJ MODIFIED

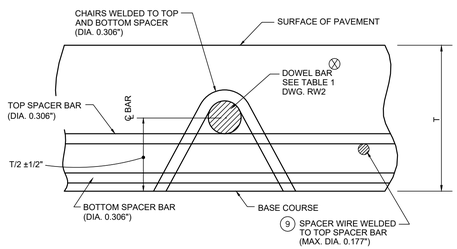
N.T.S.

NOTES:

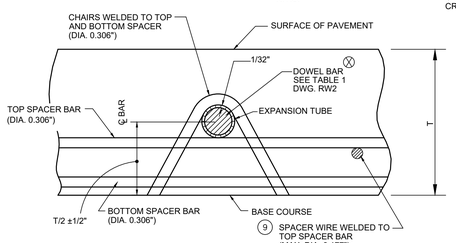
(A) JOINT SHALL BE FILLED WITH A PRE- FORMED POLYURETHANE FOAM TYPE FILLER OR A POURED-IN-PLACE POLYURETHANE FOAM. WITH PREFORMED FILLER, USE A SUITABLE LUBRICANT/ADHESIVE THAT IS INSENSITIVE TO MOISTURE.

(B) ONE LAYER OF 55-LB. TAR PAPER SHALL BE PLACED BETWEEN THE BOLSTER BLOCK AND THE PAVING SLABS.

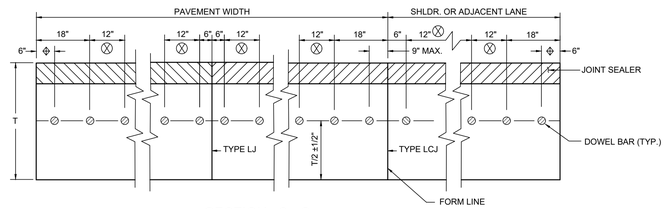
(C) BOLSTER BLOCK SHALL BE CONSTRUCTED OF CLASS "A" OR PAVEMENT TYPE CONCRETE AT NO DIRECT PAY.



SECTION F-F
(DWG. RW2)
N.T.S.



SECTION E-E
(DWG. RW2)
N.T.S.



⌖ 9" WHEN MECHANICAL PLACEMENT OF DOWEL BARS IS USED WITH FORM PAVING. ALSO, SEE NOTE ◯ DWG. RW2.

SECTION G-G
DOWEL BAR SPACING FOR TYPE TCJ, CJ, AND EJ JOINTS

(DWG. RW2)
N.T.S.

Ⓧ SEE TABLE 1 DWG. RW2

CITY OF NEW ORLEANS
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

TYPICAL ROADWAY SECTIONS
FOR
STREET CONSTRUCTION

DRAWING No.

RW3

2/3/2015 SCALE AS NOTED

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

REV.	DATE	DESCRIPTION	BY

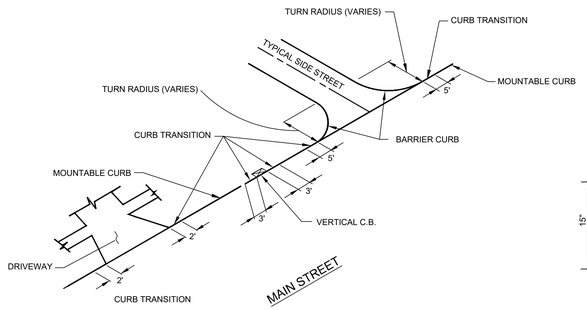
SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

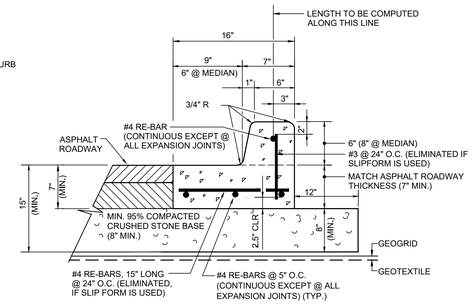
DPW DETAILS 8

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. / SHEET NO. 30 OF 32



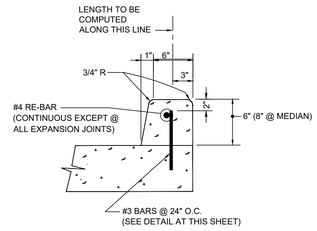
LOCATIONS OF CURB TRANSITION

N.T.S.



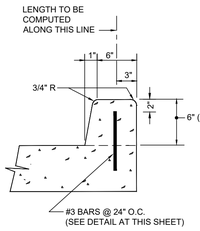
BARRIER CURB & GUTTERBOTTOM

N.T.S.



DOWELED BARRIER CURB

N.T.S.

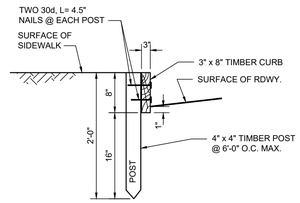


INTEGRAL BARRIER CURB

N.T.S.

NOTES:

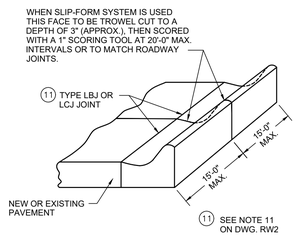
(1) ALL CONCRETE GUTTERBOTTOM AND CURBS TO BE 4000 PSI EXCEPT AS OTHERWISE INDICATED.



NOTE:
TIMBER TO BE TREATED NO. 1 COMMON PINE (12 Lbs./Cf.)

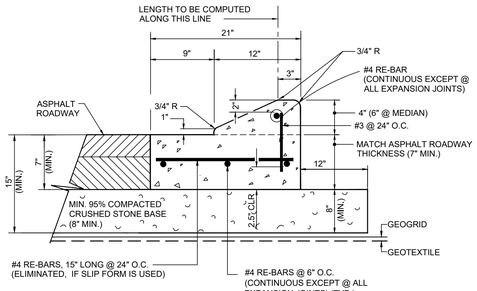
TYPICAL SECTION OF TIMBER CURB

N.T.S.



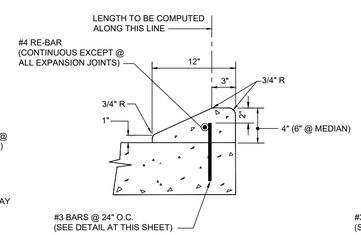
DETAIL SHOWING JOINTS IN CONCRETE CURB AND GUTTER

N.T.S.



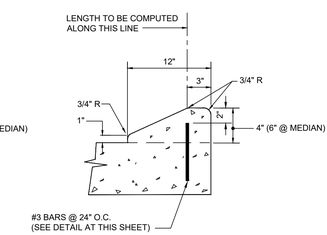
MOUNTABLE CURB & GUTTERBOTTOM

N.T.S.



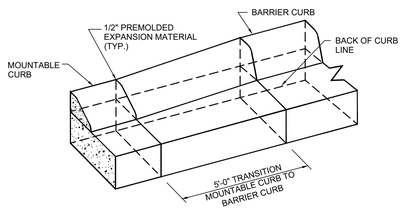
DOWELED MOUNTABLE CURB

N.T.S.



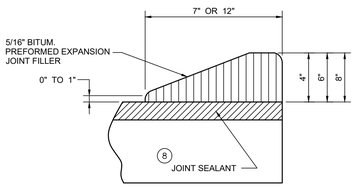
INTEGRAL MOUNTABLE CURB

N.T.S.



MOUNTABLE–BARRIER CURB TRANSITION

N. T. S.

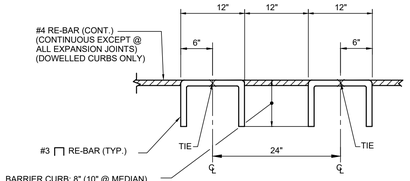


(8) SEE NOTE 8 ON DWG RW2

NOTE:
WHEN CURB IS POURED MONOLITHICALLY WITH PAVEMENT, THE BITUMINOUS PRE-FORMED EXPANSION JOINT FILLER SHALL EXTEND TO BOTTOM OF JOINT INSERT.

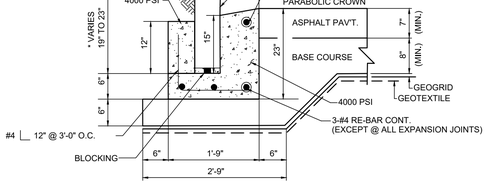
JOINT FILLER DETAIL FOR INTEGRAL CONCRETE CURB (MOUNTABLE OR BARRIER TYPE)

(MOUNTABLE CURB IS SHOWN)
N.T.S.



DETAIL A

SHOWING DIMENSIONS AND SPACING OF DEF. REINF. STEEL BARS FOR CONC. CURB
N.T.S.



TYPICAL GRANITE BLOCK CURBING

*APPROX. 19" TO 23" (ASSUME EXIST. GRANITE CURB IS 19" HIGH)
N.T.S.

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

CITY OF NEW ORLEANS
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

TYPICAL ROADWAY SECTIONS FOR STREET CONSTRUCTION

DRAWING No.

RW4

2/3/2015 SCALE AS NOTED

REV.	DATE	DESCRIPTION	BY

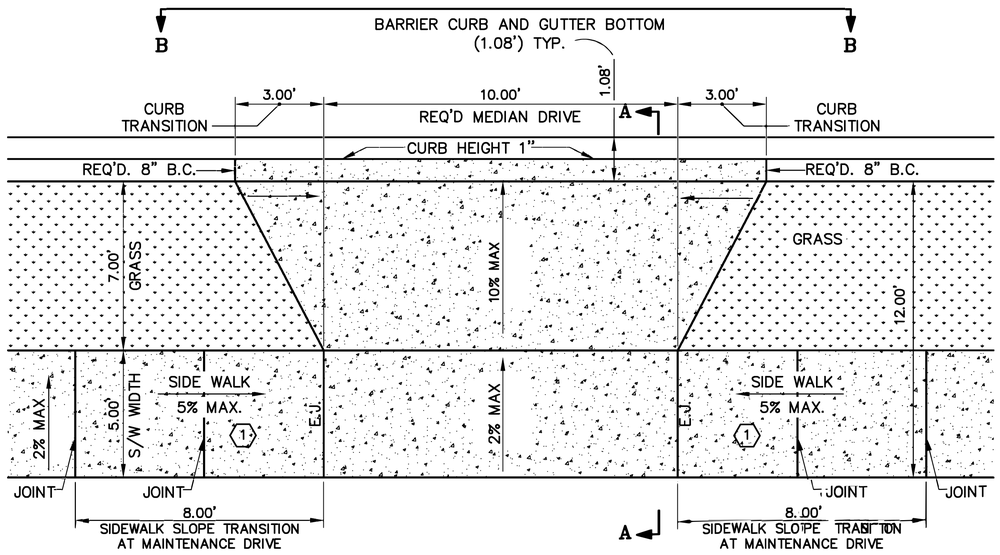
SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

DPW DETAILS 9

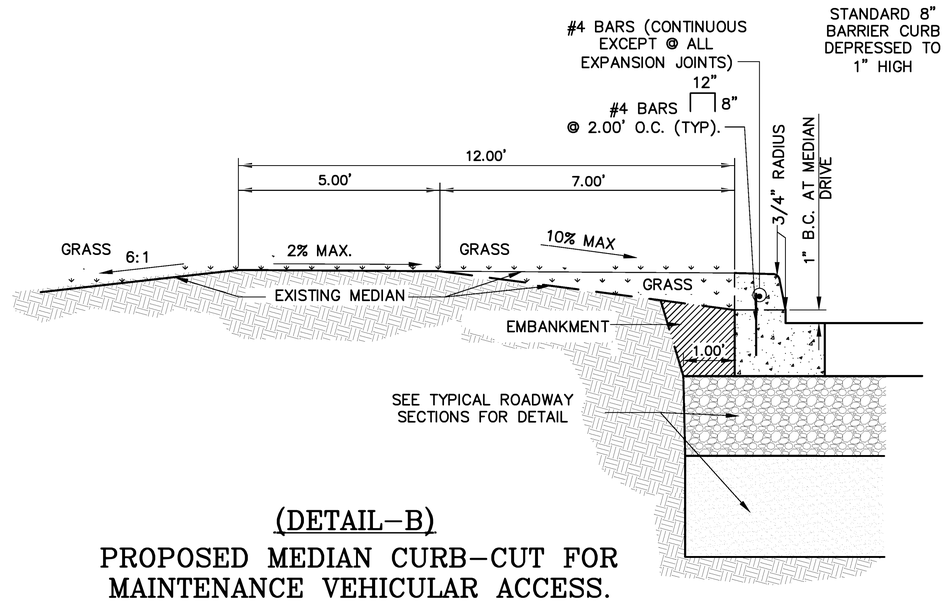
DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO. / SHEET NO. 31 OF 32



(DETAIL–A)
PROPOSED MEDIAN MAINTENANCE DRIVE AT SIDEWALK (STREET SIDE)

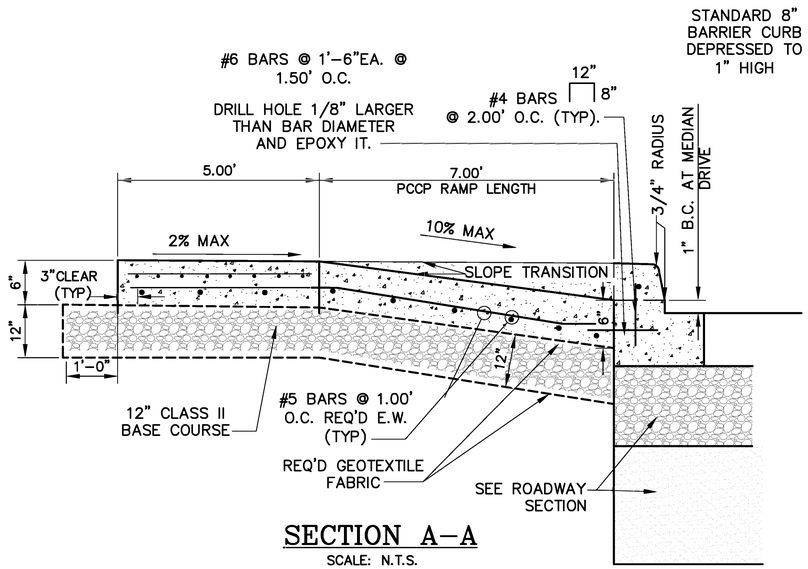
SCALE: N.T.S.

(1) PROVIDE CONCRETE WALK WHERE REQUIRED



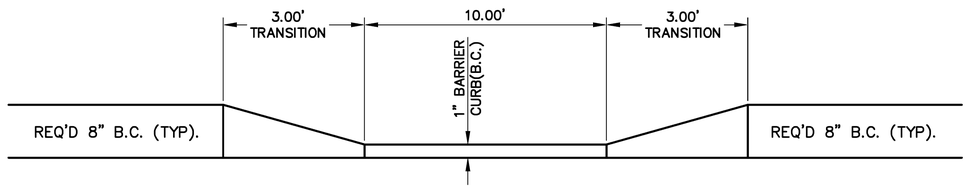
(DETAIL–B)
PROPOSED MEDIAN CURB–CUT FOR MAINTENANCE VEHICULAR ACCESS. (TO BE USED WHEN SIDEWALK IS NOT EXISTING OR NOT REQUIRED)

SCALE: N.T.S.



SECTION A–A

SCALE: N.T.S.



SECTION B–B
PROPOSED CURB HEIGHT

SCALE: N.T.S.

NOTES

1. E.J.– FULL DEPTH EXPANSION JOINT AT WALK (1/2" WIDTH, NON EXTRUDING AND SEALED). JOINTS SHALL BE 1/2" DEPTH WITH 1/2" R TOOLED EDGES.

STATE OF LOUISIANA
SPARKLE D.W. NOBLE
Reg. No. 35113
PROFESSIONAL ENGINEER
7/1/2025

REV.	DATE	DESCRIPTION	BY

SEWERAGE AND WATER BOARD OF NEW ORLEANS

CONTRACT 30266

NEW 16" SEWER FORCE MAIN ON LAFITTE ST. (N. DORGENOIS ST. - N. GALVEZ ST.) & NEW 48" SEWER FORCE MAIN ON N. GALVEZ ST. (CONTI ST. - LAFITTE ST.)

DPW DETAILS 10

DR. DK	
TRC. DK	
CK. RI	
AP. XX	
SCALE:	
DATE: 3/20/2025	SET NO.

SHEET NO. 32 OF 32

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: Sewerage & Water Board of New Orl
625 St. Joseph St.
New Orleans, LA 70165

BID FOR: *New 16" Sewer Force Main on Lafitte St. (N. Dorgenois St.- N. Galvez St.) & New 48" Sewer Froce Main on Galvez St. (Conti St.-Lafitte St.)*
Contract: 30266

NAME OF BIDDER:

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REMOVAL AND DISPOSAL OF EXISTING PORTLAND CEMENT CONCRETE PAVEMENT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C202(52)(C)	84	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REMOVAL AND DISPOSAL OF EXISTING SIDEWALK, DRIVEWAY, FOOT LAP (CONCRETE, BRICK, ASPHALT, ETC.)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C202(52)D	175	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REMOVAL AND DISPOSAL OF EXISTING CURB (CONCRETE, ASPHALT, BRICK, ETC.)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C202(52)(E)	364	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REMOVAL AND DISPOSAL OF EXISTING ASPHALTIC CONCRETE PAVEMENT	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C202(52)(I)	903	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		ROADWAY EXCAVATION	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C203(51)	366	CY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		GEOTEXTILE FABRIC FOR STABILIZATION	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C203(59)	1986	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		GEOGRID	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C203(60)	903	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		BASE COURSE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C302(51)	203	CY		

Wording for "DESCRIPTION" is to be provided by Owner.
All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: Sewerage & Water Board of New Orl
625 St. Joseph St.
New Orleans, LA 70165

BID FOR: *New 16" Sewer Force Main on Lafitte St. (N. Dorgenois St.- N. Galvez St.) & New 48" Sewer Froce Main on Galvez St. (Conti St.-Lafitte St.)*
Contract: 30266

NAME OF BIDDER: _____

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		SUPERPAVE ASPHALTIC CONCRETE BINDER COURSE FOR COMPOSITE ROADWAYS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C502(52)	84	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		SUPERPAVE ASPHALTIC CONCRETE WEARING COURSE (2" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C502(53)-1	3087	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		SUPERPAVE ASPHALTIC CONCRETE BINDER COURSE (5" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C502(53)-2	903	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		COLD PLANING ASPHALTIC PAVEMENT (2" AVERAGE THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C509(51)A	2151	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		CONCRETE SIDEWALK (4" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C706(51)(A)	88	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		6" CONCRETE BARRIER CURB WITH DOWELS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C707(56)	364	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		SODDING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C714(51)	293	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		NEW 16" PLUG VALVE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(52)(F)	1	EA		

Wording for "DESCRIPTION" is to be provided by Owner.
All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: Sewerage & Water Board of New Orl
625 St. Joseph St.
New Orleans, LA 70165

BID FOR: *New 16" Sewer Force Main on Lafitte St. (N. Dorgenois St.- N. Galvez St.) & New 48" Sewer Froce Main on Galvez St. (Conti St.-Lafitte St.)*
Contract: 30266

NAME OF BIDDER:

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		NEW 36" PLUG VALVE WITH VALVE BOX AND ACCESS DOOR	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(52)(H)	1	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REPLACE 5/8" TO 1" WATER HOUSE CONNECTION WITH 1" WATER HOUSE CONNECTION (FROM MAIN TO METER)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C741(55)(A)	5	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REPLACE 1-1/2" WATER HOUSE CONNECTiON (FROM MAIN TO METER)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C741(55)(B)	5	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REPLACE EXISTING 2" WATER HOUSE CONNECTION (FROM MAIN TO METER)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C741(55)(C)	5	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		PLUG EXISTING 48" SEWER MAIN AND FILL WITH FLOWABLE MATERIAL (SAND/CEMENT MIXTURE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C741(78)	1750	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REPLACE EXIST. SEWER H.C. FROM NEW MAIN TO BACK OF CURB	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(60)	3	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REPLACE EXIST. SEWER H.C. BEYOND BACK OF CURB	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(63)	15	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REPAIR WATER MAIN WITH FULL CIRCLE CLAMP (PIPE SIZE 4" - 8")	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
CSW-01	5	EA		

Wording for "DESCRIPTION" is to be provided by Owner.
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LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: Sewerage & Water Board of New Orl
625 St. Joseph St.
New Orleans, LA 70165

BID FOR: *New 16" Sewer Force Main on Lafitte St. (N. Dorgenois St.- N. Galvez St.) & New 48" Sewer Froce Main on Galvez St. (Conti St.-Lafitte St.)*
Contract: 30266

NAME OF BIDDER: _____

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REPAIR WATER MAIN WITH FULL CIRCLE CLAMP (PIPE SIZE 12" - 16")	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
CSW-02	5	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REPAIR WATER MAIN WITH BELL JOINT CLAMP (PIPE SIZE 4" - 12")	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
CSW-03	5	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REPAIR WATER MAIN WITH BELL JOINT CLAMP (PIPE SIZE 16" - 24")	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
CSW-04	5	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		SAW CUT CONCRETE CURB, PAVEMENT, SIDEWALK, DRIVEWAY, ETC. ACCORDING TO PLANS (8"DEPTH)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
CF-3	1045	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		REMOVAL OF HANDICAP RAMPS, CURB AND GUTTER, AND CONCRETE SIDEWALKS AT INTERSECTIONS INCLUDING SAW CUTTING	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C706(54)R	102	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		HANDICAP RAMPS, CURB AND GUTTER, AND CONCRETE SIDEWALKS AT INTERSECTIONS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C706(54)	102	SY		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		SIDEWALK TRANSITION ADJACENT TO HANDICAPPED RAMPS	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C706(54)SW	48	SY		

Wording for "DESCRIPTION" is to be provided by Owner.
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LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: Sewerage & Water Board of New Orl
625 St. Joseph St.
New Orleans, LA 70165

BID FOR: *New 16" Sewer Force Main on Lafitte St. (N. Dorgenois St.- N. Galvez St.) & New 48" Sewer Froce Main on Galvez St. (Conti St.-Lafitte St.)*
Contract: 30266

NAME OF BIDDER: _____

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		SEWER POINT REPAIR UP TO 12 FEET (8" AT 6.1' - 8.0')	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(57)C	1	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		SEWER POINT REPAIR BEYOND 12 FEET (8" AT 6.1' - 8.0')	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(58)C	10	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		INSTALL 16" HDPE SEWER FORCE MAIN	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(51)(16)(D)	89.1	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		INSTALL 16" HDPE SEWER FORCE MAIN VIA HDD	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(51)(16)(D)HDD	1477	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		INSTALL 36" DI SEWER FORCE MAIN	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(51)(I)(D)	109	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		INSTALL 48" HDPE SEWER FORCE MAIN	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(51)(J)(D)	309	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		INSTALL 48" DI SEWER FORCE MAIN	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(51)(J)(D2)	20	LS		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		DRAINAGE CANAL REHABILITATION	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
DCR-1	1	LS		

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LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: Sewerage & Water Board of New Orl
625 St. Joseph St.
New Orleans, LA 70165

BID FOR: *New 16" Sewer Force Main on Lafitte St. (N. Dorgenois St.- N. Galvez St.) & New 48" Sewer Froce Main on Galvez St. (Conti St.-Lafitte St.)*
Contract: 30266

NAME OF BIDDER:

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		DEMO EXISTING AIR RELEASE CONCRETE BOX	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
SP-1	1	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		INSTALL SEWER VALVE MANHOLE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(55)(E)	14	VF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		MEDIAN MAINTENANCE DRIVE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C706(51)(C)	2	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		AIR RELEASE VALVE	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
ARV-1	1	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		PLASTIC PAVEMENT STRIPING (4" SOLID WHITE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C732(52)(A)W	319	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		PLASTIC PAVEMENT STRIPING (4" SOLID YELLOW)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C732(52)(A)Y	280	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		PLASTIC PAVEMENT STRIPING (4" DASHED WHITE)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C732(53)(A)W	151	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		PLASTIC PAVEMENT STRIPING (4" DASHED YELLOW)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C732(53)(A)Y	139	LF		

Wording for "DESCRIPTION" is to be provided by Owner.
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LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: Sewerage & Water Board of New Orl
625 St. Joseph St.
New Orleans, LA 70165

BID FOR: *New 16" Sewer Force Main on Lafitte St. (N. Dorgenois St.- N. Galvez St.) & New 48" Sewer Froce Main on Galvez St. (Conti St.-Lafitte St.)*
Contract: 30266

NAME OF BIDDER:

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		PLASTIC PAVEMENT STRIPING (12" WHITE STOP BAR)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C732(52)(D)W	122	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		PLASTIC PAVEMENT STRIPING (24" SOLID WHITE PEDESTRIAN CROSSWALK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C732(52)(E)W	852	LF		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		DOGHOUSE MANHOLE WITH HATCH LID	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C742(55)D	1	EA		

DESCRIPTION:	_x_Base Bid or ___Alt. # ____		CONCRETE PADS FOR FITTINGS (6" THICK)	
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
C601(C)	5	CY		

Wording for "DESCRIPTION" is to be provided by Owner.
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SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

A. Unit price is a price per unit of measurement for plant, labor, construction aids, utilities, pumping, mobilization, sewer flow control, materials, equipment, supplies or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, profit, and all other incidentals.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3 Execution. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

E. For measuring progress toward Consent Decree Milestones, the percent complete will be calculated by dividing the value of work that has been completed and approved by the Engineer by the total bid amount for the milestone items, for **pay items 19 through 41.**

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. C202(52)C: Removal and Disposal of Existing Portland Cement Concrete Pavement

1. Description: This work consists of removal and satisfactory disposal of existing Portland cement concrete roadway, in accordance with the plans and these specifications.
2. Unit of Measurement: Square Yard

B. Unit Price No. C202(52)D: Removal and Disposal of Existing Sidewalk, Driveway, Foot Lap (Concrete, Brick, Asphalt, Etc.)

1. Description: This work consists of removal and satisfactory disposal of existing sidewalk, driveway, foot lap (concrete, brick asphalt, or other materials, or combinations of materials).
2. Unit of Measurement: Square Yard

C. Unit Price No. C202(52)E: Removal and Disposal of Existing Curb (Concrete, Asphalt, Brick, Etc.)

1. Description: This work consists of removal and satisfactory disposal of existing curb (concrete, asphalt, brick, or other materials, or combinations of materials).
2. Unit of Measurement: Linear Foot

D. Unit Price No. C202(52)(I): Removal and Disposal of Existing Asphaltic Concrete Pavement.

1. Description: This work consists of removal and satisfactory disposal of existing asphaltic concrete pavement.

2. Unit of Measurement: Square Yard

E. Unit Price No. C203(51): Roadway Excavation

1. Description: This work consists or preparing and inspecting the subgrade to determine if it is suitable to receive the roadway base course. If the subgrade is unsuitable acceptable material shall be installed as indicated on the drawings and specified herein according to Section 312313 “Subgrade Preparation.”
2. Unit of Measurement: Cubic Yard

F. Unit Price No. C203(59): Geotextile Fabric for Stabilization

1. Description: This work consists of furnishing and installing all geotextile fabrics for embankment separation, subgrade reinforcement of roadways, subsurface drainage, or riprap lining in a manner and at locations as detailed and specified according to Section 310519 “Geosynthetics for Earthwork”, as shown in the drawings or as otherwise directed by the Construction Manager.
2. Unit of Measurement: Square Yard

G. Unit Price No. C203(60): Geogrid

1. Description: This work consists of furnishing and installing all geogrid for embankment separation, subgrade reinforcement of roadways, subsurface drainage, or riprap lining in a manner specified according to Section 310519 “Geosynthetics for Earthwork”, in locations shown in the drawings or as otherwise directed by the Construction Manager.
2. Unit of Measurement: Square Yard

H. Unit Price No. C302(51): Base Course

1. Description: This work includes procuring and properly installing aggregate base course on acceptable subbase, as indicated on the drawings and specified herein according to Section 321123 “Aggregate Base Course”. The work also includes all efforts necessary to schedule and allow for testing of material, as well as satisfactory removal and cleanup of unused material from the work site.
2. Unit of Measurement: Cubic Yard

I. Unit Price No. C502(52): Superpave Asphaltic Concrete Binder Course for Composite Roadways

1. Description: This work consists of placing an asphaltic concrete binder course (2” Thick), on top of concrete roadway, as shown in the New Orleans DPW Standard Details and according to Section 321216 “Asphalt Paving.”
2. Unit of Measurement: Square Yard

J. Unit Price No. C502(53)-1: Superpave Asphaltic Concrete Wearing Course (2” Thick)

1. Description: This work consists of placing an asphaltic concrete wearing surface course (2” Thick), to the specified thickness, on binder course in conformity with the typical sections shown in the New Orleans DPW Standard Details and according to Section 321216 “Asphalt Paving.”
2. Unit of Measurement: Square Yard

K. Unit Price No. C502(53)-2: Superpave Asphaltic Concrete Binder Course (5” Thick)

1. Description: This work consists of placing concrete binder course (5” Thick), to the specified thickness, on precast concrete in conformity with the typical sections shown in the New Orleans DPW Standard Details and according to Section 321216 “Asphalt Paving.”
2. Unit of Measurement: Square Yard

L. Unit Price No. C509(51)A: Cold Planning Asphaltic Pavement (2” Thick)

1. Description: This work consists of milling existing asphalt (2” Thick), to the specified thickness, in the New Orleans DPW Standard Details and according to Section 321216 “Asphalt Paving.”
2. Unit of Measurement: Square Yard

M. Unit Price No. C706(51)A: Concrete Sidewalk (4” Thick)

1. Description: This work consists of constructing concrete sidewalks in conformance with the specifications and in conformity with the locations, lines, grades, slopes, thickness,

sections, and strength shown in the New Orleans DPW Standard Details and according to Section 321623 “Sidewalks and Driveways.”

2. Unit of Measurement: Square Yard

N. Unit Price No. C707(56): 6” Concrete Barrier Curb with Dowels

1. Description: This work consists of constructing 6” concrete barrier curb with dowels in conformance with the specifications and in conformity with the locations, lines, grades, slopes, thickness, sections, and strength shown in the New Orleans DPW Standard Details and according to Section 321613 “Curbs and Gutters.”
2. Unit of Measurement: Linear Foot

O. Unit Price No. C714(51): Sodding

1. Description: This work consists of furnishing, hauling, planting, rolling, watering, and maintaining placed and in-place live grass sod at locations shown on the plans or as directed according to Section 329223 “Sodding.”
2. Unit of Measurement: Square Yard

P. Unit Price No. C742(52)(F): New 16” Plug Valve

1. Description: This work consists of furnishing and installing a new 16 inch sewer plug valve, in accordance with these plans and specifications.
2. Unit of Measure: Each

Q. Unit Price No. C742(52)(H): New 36” Plug Valve with Valve Box and Access Door

1. Description: This work consists of furnishing and installing a new 36 inch sewer plug valve, in accordance with these plans and specifications. A subsidiary obligation to this pay item is to furnish and install a valve box with an access door.
2. Unit of Measure: Each

R. Unit Price Nos. C741(55)(A), C741(55)(B), and C741(55)(C): Replace Lead Service Line Water House Connection (From Meter to Main)

1. Description: This work consists of the removal of exposed Lead Service Line Water House Connections with new Polyethylene Water House Connections, from the Water Main to the Water Meter, is accordance with Section 330110.73 Excavated Rehabilitation of Water Utility Piping.
2. Unit of Measure: Each
3. This unit price is broken down into specific pay items based on nominal service line diameter as per the Bid Form.
4. Unit Prices by Diameter: Measurement and Payment for these Unit Price items will be made by the nominal diameter as per the Bid Form.
    a. Unit Price No. C741(55)A: 5/8” to 1” Lead Service Line.
    b. Unit Price No. C741(55)B: 1-1/2” Lead Service Line.
    c. Unit Price No. C741(55)C: 2” Lead Service Line.

S. Unit Price No. C741(78): Plug Existing 48” Sewer Main and Fill with Flowable Fill (Sand/Cement Mixture)

1. Description: This work consists of glugging and filling existing 48” sewer mains with flowable fill.
2. Unit of Measurement: Linear Feet

T. Unit Price No. C742(60): Replace Existing, Sewer House Connection (H.C.) From New Main to Back of Curb

1. Description: This work consists of the replacement of sewer house connected pipelines and sewer service laterals by means of excavation including full line replacement, partial line replacement (point repair) and line relocations from the sewer main to the back of curb according to Section 330130.73 “Rehabilitation of Sewers.”
2. Unit of Measure: Each

U. Unit Price No. C742(63): Replace Existing, Sewer H.C. Beyond Back of Curb

1. Description: This work consists of the replacement of sewer house connected pipelines and sewer service laterals by means of excavation including full line replacement, partial line replacement (point repair) and line relocations from the back of curb to the property line according to Section 330130.73 “Rehabilitation of Sewers.”
2. Unit of Measure: Linear Foot

V. Unit Price Nos. CSW-01 and CSW-02: Repair Water Main with Full Circle Clamp

1. Description: This work consists of the rehabilitation of water mains by means of excavation and installation of full circle clamps including partial line replacement (point repair) and line relocations according to Section 330110.73 Excavated Rehabilitation of Water Utility Piping.
2. Unit of Measure: Each
3. This unit price is broken down into specific pay items based on nominal pipe diameter as per the Bid Form.
4. Unit Prices by Diameter: Measurement and Payment for these Unit Price items will be made by the nominal diameter as per the Bid Form.
    a. Unit Price No. CSW-01: Pipe Diameter 4” – 8”.
    b. Unit Price No. CSW-02: Pipe Diameter 12” – 16”.

W. Unit Price Nos. CSW-03 and CSW-04: Repair Water Main with Bell Joint Clamp

1. Description: This work consists of the rehabilitation of water mains by means of excavation and installation of bell joint clamps including partial line replacement (point repair) and line relocations according to Section 330110.73 Excavated Rehabilitation of Water Utility Piping.
2. Unit of Measure: Each
3. This unit price is broken down into specific pay items based on nominal pipe diameter as per the Bid Form.
4. Unit Prices by Diameter: Measurement and Payment for these Unit Price items will be made by the nominal diameter as per the Bid Form.
    a. Unit Price No. CSW-03: Pipe Diameter 4” – 12”.
    b. Unit Price No. CSW-04: Pipe Diameter 16” – 24”.

X. Unit Price No. CF-3: Saw Cut Concrete Curb, Pavement, Sidewalk, Driveway, Etc. According to Plans (8” Depth)

1. Description: This work consists of saw cutting existing concrete curb, pavement, sidewalk, driveway, etc. in accordance with these plans and specifications.
2. Unit of Measure: Linear Foot

Y. Unit Price No. C706(54)R: Removal of Handicap ramps, Curb and Gutter, and Concrete Sidewalks at Intersections Including Saw Cutting.

1. Description: This work consists of removal and satisfactory disposal of existing handicap ramps, curb and gutter, and concrete sidewalks at intersections including saw cutting.
2. Unit of Measurement: Square Yard

Z. Unit Price No. C706(54): Handicap Ramps, Curbs and Gutter, and Concrete Sidewalks at Intersections

1. Description: This work consists of all excavation, surface preparation, joint materials, welded wire fabrics, ADA compliant detectable warnings, and incidentals associated with the installation of ADA accessible handicap ramps.
2. Unit of Measurement: Square Yard

AA. Unit Price No. C706(54)SW: Sidewalk Transition Adjacent to Handicapped Ramps

1. Description: This work consists of all excavation, surface preparation, joint materials, welded wire fabrics, and incidentals associated with the installation of ADA accessible handicap ramps and their adjacent sidewalk transitions.
2. Unit of Measurement: Square Yard

BB. Unit Price No. C742(57)C: Sewer Point Repair, Up to 12 Feet

1. Description: This work consists of the rehabilitation of sewer pipelines and sewer service laterals by means of excavation including full line replacement, partial line replacement (point repair) and line relocations according to Section 330130.73 “Rehabilitation of Sewers.”
2. Unit of Measure: Each
3. This unit price is broken down into specific pay items based on nominal pipe diameter and average depth of inverts as per the specific unit price items as stated on the Bid Form.
4. Unit Prices by Diameter: Measurement and payment for these unit price items will be made by the nominal diameter as per the Bid Form.
5. Unit Prices by Invert Depth: Measurement and payment for these unit price items will be made by the average depth of invert per the Bid Form.
    a. Unit Price No. C742(57)C: Eight-Inch (8”) Diameter at 6.1-ft to 8.0-ft Depth

CC. Unit Price No. C742(58)C: Sewer Point Repair, Beyond 12 Feet

1. Description: This work consists of the rehabilitation of sewer pipelines and sewer service laterals by means of excavation including full line replacement, partial line replacement (point repair) and line relocations beyond 12 feet according to Section 330130.73 “Rehabilitation of Sewers.”
2. Unit of Measure: Linear Foot
3. This unit price is broken down into specific pay items based on nominal pipe diameter and average depth of inverts as per the Bid Form.

4. Unit Prices by Diameter: Measurement and payment for these unit price items will be made by the nominal diameter as per the Bid Form.
5. Unit Prices by Average Invert Depth: Measurement and payment for these unit Price items will be made by the average depth of inverts per the Bid Form.
    a. Unit Price No. C742(58)C: Eight-Inch (8") Diameter at 6.1-ft to 8.0-ft Depth

DD. Unit Price Nos. C742(51)(16)D, C742(51)(I)D, C742(51)(J)D, and C742(51)(J)(D2): Install Sewer Main

1. Description: This work consists of the installation of sewer pipelines by means of excavation or horizontal directional drilling (HDD) including full line replacement, partial line replacement (point repair) and line relocations according to Sections 330130.73 "Rehabilitation of Sewers", 333111 "Public Sewerage Gravity Piping", and 330507.13 "Utility Directional Drilling."
2. Unit of Measure: Linear Foot
3. This unit price is broken down into specific pay items based on nominal pipe diameter, method of installation, and average depth of sewer pipe invert as per the Bid Form.
4. Unit Prices by Diameter: Measurement and Payment for these Unit Price items will be made by the nominal diameter as per the Bid Form.
5. Unit Prices by Pipe Invert Depth: Measurement and payment for these unit price items will be made by the average depth of sewer pipe invert as per the Bid Form.
    a. Unit Price No. C742(51)(16)D: Install Sixteen-Inch (16") HDPE Sewer Force Main
    b. Unit Price No. C742(51)(I)D: Install Thirty-Six-Inch (36") DI Sewer Force Main
    c. Unit Price No. C742(51)(J)D: Install Forty-Eight-Inch (48") HDPE Sewer Force Main
    d. Unit Price No. C742(51)(J)(D2): Install Forty-Eight-Inch (48") DI Sewer Force Main

EE. Unit Price No. C742(51)(16)HDD: Install 16" HDPE Sewer Force Main Via Horizontal Directional Drilling (HDD)

1. Description: The work consists of replacing an existing sewer line with a new high-density polyethylene (HDPE) sewer line by means of HDD according to Sections 330507.13 "Utility Directional Drilling."
2. Unit of Measure: Linear Foot
3. This unit price is broken down into specific pay items based on nominal pipe diameter as per the Bid Form.
4. Unit Prices by Diameter: Measurement and Payment for these Unit Price items will be made by the nominal diameter as per the Bid Form.
    a. Unit Price No. C742(51)(16)HDD: Install Sixteen-Inch (16") HDPE Sewer Force Main Via HDD.

FF. Unit Price No. DCR-1: Drainage Canal Rehabilitation

1. Description: The work consists of removing and replacing an existing top section of an under-ground drainage canal. This includes any and all proper removal and disposal of existing I-beams, steel plates, grout, wire mesh, bricks, and 6" reinforced concrete. The size and scope of removal will be determined by the Engineer based on the existing materials field conditions, contractor opinion, and engineering decision. This work will be performed in accordance with these plans and specifications.

2. Unit of Measure: Lump Sum

GG. Unit Price No. SP-1: Demo Existing Air Release Box
1. Description: The work consists of removing and properly disposing of the existing air release valve box, in accordance with these plans and specifications.
2. Unit of Measure: Each

HH. Unit Price No. C742(55)(E): Install Sewer Valve Manhole
1. Description: This work consists of furnishing and installing a new 48" brick manhole for a sewer valve, in accordance with these plans and specifications.
2. Unit of Measurement: Vertical Feet

II. Unit Price No. C706(51)(C): Median Maintenance Drive
1. Description: This work consists of installing a new concrete median maintenance drive, in accordance with these plans and specifications.
2. Unit of Measurement: Each

JJ. Unit Price No. ARV-1: Aire Release Valve
1. Description: This work consists of furnishing and installing a new air release valve (H-Tech Model 989-00 or approved equal).
2. Unit of Measurement: Each

KK. Unit Price Nos. C732(52)(A)W, C732(52)(A)Y, C732(53)(A)W, C732(53)(A)Y, C732(52)(D)W, & C732 (52)(E)W: Plastic Pavement Striping

1. Description: The work consists of furnishing and installing plastic pavement striping, in accordance with DPW's standard specifications and standard drawings.
2. Unit of Measure: Linear Foot
3. This unit price is broken down into specific pay items based on stripe color and width, as per the Bid Form.
4. Unit Prices by color and width: Measurement and Payment for these Unit Price items will be made by the color and width as per the Bid Form.
    a. Unit Price No. C732(52)(A)W: Plastic Pavement Striping (4" Solid White).
    b. Unit Price No. C732(52)(A)Y: Plastic Pavement Striping (4" Solid Yellow).
    c. Unit Price No. C732(53)(A)W: Plastic Pavement Striping (4" Dashed White).
    d. Unit Price No. C732(53)(A)Y: Plastic Pavement Striping (4" Dashed Yellow).
    e. Unit Price No. C732(52)(D)W: Plastic Pavement Striping (12" White Stop Bar)
    f. Unit Price No. C732(52)(E)W: Plastic Pavement Striping (24" Solid White Pedestrian Crosswalk)

LL. Unit Price No. C742(55)D: Doghouse Manhole with Hatch Lid
1. Description: This work consists of furnishing and installing a new 60" doghouse manhole, in accordance with these plans and specifications. The doghouse manhole shall have a Halliday Products Model No. R1R60 Hatch Lid (or approved equal).
2. Unit of Measurement: Each

MM. Unit Price No. C601(C): Concrete Pads for Fittings (6" Thick)
1. Description: This work consists of placing and installing concrete pads for fittings. This pay item includes any framing work and rebar needed.
2. Unit of Measurement: Cubic Yard

NN. Unit Price No. C742(51)H: 20” Temporary Bypass Line

1. Description: This work consists of installing maintain and removing a temporary bypass line according to Section 330130.03 Sewer Flow Control.
2. Unit of Measure: Linear Foot

OO. Unit Price No. CSS-01: New 48” Linestop
1. Description: This work consists of installing a new 48” linestop for bypass operations.
2. Unit of Measurement: Each

END OF SECTION 012200

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SECTION 40 05 57 - ACTUATORS FOR VALVES

PART 1 -- GENERAL

1.1 THE SUMMARY

A. Provide valve and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.

B. The provisions of this Section apply to valves except where otherwise indicated in the Contract Documents.

C. Unit Responsibility

1. Make the valve manufacturer responsible for the coordination of design, assembly, testing, and installation of actuators on the valves; however, the Contractor shall be responsible to the Owner for compliance of the valves and actuators with the Contract Documents.

D. Where 2 or more valve actuators of the same type or size are required, the actuators shall be produced by the same manufacturer.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

American National Standards Institute (ANSI)	
ANSI/ASME B 31.1	Power Piping
EN55011	Industrial, Scientific and Medical Equipment. Radio-Frequency Disturbance Characteristics
EN50082-2	Electromagnetic Compatibility - Generic Immunity Standard - Part 2 Industrial Environment
American Society of Mechanical Engineers (ASME)	
ASME BPVC SEC VIII	Boiler and Pressure Vessel Codes: Section VIII Rules for Construction of Pressure Vessel
American Water Works Association (AWWA)	
AWWA C 500	Metal-Seated Gate Valves for Water Supply Service
AWWA C504	Rubber-Seated Butterfly Valves
AWWA C541	Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates
AWWA C 542	Electric Motor Actuators for Valves and Slide Gates
ASTM International (ASTM)	
ASTM A 105	Forging, Carbon Steel, for Piping Components
International Electrotechnical Commission (IEC)	
IEC 801.5	Surge Immunity Test

IEC 1000-4-5	Electromagnetic Compatibility Testing and Measurement Techniques – Surge Immunity Test
IEC 1000-4-8	Power Frequency Magnetic Field Immunity Test
National Fire Protection Association (NFPA)	
NPFA 70	National Electrical Code

1.3 CONTRACTOR SUBMITTALS

A. Furnish Submittals in accordance with Section 01 33 00 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submit Shop Drawing information for actuators with the valve submittals as a complete package.

C. Submit calculations showing dynamic seating and unseating torques versus the output torque of the actuator.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Unless otherwise indicated, provide shut-off and throttling valves and externally actuated valves with manual or power actuators.

B. Provide actuators complete and operable with mounting hardware, motors, gears, controls, wiring, solenoids, hand wheels, levers, chains, and extensions, as applicable.

C. Provide actuators with torque ratings equal to or greater than required for valve seating and dynamic torques, whichever is greater, and capable of holding the valve in any intermediate position between fully-open and fully-closed without creeping or fluttering.

D. Manufacturers

1. Where indicated, certain valves may be provided with actuators manufactured by the valve or gate manufacturer.

2. Where actuators are furnished by different manufacturers, coordinate the selection to result in the fewest number of manufacturers possible.

E. Materials

1. Provide actuators of current models, of the best commercial quality materials, and liberally sized for the required torque.

2. Provide materials suitable for the environment in which the valve or gate is to be installed.

F. Actuator Mounting and Position Indicators

1. Securely mount actuators by means of brackets or hardware specially designed and sized for this purpose and of ample strength.

2. Cast the word "OPEN" on each valve or actuator, with an arrow indicating the direction to open in the counter-clockwise direction.

3. Equip gear and power actuators with position indicators.

4. Where possible, locate manual actuators between 48 and 60 inches above the floor or the permanent working platform.

2.2 MANUAL ACTUATORS

A. General

1. Unless otherwise indicated, provide valves with manual actuators.

2. Provide valves larger than 4-inch with gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the hand wheel.

3. Provide buried and submerged gear-assisted valves, gear-assisted valves for pressures higher than 250 psig, valves 30 inches in diameter and larger, and where indicated, with worm gear actuators, hermetically-sealed water-tight and grease-packed.

4. Valves 6-inch to 24-inch diameter may be provided with traveling-nut actuators, worm gear actuators, spur or bevel gear actuators, as appropriate for each valve.

B. Buried Valves

1. Unless otherwise indicated, provide buried valves with extension stems to grade, with square nuts or floor stands, position indicators, and cast-iron or steel pipe extensions with valve boxes, covers, and operating keys.

2. Where indicated, provide buried valves in cast-iron, concrete, or similar valve boxes with covers of ample size in order to allow operation of the valve actuators.

3. Permanently label the valve box covers as required by the local Utility Company or the Engineer.

C. Floor Boxes

1. Provide hot-dipped galvanized cast iron or steel floor boxes and covers to fit the slab thickness, for operating nuts in or below concrete slabs.

2. For operating nuts in the concrete slab, provide a bronze-bushed cover.

D. Tee Wrenches

1. Furnish buried valves with floor boxes with 2 operating keys or one key per 10 valves, whichever is greater.

2. Size the tee wrenches such that the tee handle will be 2 to 4 feet above ground, and to fit the operating nuts.

E. Manual Worm Gear Actuator

1. Provide an actuator consisting of a single- or double-reduction gear unit contained in a weatherproof cast iron or steel body with cover, and a minimum 12-inch diameter handwheel.

2. Provide the actuator to be capable of a 90-degree rotation and equip the actuator with travel stops capable of limiting the valve opening and closing.

3. Provide the actuator with spur or helical gears and worm gearing.

4. Provide a self-locking gear ratio in order to prevent "back-driving."

5. Construct the spur or helical gears of hardened alloy steel, and the worm gear of alloy bronze.

6. Construct the worm gear shaft and the hand wheel shaft from 17-4 PH or similar stainless steel.

7. Accurately cut gearing with hobbing machines.

8. Use ball or roller bearings throughout.

9. Provide the output shaft end with a spline in order to allow adjustable alignment.

10. Actuator output gear changes shall be mechanically possible by simply changing the exposed or helical gearset ratio without further disassembly of the actuator.

11. Design gearing for a 100 percent overload.

12. The entire gear assembly shall be sealed weatherproof.

F. Design and rate buried gear actuators for buried service, provide with a stainless-steel input shaft, and double-seal on shaft and top cap.

G. Traveling-Nut Actuator

1. Provide the actuator with a traveling-nut and screw (Scotch yoke), contained in a weatherproof cast iron or steel housing with a spur gear and a minimum 12-inch diameter hand wheel.

2. The screw shall run in 2 end bearings and provide a self-locking actuator in order to maintain the valve position under any flow condition.

3. Construct the screw and gear from hardened alloy steel or stainless steel, and the construct the nut and bushings from alloy bronze.

4. The bearings and gear shall be grease-lubricated by means of nipples.

5. Design gearing for a 100 percent overload.

PART 3 -- EXECUTION

3.1 SERVICES OF MANUFACTURER

A. Field Adjustments

1. The adjustment of actuator controls and limit switches in the field for the required function shall be performed by field representatives of the manufacturers of valves or gates with pneumatic, hydraulic, or electric actuators.

3.2 INSTALLATION

A. Install valve actuators and accessories in accordance with the requirements of Section 40 05 62 – Plug Valves.

B. Locate the actuators to be readily accessible for operation and maintenance without obstructing walkways.

C. Do not mount actuators where shock or vibrations will impair their operation, and do not attach the support systems to handrails, process piping, or mechanical equipment.

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SECTION 40 05 62 - PLUG VALVES

PART 1 -- GENERAL

1.1 THE SUMMARY

A. The Contractor shall provide plug valves and appurtenances, complete and operable, in accordance with the Contract Documents.

B. The requirements of Section 40 05 57 – Actuators apply to this Section.

C. Plug valves shall have undergone a proof-of-design test to demonstrate that the valve components operate at the service flow, pressure, temperature, and fluid conditions, free from binding, excessive noise, and premature failures. Proof-of-design test results shall be available to the Engineer on request. The proof-of-design test shall be conducted in accordance with the applicable provisions of AWWA C517- Resilient-Seated Cast-Iron Eccentric Plug Valves.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

American Water Works Association (AWWA)	
AWWA C517	Resilient-Seated Cast-Iron Eccentric Plug Valves
ASTM International (ASTM)	
ASTM A 126	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 216	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service
ASTM A 536	Ductile Iron Castings

1.3 CONTRACTOR SUBMITTALS

A. Furnish Submittals in accordance with Section 01 33 00 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Furnish the following information on Shop Drawings:

1. valve name, size, Cv factor, pressure rating, identification number (if any), and specification section number.

2. complete information on the valve actuator, manufacturer, model number, and mounting.

3. assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand wheels, and position indicators.

4. A valve-labeling schedule, listing the valves to be furnished with stainless steel tags, indicating in each case the valve location and the proposed wording for the label.

C. Furnish a technical manual containing the required information for each valve, as indicated.

D. Furnish a spare parts list, containing the required information for each valve assembly, as indicated.

E. Factory Test Data

1. Where indicated, submit signed, dated, and certified factory test data for each valve requiring certification, before shipping the valve.

2. Furnish a certification of quality and test results for factory-applied coatings.

F. Field Test Data

1. Submit signed, dated, and certified field test data for each valve.

PART 2 -- PRODUCTS

2.1 PRODUCTS

A. General

1. Provide valves and gates of new and current manufacture.

2. Provide valves 6-inch and larger with actuators with position indicators.

3. Unless otherwise indicated, provide valve actuators in accordance with Section 40 05 57 – Actuators.

B. Protective Coating

1. The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with the indicated requirements.

2. Do not coat the machined flange faces of valves except where such flanges are not adjoining a mating flange as shown in the Contract Documents. Apply rust inhibitor coating on machined surfaces of the flange prior to shipment.

C. Valve Labeling

1. Furnish a label composed of 1/16-inch plastic or stainless steel, a minimum of 2 inches by 4 inches in size and permanently attached to the valve or on the wall adjacent to the valve as directed by the Engineer.

D. Valve Testing

1. Factory-test valves 4 inches in diameter and larger as follows:

a. Hydrostatic Testing

1) Subject valve bodies to an internal hydrostatic pressure equivalent to twice the water-rated pressure of the valve.

2) Metallic valves rating pressures shall be based at 100 degrees F.

3) Plastic valves rating pressures shall be based at 73 degrees F, or at a higher temperature according to material type.

4) During the hydrostatic test, there shall be no visible leakage through the valve body, end joints, or shaft seals, nor shall parts of the valve be permanently deformed.

5) Allow test duration of at least 10 minutes, in order to allow visual examination for leakage.

b. Seat Testing

1) Test the valves for leaks in the closed position, with the pressure differential across the seat equal to the water rated pressure of the valve.

2) Provide test duration of at least 10 minutes, in order to allow visual examination for leakage.

3) The leakage rate shall be the more stringent of the following:

a) As recommended by the reference standard for that type of valve; or

b) Leakage past the closed valve not to exceed one fluid ounce per hour per inch diameter for metal seated valves and drop-tight for resilient seated valves.

c. Performance Testing

1) Shop-operate the valves from the fully-closed to the fully-open position and reverse under no-flow conditions in order to demonstrate that the valve assembly operates properly.

E. Certification

1. Prior to shipment of valves with sizes larger than 12-inches in diameter, submit certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, or ASTM.

F. Valve Markings

1. Permanently mark valve bodies in accordance with MSS SP-25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.2 VALVE CONSTRUCTION

A. Bodies

1. Provide valve bodies that are cast, molded (in the case of plastic valves), forged, or welded, of the materials indicated, and with smooth interior passages.

2. Provide wall thicknesses uniform and in agreement with the applicable standards for each type of valve, without casting defects, pinholes, and other defects that could weaken the body.

3. Perform welds on welded bodies by certified welders and ground welds smooth.

4. Provide valve ends as indicated and rated for the maximum temperature and pressure to which the valve will be subjected.

B. Valve End Connections

1. Provide valves 3 inches in diameter and larger with flanged end connections.

C. Bonnets

1. Connect valve bonnets to the body by clamping, screwing, or flanging.

2. Provide bonnets of the same material, temperature, and pressure rating as the body.

3. Make provisions for the stem seal with the necessary glands, packing nuts, and yokes.

D. Stems

1. Provide valve stems of the materials indicated, or, if not indicated, of the best commercially-available material for the specific service, with adjustable stem packing, O-rings, chevron V-type packing, or other suitable seal. Bronze materials in contact with potable water shall be NSF 61 approved and free of lead. Elastomeric materials shall be compatible with fluid service.

E. Stem Guides

1. Provide stem guides spaced with an L/R ratio not to exceed 200:1. Submit calculations for L/R ratios and guide spacing to the Engineer for review.

2. Stem guides shall have slotted holes and shall be adjustable in two directions.

3. Construct submerged stem guides from Type 316 stainless steel.

F. Internal Parts

1. Provide internal parts and valve trim as indicated for each individual valve.

2. Where not indicated, construct valve trim from Type 316 stainless steel or other material best-suited for the intended service.

2.3 ECCENTRIC PLUG VALVES (1/2-inch to 72-inches)

A. Construction: Eccentric plug valves shall be of the non-lubricated, eccentric plug design with cast iron bodies conforming to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with ANSI 125 lb. flanged ends for valves 3-inches and larger, and screwed or flanged ends for smaller sizes. The plugs and shafts shall be of cast iron or ductile iron conforming to ASTM A 536 - Ductile Iron Castings, and the plugs shall be lined with a resilient coating, best

suited for the specific service. The body shall be lined with a suitable elastomer, where required for a special service, or it shall be epoxy-lined. The seats shall be of nickel or stainless steel welded to the body. Top and bottom shaft bearings shall be of permanently lubricated stainless steel or Teflon coated stainless steel. Grit seals of Teflon, Nylatron, or similar suitable material shall be at the top and bottom plug journals. Valves up to and including 20-inches in size shall have an unobstructed port area of not less than 80 percent of full pipe area, and not less than 70 percent for larger valves. Valves 24-inches and larger shall have an unobstructed port area of 100% of pipe area. Eccentric plug valves shall have a pressure rating of not less than 150 psi WOG, for bubble-tight shut-off in the standard flow direction, and 25 psi WOG in the reverse flow direction. When equipped with worm gear actuator, the pressure rating shall be 150 psi WOG in both directions. The stem seal shall consist of field adjustable packing, replaceable without removal of the actuator, or of self-adjusting U-cup packing.

B. Actuators: Unless otherwise indicated, eccentric plug valves 3-inches and smaller shall have operating levers; larger valves shall have worm-gear actuators. Valve actuators shall be in accordance with Section 40 05 57 – Actuators.

C. Manufacturers, or Equal

1. DeZurik Corporation
2. Clow Valve Company
3. Pratt Valve
4. Victaulic

2.4 SPARE PARTS

A. Furnish the required spare parts, suitably packaged and labeled with the valve name, location, and identification number.

B. Furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve.

C. Spare parts are intended for use by the Owner, after expiration of the correction of defects period.

2.5 MANUFACTURERS

A. Valve manufacturers shall have a successful record of not less than 5 years in the manufacture of the indicated valves.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Plug valves shall be installed in strict accordance with the manufacturer's published recommendations.

B. Eccentric Plug Valves: Unless otherwise directed, the following rules shall be observed for the installation of eccentric plug valves on sewage, sludge, or other liquid systems containing solids, silt, or fine sand:

1. The valves shall be positioned with the stem in the horizontal direction.

2. In horizontal pipelines, the plug shall swing upwards when opening, to permit flushing out of solids.

3. The orientation of the valve shall prevent the valve body from filling up with solids when closed; however, where the pressure differential through the valve exceeds 25 psi, the higher pressure for valves without worm gear, electric, or air operators shall be through the valve to force the plug against the seat.

4. Valves which may be closed for extended periods (stand-by, bypass, or drain lines) and valves with reversed flow (higher pressure on downstream side, forcing the plug away from its seat), shall be equipped with worm gear operators for the full range of sizes.

5. For special applications or when in doubt, consult with the manufacturer prior to installation.

C. Trial Operation

1. After installation, schedule trial operation witnessed by the Engineer and the Owner representative.

2. All valves shall be cleaned thoroughly of all foreign materials and final adjustments made. The valves shall then be operated through one complete cycle from a fully closed position to a fully open position and back to a fully closed position to verify that the assembly is functional.

3. A field leakage test meeting the maximum allowable specified requirement shall be conducted.

4. Test certificate shall be signed by the valve manufacturer and the Contractor and shall be submitted to the Engineer.

- END OF SECTION –

GULF SOUTH
ENGINEERING AND TESTING, INC.
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August 8, 2019

Stantec
1340 Poydras St.
Suite 1420
New Orleans, LA

Attn: Chris Sanchez, PE
PN: (504) 654-1704
E-mail: Christopher.sanchez@stantec.com ; Jeff.sapia@stantec.com

Re: Geotechnical Investigation Report
SFM Replacement
Horizontal Directional Drilling (HDD) – Lafitte Avenue
Galvez Street to Board Street
New Orleans, LA
Gulf South Engineering & Testing File No. 19-062

Dear Chris,

This letter presents the results of soil borings and engineering analyses performed for the subject project. The results of the field investigation, laboratory testing and engineering analyses for the project are attached.

INTRODUCTION

This letter contains the results of an investigation made at the subject site. Instructions to proceed with the investigation were received from Stantec (Client) via approval of our proposal dated February 27, 2018. The study included drilling soil test borings and the performance of soil mechanics laboratory tests to evaluate the soil stratigraphy along the proposed pipeline replacement alignment. Engineering analyses/design recommendations were requested for this investigation and were aimed at determining the maximum pressure for HDD installation per ASTM and maximum fluid pressure U.S. Army Corps of Engineers (USACE) guidelines for pipeline crossings.

SOIL BORINGS

Two (2) undisturbed soil borings (Borings B-1 and B-2) were each drilled to a depth of 30 feet below the ground/pavement surface of Lafitte Ave. on July 16, 2019. The borings were drilled with a truck mounted drilling rig at the designated locations, as approximately shown on Figure 1, attached to this letter.

Undisturbed sampling was performed continuously or on approximate 5 foot centers in all cohesive or semi-cohesive materials with a three inch diameter thin wall tube sampler. The samples were extruded in the field, representative portions of each sample were trimmed and placed in moisture proof containers, the samples were properly labeled, and secured for transport to the laboratory.

When cohesionless material was encountered or when soils could not be adequately sampled by undisturbed methods, the Standard Penetration Test was performed. This test consists of driving a two-inch diameter split spoon sampler a total of approximately 18 inches with a 140 lb. hammer falling 30 inches. The number of blows required to drive the sampler per 6 inch increment is recorded and gives an indication of the density of the material. The blows per foot shown on the boring log are the total of the blow counts for the final 12 inches of penetration.

LABORATORY TESTING

Soil mechanics laboratory tests were performed on samples obtained from the borings. The testing consisted of natural moisture content, Atterberg limits, grain size sieve testing, and unconfined, compression, strength testing. The results of the laboratory tests are shown on the soil boring logs are attached to this letter.

SUBSOIL CONDITIONS

Subsoil Description

Reference to the borings shows there is pavement sections consisting of 2

to 4 inches of asphalt over 4 inches of concrete pavement or over a sand base The sand soils below the pavement follow to the approximate 1 foot to 3 foot depths below the ground surface. Interbedded layers of very soft to medium stiff organic clay and clay follow the borings' termination depth of 30 feet.

Groundwater

At the time of making the borings, groundwater was first encountered at 6 feet to 8 feet below the ground surface. After a short period (15 minutes), a rise detected at 4 feet below the ground surface. These observations were made during a short period of time and groundwater may not have become fully realized at the time of observation. Groundwater can fluctuate with seasonal precipitation, drainage, and prolonged drought. If the depth to groundwater is important to construction, it should be measured at that time.

FURNISHED INFORMATION

We understand that an existing sewer force main (SFM) will be replaced along Lafitte Avenue, between Galvez Street and Broad Street, by installing an HDD pipeline (18 inches Outer Diameter; At least 10 feet below the existing ground surface).

METHODOLOGY

We have performed analyses to provide the maximum pressure om the pipe and the maximum hydraulic fracture pressure.

In general, the earth pressure against heave is calculated using a procedure to determine the earth pressures acting at the top of the pipe. The procedure is outlined in the appendix of ASTM F1962-11 and requires pipe or borehole dimensions in addition to soil parameters (i.e. soil density, overburden stress, coefficient of earth pressure, etc.)

The procedure for calculating the hydraulic fracture pressure is found in relevant portions of a USACE guideline (CELMN-ED-F; Section 5; 2010) for installing pipelines by nearsurface direction drilling under levees. These analyses apply a factor of safety (FOS) against hydraulic fracture of at least 2 and is based on the relationship of fracture pressure (Pf) to downhole mud pressure (Pm). The fracture pressure is comprised of the soil overburden stress and undrained shear strength.

CONCLUSION AND RECOMMENDATIONS

The results of our analyses are provided on Figure 2, attached to this letter.

As there are many variables that are required in planning a HDD project that are not yet available, we recommend that an experience HDD contractor be consulted for the project. A pressure meter may be placed behind the cutting head to assure that the maximum mud pressure is not exceeded during installation.

LIMITATIONS

The results of the geotechnical investigation do not guarantee or warrant that conditions away from the borehole locations will be the same as those encountered in the borings. Also, should the nature of the project change or should any of the stated assumptions be inaccurate, Gulf South should be notified for comment.

We appreciate the opportunity to serve your geotechnical needs for this project.

Sincerely,
GULF SOUTH ENGINEERING AND TESTING, INC.

CHAD M. POCHE, P.E.
Principal/Vice President

BLAKE E. VUTERA, P.E.
Engineering Manager

STATE OF LOUISIANA
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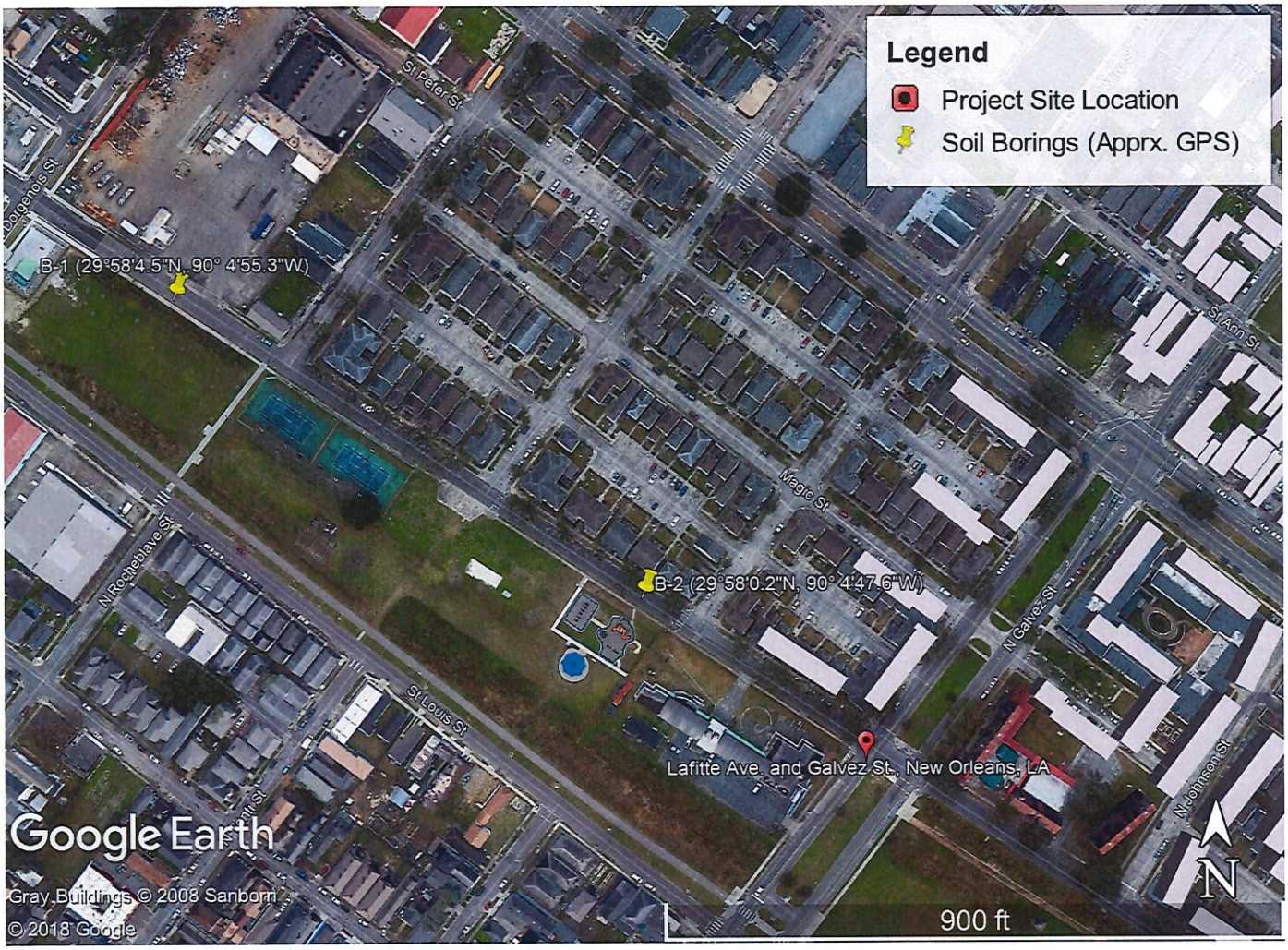
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

GULF SOUTH
ENGINEERING AND TESTING, INC.
Geotechnical & Materials Consultants

ATTACHMENTS

- **FIGURE 1 – BORING PLAN**
- **FIGURE 2 –PRESSURE CALC. TABLE**
- **BORING LOGS B-1 & B-2**
- **ASTM PROCEDURE**
- **USACE PROCDURE**



Gulf South File 19-062	GULF SOUTH ENGINEERING AND TESTING, INC. Geotechnical & Materials Consultants	
SFM Replacement HDD-Lafitte Avenue Galvez to Broad New Orleans, LA	**For Stantec New Orleans, LA**	**BORING PLAN**
		Figure No. 1

Gulf South File No. 19-062

SFM Relocation
HDD - Lafitte Avenue
Galvez Street to Broad Street
New Orleans, LA

Boring Profile by Depth Below Ground Surface

Soil Layer Bot. Depth d, (ft.)	Wet Dens. γ ,(pcf)	Soil Strength C, (psf)	Overburden Per Layer OB_{lyr}, (psf)	Angle of Soil Fricition φ, (degrees)	Angle of Pipe-Soil Fricition δ ,(degrees)
4.0	80	250	320	0	0
8.0	111	425	444	0	0
13.0	81	200	405	0	0
18.0	86	300	430	0	0
23.0	80	225	400	0	0
30.0	103	345	721	0	0

Max. Earth Pressure
at Top of Pipe Against Heave Per ASTM F1962

Cover Depth, H, (ft. below ground surface)	Coeficent of Earth Pressure K, (-)	Arching Factor Kappa, (-)	Earth Pressure at Pipe, P_E, (psi)	Max. Pressure at Top of Pipe, P_{EV}, (psi)
10.0	1.00	0.99	7	7.0
15.0	1.00	0.99	10	9.8
20.0	1.00	0.99	13	12.6
25.0	1.00	0.99	17	17.2
30.0	1.00	0.98	19	18.6

Max. Downhole Mud Pressure
for Factor of Safety >= 2.0 against Hydraulic Fracture Per USACE's CELMN-ED-F (2010)

Pipe Depth D, (ft. below ground surface)	Total Overburden at Bottom EL OB, (psf)	Soil Strength at Bottom EL C, (psf)	Fracture Pressure Pf, (Overburden + Strength, psf)	Fracture Pressure Pf, (Overburden + Strength, psi)	Max. Mud Pressure for Min. Factor of Safety = 2.0 Pm, (psi)
10.0	1,007	200	1,207	8.4	4.2
15.0	1,427	300	1,727	12.0	6.0
20.0	1,839	225	2,064	14.3	7.2
25.0	2,514	345	2,859	19.9	9.9
30.0	2,720	345	3,065	21.3	10.6

Assumptions: Pipe/Borehole outer diameter 18.0 inches and values for H and D are equal

Figure No. 2

Boring No. B-1

Project: SFM Replacement
HDD - Lafitte Avenue
Location: Galvez Street to Broad Street
New Orleans, LA
Client: Stantec
New Orleans, LA

GSE&T File No.: 19-062
Date: 7/16/2019
Technician: V. Leco
Rig Type: Truck
Page: 1 of 1

Coord: 29° 58' 4.5"N, 90° 4' 55.3" W

Depth (Feet)	Sample	(Field Test) PP/ SPT	Comp. Strength (tsf)	Water Content (%)	Wet Density (pcf)	LL (%)	PI (%)	% Passing #200 Sv	TYPE	Description of Stratum
0		n/a								Approx. 4 inches ASPHALT over 4 inches CONCRETE pavement
		n/a		22.4				6.4		Brown SAND (SP/SC-FILL)
		n/a*		22.1				8.1		
		0.25 (PP)		38.0		153	105	55.1		Gray CLAY (CH) with sand layers, organic materials, trace gravel
5		0 b/f (PSS)		110.2		165	112	88.2		Very Soft gray ORGANIC CLAY (OH) with silt, peat pockets, wood
		0.25 (PP)		157.8						
		<0.25 (PP)	0.193	192.6	77					
10		0.50 (PP)	0.199	141.7	84					
		1.00 (PP)	0.275	133.6	86	129	82			Soft gray and black ORGANIC CLAY (OH) with wood/root
15										
		0.50 (PP)	0.332	58.6	109			98.7		Soft gray CLAY (CH) with silt, sand seams
20										
		1.00 (PP)	0.325	51.1	106					
25										
		0.50 (PP)	0.425	57.30	104					
30										Boring completed to 30 feet below ground surface
35										
40										

Sample Legend:
- Core (Shelby Tube)
- Standard Penetration (SPT)
- No Recovery
- Auger Sample

Comments/Notes:
- Borehole backfilled per LA DOTD & LA DEQ requirements upon completion
- D.A. / R.W. Depths = 0-10 ft. / 10-30 ft.
- Ground Water = Encountered at 6 ft. b.g.s.. After waiting approx. 15 minutes, groundwater rise detect to 4 ft. b.g.s..
*- Encountered refusal at apprx. 4 ft. b.g.s.; Borehole offset 5 feet and redrilled

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Geotechnical & Materials Consultants

Boring No. B-2

Project: SFM Replacement
HDD - Lafitte Avenue
Location: Galvez Street to Broad Street
New Orleans, LA
Client: Stantec
New Orleans, LA

GSE&T File No.: 19-062
Date: 7/16/2019
Technician: V. Leco
Rig Type: Truck
Page: 1 of 1

Coord: 29° 58' 0.2"N, 90° 4' 47.6" W

Depth (Feet)	Sample	(Field Test) PP/ SPT	Comp. Strength (tsf)	Water Content (%)	Wet Density (pcf)	LL (%)	PI (%)	% Passing #200 Sv	TYPE	Description of Stratum
0		n/a								Approx. 4 inches ASPHALT pavement over sand base
		1.00 (PP)	0.588	50.3	104					Medium stiff gray CLAY (CH)
		1.00 (PP)	0.438	40.3	112	77	28			Soft gray CLAY (CH) with silt trace roots
5		0.75 (PP)	0.402	40.2	117					
		0.50 (PP)	0.440	37.0	116	53	30			Soft gray CLAY with silt layers
		0.75 (PP)	0.409	62.9	101	86	59			Soft gray CLAY with trace wood
10		1.00 (PP)	0.260	55.7	108					
		1.00 (PP)	0.541	175.9	80					Medium Stiff gray ORGANIC CLAY (OH) with trace wood
15										
		1.00 (PP)	0.261	53.2	104			86.5		Soft gray CLAY (CH) with sand pockets
20										
		0.25 (PP)	0.332	66.0	100					
25										
		0.50 (PP)	0.343	58.8	104					with trace silt seams
30										Boring completed to 30 feet below ground surface
35										
40										

Sample Legend:
- Core (Shelby Tube)
- Standard Penetration (SPT)
- No Recovery
- Auger Sample

Comments/Notes:
- Borehole backfilled per LA DOTD & LA DEQ requirements upon completion
- Dry Auger Depths = 0-10 ft.
- Rotary Wash Depths =10-30 ft.
- Ground Water = Encountered at 8 ft. b.g.s.. After waiting approx. 15 minutes, groundwater rise detect to 4 ft. b.g.s..

GULF SOUTH
ENGINEERING AND TESTING, INC.
Geotechnical & Materials Consultants

Designation: F1962 – 11

Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings[1]

This standard is issued under the fixed designation F1962; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This guide describes the design, selection considerations, and installation procedures for the placement of polyethylene pipe or conduit below ground using maxi-horizontal directional drilling equipment. The pipes or conduits may be used for various applications including telecommunications, electric power, natural gas, petroleum, water lines, sewer lines, or other fluid transport.

1.2 Horizontal directional drilling is a form of trenchless technology. The equipment and procedures are intended to minimize surface damage, restoration requirements, and disruption of vehicular or maritime traffic with little or no interruption of other existing lines or services. Mini-horizontal directional drilling (min-HDD) is typically used for the relatively shorter distances and smaller diameter pipes associated with local utility distribution lines. In comparison, maxi-horizontal directional drilling (maxi-HDD) is typically used for longer distances and larger diameter pipes common in major river crossings. Applications that are intermediate to the mini-HDD or maxi-HDD categories may utilize appropriate "medi" equipment of intermediate size and capabilities. In such cases, the design guidelines and installation practices would follow those described for the mini- or maxi-HDD categories, as judged to be most suitable for each situation.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of the regulatory limitations prior to use.* Section 6 contains general safety information related to the use of maxi-horizontal directional drilling equipment.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D420 Guide to Site Characterization for Engineering Design and Construction Purposes (Withdrawn 2011)[3]

D422 Test Method for Particle-Size Analysis of Soils

D1586 Test Method for Penetration Test (SPT) and Split-Barrel Sampling of Soils

D1587 Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes

D2113 Practice for Rock Core Drilling and Sampling of Rock for Site Exploration

D2166 Test Method for Unconfined Compressive Strength of Cohesive Soil

D2435 Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading

D2447 Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter (Withdrawn 2010)[3]

D2513 Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings

D2850 Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils

D3035 Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter

D4186 Test Method for One-Dimensional Consolidation Properties of Saturated Cohesive Soils Using Controlled-Strain Loading

D4220 Practices for Preserving and Transporting Soil Samples

D4318 Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

D4767 Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils

[1] This guide is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.67 on Trenchless Plastic Pipeline Technology.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard

D5084 Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

F714 Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter

F1804 Practice for Determining Allowable Tensile Load for Polyethylene (PE) Gas Pipe During Pull-In Installation

F2620 Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

2.2 *Other Standards:*

ANSI Preferred Number Series 10

ANSI/EIA/TIA-590 Standard for Physical Location and Protection of Below-Ground Fiber Optic Cable Plant[4]

OSHA-3075 Controlling Electrical Hazards[5]

TR-NWT-000356 Generic Requirements for Optical Cable Innerduct[6]

3. Terminology

3.1 *Definitions:*

3.1.1 *horizontal directional drilling, HDD, n*—a technique for installing pipes or utility lines below ground using a surface-mounted drill rig that launches and places a drill string at a shallow angle to the surface and has tracking and steering capabilities.

3.1.1.1 *Discussion*—The drill string creates a pilot bore hole in an essentially horizontal path or shallow arc which may subsequently be enlarged to a larger diameter during a secondary operation which typically includes reaming and then pullback of the pipe or utility line. Tracking of the initial bore path is accomplished by a manually operated overhead receiver or a remote tracking system. Steering is achieved by controlling the orientation of the drill head which has a directional bias and pushing the drill string forward with the drill head oriented in the direction desired. Continuous rotation of the drill string allows the drill head to bore a straight path. The procedure uses fluid jet or mechanical cutting, or both, with a low, controlled volume of drilling fluid flow to minimize the creation of voids during the initial boring or backreaming operations. The drilling fluid helps stabilize the bore hole, remove cuttings, provide lubricant for the drill string and plastic pipe, and cool the drill head. The resultant slurry surrounds the pipe, typically filling the annulus between the pipe and the bored cavity.

3.1.2 *maxi-horizontal directional drilling, maxi-HDD, n*—a class of HDD, sometimes referred to as directional drilling, for boring holes of up to several thousand feet in length and placing pipes of up to 48 in. (1¼ m) diameter or greater at depths up to 200 ft (60 m).

3.1.2.1 *Discussion*—Maxi-HDD is appropriate for placing pipes under large rivers or other large obstacles (Fig. 1). Tracking information is provided remotely to the operator of the drill rig by sensors located towards the leading end of the drill string. Cutting of the pilot hole and expansion of the hole is typically accomplished with a bit or reamer attached to the drill pipe, which is rotated and pulled by the drilling rig.

3.1.3 *mini-horizontal directional drilling, mini-HDD, n*—a class of HDD, sometimes referred to as guided boring, for boring holes of up to several hundred feet in length and placing pipes of typically 12 in. (300 mm) or less nominal diameter at depths typically less than 25 ft (7 m).

3.1.3.1 *Discussion*—Polyethylene pipe selection and usage for mini-HDD is discussed extensively in the Plastics Pipe Institute's (PPI) TR-46, "Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe." (1)[7]

3.1.3.2 *Discussion*—Mini-HDD is appropriate for placing local distribution lines (including service lines or laterals) beneath local streets, private property, and along right-of-ways. The creation of the pilot bore hole and the reaming operations are typically accomplished by fluid jet cutting or the cutting torque provided by rotating the drill string, although mud motors powered by the drilling fluid are sometimes used for hard or rocky soil conditions. The use of such mud motors would only be applicable for the larger mini-HDD machines. The locating and tracking systems typically require a manually operated overhead receiver to follow the progress of the initial pilot bore. The receiver is placed above the general vicinity of the drill head to allow a determination of its precise location

[4] Available from the Electronics Industries Association, 2001 Pennsylvania Ave., N.W., Washington, DC, 20006.

[5] Available from the Occupational Health and Safety Administration, 200 Constitution Ave. N.W. Washington, DC 20210.

[6] Available from Bellcore, 60 New England Ave., Room 1B252, Piscataway, NJ, 08854-4196.

[7] The boldface numbers in parentheses refer to the list of references at the end of this standard.

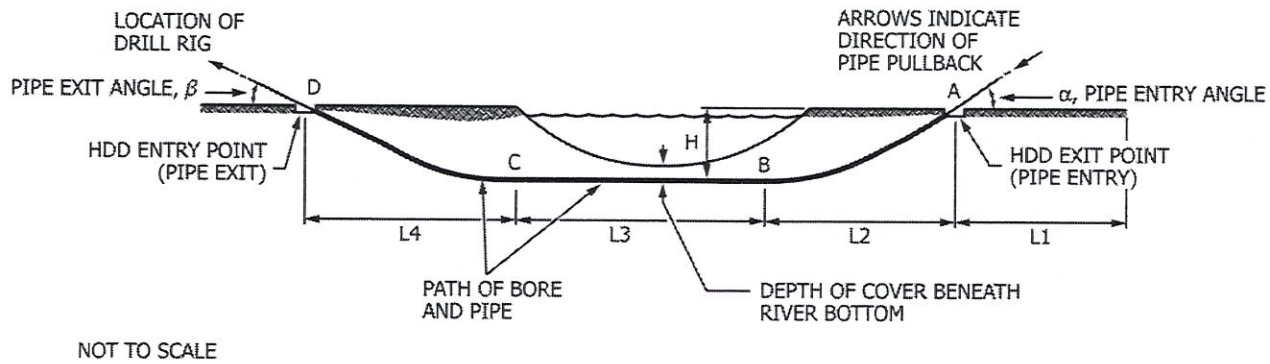

FIG. 1 Maxi-HDD for Obstacle (for example, River) Crossing

and depth, indicate drill head orientation for determining steering information to be implemented from the drill rig.

3.1.4 *pipe dimension ratio, DR, n*—the average specified diameter of a pipe divided by the minimum specified wall thickness.

3.1.4.1 *Discussion*—For pipes manufactured to a controlled outside diameter (OD), the DR is the ratio of pipe outer diameter to minimum wall thickness. The standard dimension ratio (SDR) is a specific ratio of the outside diameter to the minimum wall thickness as specified by ANSI Preferred Number Series 10.

NOTE 1—Lower DR values correspond to thicker, stronger pipes.

4. Preliminary Site Investigation

4.1 *General Considerations*—A maxi-HDD project, such as that associated with a river crossing, is a major event that will require extensive and thorough surface and subsurface investigations. Qualified geotechnical engineers should perform the work for the owner in preparation for planning and designing of the bore route. The information should also be provided to the potential contractors to provide guidance for the bidding stage and subsequent installation. The contractor may perform additional investigations, as desired. Since typical maxi-HDD projects represent river crossings, the following procedures are described in terms of the specific investigations and issues arising in such cases. The general procedures, however, may be appropriately interpreted to also apply to non-river crossings, such as under land-based obstacles including highways, railways, etc.

4.2 *Surface Investigation* **(2, 3)**

4.2.1 *Topographic Survey*—A survey should be conducted to accurately define the working areas described in 4.1 for the proposed crossing site. Horizontal and vertical references must be established for referencing hydrographic and geotechnical data. The survey should typically include overbank profiles on the anticipated path center-line, extending about 150 ft (75 m) landward of the bore entry point to the length of the (pre-fabricated) pull section landward of the bore exit point. The survey information should be related to topographical features in the vicinity of the proposed crossing. Existing topographical information may be available from the U.S. Geological Survey, or Federal, state, or county publications. Aerial photographs or ordnance surveys may be useful, especially for crossing land-based obstacles in urban areas, since these may indicate the presence of demolished buildings and the possibility of old foundations, as well any filled areas (4). It is also necessary to check available utility records to help identify the precise location of existing below-ground facilities in the vicinity, including electric power, natural gas, petroleum, water, sewer, or telecommunications lines. The presence of existing pipelines, support pilings, etc., containing significant steel mass should be noted since this may cause interference with magnetically sensitive equipment guidance or location instrumentation.

4.2.1.1 *Drill Rig (Bore Entry) Side*—The available area required on the side of the drill rig must be sufficient for the rig itself and its ancillary equipment. In general, the size of the required area on the rig side will depend upon the magnitude of the operation, including length of bore and diameter of pipe to be placed. Typically, a temporary workspace of approximately 150 ft (45 m) width by 250 ft (75 m) length will be sufficient. These dimensions may vary from 100 by 150 ft (30 by 45 m) for shorter crossings of 1000 ft (300 m) or less, to 200 by 300 ft (60 by 90 m) for medium or long crossings.

4.2.1.2 *Water Supply*—Water storage and facilities for mixing, storing, and pumping drilling fluid will require significant space. Although it is standard practice to draw fresh water found at the location for mixing the drilling fluid, alternate water supplies may be required to obtain proper drilling fluid characteristics. Hard or salty water is undesirable, although additives may be used to create the proper pH value. It may be necessary to provide access for trucks to transport water or to provide for the installation of a relatively long surface pipe or hose connecting a remote hydrant.

4.2.1.3 *Pipe (Bore Exit) Side*—Assuming the pipe to be placed is too large a diameter to be supplied on a reel (for example, larger than 6 in. (150 mm)), sufficient space is required at the side opposite that of the drill rig, where the bore will exit and the pipe be inserted, to accommodate a continuous straight length of pre-fabricated pipe. The space for the straight length will begin approximately 50 to 100 ft (15 to 30 m) from the anticipated bore exit and extend straight landward at a width of 35 to 50 ft (10 to 15 m), depending upon the pipe diameter. In the immediate vicinity of the bore exit (pipe entry), an area of typically 50 ft (15 m) width by 100 ft (30 m) length is required; for relatively large diameter pipes (larger than 24 in. (600 mm), or in cases of difficult soil conditions, an area of 100 ft (30 m) width by 150 ft (45 m) length should be provided.

4.2.2 *Hydrographic/Potamological Survey*—For crossing significant waterways, a survey should be conducted to accurately describe the bottom contours and river stability to establish suitability for the design life of the pipeline. Typically, depths should be established along the anticipated center-line, and approximately 200 ft (60 m) upstream and downstream; closer readings may be required if it is necessary to monitor future river activity. Consideration should be given to future changes in river bank terrain. Washouts, bank migrations, or scour can expose pipe.

4.2.3 *Drilling Fluid Disposal*—The means for disposal of the drilling fluid wastes must be considered. The volume of drilling fluid used will depend upon the soil characteristics but is typically on the order of 1 to 3 times the volume of removed soil. Most drilling fluids use bentonite or polymer additives which are not generally considered to be hazardous. However, local regulations should be followed regarding disposal.

4.2.3.1 *Drilling Fluid Recirculation* —Occasionally, drilling fluid recirculation is used to reduce overall material and disposal costs. If drilling fluid recirculation is contemplated, a means must be considered for transporting any fluid exhausted from the opposite (bore exit) side, during the pullback operation, to the rig side. This may be accomplished by truck, barge, or a temporary recirculation pipe line on the bottom of the waterway (for river-crossings). The recirculation line must be adequate to prevent accidental discharge into the waterway.

4.3 *Subsurface Investigation*—The overall technical and economic feasibility of the maxi-HDD process is highly dependent upon the properties of the soil formation through which the penetration will be accomplished. Thus, an accurate and thorough geotechnical investigation must be performed by a qualified engineer, including review of existing information and site specific studies for the proposed location. This information will be used to produce design drawings (including final bore route, pipe design, and bore design), construction specifications, and permit applications as well as to provide information for the contractors upon which to select appropriate tools and methods for the actual construction. While the guidelines given in the following sections point out general procedures or types of information, or both, which could be developed, unforeseeable site-specific variables make the thoroughness and accuracy of any site characterization study directly dependent on the skill, experience, and inquisitiveness of the investigating engineer. Therefore, the investigator should define the configuration, extent, and constituency of the investigation. Site characterization information must go beyond just defining soil conditions along the bore path to include a forecast of future conditions (that is, river meanders and scours) and to anticipate the affect of the maxi-HDD process on site conditions.

4.3.1 *Preliminary Study*—The subsurface investigation should begin with a review of existing data such as may be obtained from published soil reports (for example, Soil Conservation Service Report, U.S. Geological Survey, U.S. Army Corps of Engineers reports, etc.) or records from previous construction projects. In particular, data from nearby pipe or cable river-crossings, or bridge foundation construction should be examined. The results of this study will be used to define the initially recommended bore penetration profile path.

4.3.2 *Test Borings* **(2,3,5)**—Site-specific data must be obtained to fully characterize and verify the conditions through which the proposed bore path will be created. Refer to Guide D420, Test Method D1586, Test Method D1587, Test Method D2113 and Practice D4220. Data collection should be aimed at identifying earth materials at the site and at exploring subsurface stratification (including identification of the boundary between rock and other strata, presence of cobbles or boulders and other anomalies such as old tree stumps and fill debris). The location, depth, and number of borings should be determined by the engineer based on the preliminary study, anticipated future changes in site conditions (river meanders, scours, etc.), and modifications of soil conditions during construction. These borings should be located at a sufficient lateral distance (to either side) from the proposed bore path to avoid boring into the test hole, and the holes should be sealed with grouting to avoid potential leakage paths for drilling fluid during the actual installation. Following completion of the detailed route design (Section 7), additional test borings may be desirable at critical points such as bends.

NOTE 2—In environmentally sensitive areas, possible restrictions may exist on the location or number of test borings.

4.3.3 In addition to test borings, dynamic cone testing or developing non-intrusive techniques such as ground penetrating radar or sonar may be used to identify stratification and areas with anomalies. Such probing techniques may be applied in the proximity of known conditions determined by a boring to obtain proper calibration, and then extended towards untested areas at relatively close intervals to identify irregularities between borings. If needed, additional borings may then be made at intermediate points of interest **(4,5)**.

4.3.4 *Soil Analysis* **(3,6,7)**—The geotechnical study should evaluate several parameters, including soil classifications, (Refer to Test Methods D4318 and D422.) strength and deformation properties, (Refer to Test Methods D1586, D2166, D2435, D2850, D4186, and D4767.) and groundwater table behavior. (Refer to Test Method D5084.) Although some field evaluation and in-situ testing should be included, the geotechnical investigation should emphasize laboratory testing in order to obtain more accurate and meaningful quantitative results. If rock is encountered, the borings should penetrate sufficiently to verify whether or not it is bedrock. The relevant soil testing methods listed in Section 2 should be followed. In general, the following specific data should be obtained from the borings:

4.3.4.1 Standard classification of soils, (Refer to Test Method D4318),

4.3.4.2 Gradation curves for granular soils, as described in Test Method D422,

4.3.4.3 Standard penetration test values, as described in Test Method D1586,

4.3.4.4 Cored samples of rock with rock quality designation (RQD) and percent recovery,

4.3.4.5 Unconfined compressive strength, as described in Test Method D2166,

4.3.4.6 Moh's hardness for rock samples,

4.3.4.7 Possible contamination (hazardous waste),

4.3.4.8 Groundwater location, type, and behavior, and

4.3.4.9 Electrical resistivity or mineralogical constituents.

4.3.5 For river crossings, the results from the preliminary study and site specific tests should be combined in a comprehensive report describing the geotechnical subsurface conditions beneath the river bottom plus the stream's potential for meandering and scouring. The results must then be considered by the owner, the engineer, and potential contractors, with regard to compatibility with the state-of-the-art of directional drilling technology for cost-effectively completing the task. If necessary, the crossing location may be altered to a more favorable crossing site. In this case, many of the surface and subsurface investigations may have to be repeated for the new proposed crossing location and bore path.

4.3.6 *Feasibility*—Soil conditions are a major factor affecting the feasibility and cost of using maxi-HDD in a given geographic area. Table 1 indicates the suitability of horizontal directional drilling as a function of the general characteristics of the soil conditions in the area and depths of interest **(4,6)**. The "generally suitable" category presumes knowledgeable, experienced contractors or personnel using appropriate equipment. Such contractors are assumed to have a minimum of one year field experience and completed approximately 30 000 ft (10 km) of construction in related projects. The size and type machines considered appropriate for particular installations are a function of bore length, final hole diameter, and soil conditions. Various type drill heads, mud motors, reamers, and

TABLE 1 Soil Conditions and Suitability of Horizontal Directional Drilling[A]

Soil Conditions	Generally Suitable	Difficulties May Occur	Substantial Problems
Soft to very soft clays, silts, and organic deposits		X	
Medium to very stiff clays and silts	X		
Hard clays and highly weathered shales	X		
Very loose to loose sands above and below the water table (not more than 30 % gravel by weight)		X	
Medium to dense sands above or below the water table (not more than 30 % gravel by weight)	X		
Very loose to dense gravelly sand, (30 % to 50 % gravel by weight)		X	
Very loose to dense gravelly sand (50 % to 85 % gravel by weight)			X
Very loose to very dense gravel			X
Soils with significant cobbles, boulders, and obstructions			X
Weathered rocks, marls, chalks, and firmly cemented soils	X		
Slightly weathered to unweathered rocks		X	

[A]For additional information, see Ref. **(6)**.

drilling fluid capabilities are available for various ground conditions. The conditions under which "difficulties may occur" may require modifications of routine procedures or equipment, such as the use of special purpose drill heads or optimized drilling fluids. Some cases will entail "substantial problems" and may not be economically feasible for directional drilling using present technology. The potential for problems to occur increases with the presence of gravels, boulders, or cobbles or with transitions from non-lithified material into solid rock. In such cases, other drilling locations or construction alternatives should be considered unless special circumstances dictate the need for directional drilling at the present location, even at high costs associated with special rock drilling techniques, etc.

5. Safety and Environmental Considerations

5.1 *General Considerations*—Injury to personnel may result from the mechanical and hydraulic machine operations directly related to the drilling operation or from striking of electric power lines or buried pipelines. In addition, the scale of maxi-HDD operations may involve additional equipment and accessories required for the lifting and handling of heavy drill rods, drill heads, reamers, etc., as well as the product pipe or conduit. Additional precautions relating to specific auxiliary equipment must be followed, but is beyond the scope of this standard. Non-essential personnel and bystanders should not be allowed in the immediate vicinity of the maxi-HDD equipment. Barriers and warnings should be placed a minimum of 30 ft (10 m) from the edge of the equipment or associated hardware. Safety precautions are to be followed by all personnel and at both ends of the bore path. Inadvertent contact with electric power, natural gas, or petroleum lines may result in hazards to personnel or contamination. If possible, any in-service pipeline in the proximity of the bore should be de-activated during the construction. In general, the possibility of injury or environmental impact caused by damage to working or powered subsurface facilities or pipelines during the initial boring or backreaming operations is reduced by appropriate adherence to regulations and damage prevention procedures, as outlined in Section 6.

5.2 *Work Clothing*—**Caution:** Loose clothing or jewelry should not be worn since they may snag on moving mechanical parts. Safety glasses or OSHA approved goggles, or both, and OSHA approved head gear should be worn at all times. Protective work shoes and gloves must be worn by all personnel.

5.3 *Machine Safety Practices*—Contractors must comply with all applicable OSHA, state, and local regulations, and accepted industry practices. All personnel in the vicinity of the drill rig or at the opposite end of the bore must be properly trained and educated regarding the potential hazards associated with the maxi-HDD equipment. For electrical hazards, see OSHA 3075. Personnel shall be knowledgeable of safe operating procedures, safety equipment, and proper precautions. Courses and seminars are available in the industry, including training provided by the equipment suppliers.

5.3.1 The operation of the drill rig requires rotation and advancement or retraction of the drill rods. Drill rig operation is typically accomplished using chain drives, gear systems, and vises which may potentially lead to personal injury due to the moving mechanical components. All safety shields or guards must be properly mounted. The equipment must be checked at the beginning of each work day to verify proper operation.

5.3.2 *Hydraulic Fluid*—The hydraulic oil lines powering the drill rig operate under pressures of several thousand psi (hundreds of bars). The hoses and connectors must be properly maintained to avoid leaks.

5.3.2.1 *Caution:* If a leak is suspected, it should be checked by using a piece of cardboard or other object, but not hands or any other part of the body. The high pressure hydraulic fluid can penetrate the skin, burn, or cause blood poisoning. Before disconnecting any hydraulic lines, the system pressure should be relieved.

5.3.3 *Drilling Fluid*—Drilling fluid pressures will vary depending upon the equipment design and operator preference; pressures of several thousand psi (hundreds of bars) are possible. The hoses and connections must be properly maintained to avoid leaks.

5.3.3.1 *Caution:* Suspected leaks should be checked by using a piece of cardboard or other object. Avoid the use of hands or any other part of the body to check for a leak. Before individual drill rods are inserted or removed from the drill string, it must be verified that the drilling fluid pressure has been shut off and allowed to decrease; otherwise, high pressure fluid will squirt from the joint and possibly cause injury to

personnel. The drilling fluid pressure gage must be checked to verify the pressure has been relieved before disconnecting any rods.

NOTE 3—If the pressure does not decrease in a short interval following pressure shut off, the fluid jet openings at the drill head may be clogged. Special care must then be made when disconnecting the rod. It may be necessary to retract the drill string or expose the drill head to clear the jets before continuing the operation. To avoid injury from the drill head and drilling fluid, all personnel should maintain a safe distance from the exit point of the bore as the drill head surfaces. The pressure should be shut off as soon as the drill head exits.

5.4 *Construction Effects on Site*—It is assumed that the preliminary site investigations included analyses to verify the stability of embankments, roads, or other major features to be traversed. It is necessary to ensure that the maxi-HDD operation will not negatively impact the site upon completion. In many cases, it will be appropriate to use grouting to seal the final bore path hole or the end portions of the hole following the installation of the pipe to prevent future flow or environmental contamination. Particularly sensitive areas include statutorily designated areas, such as wetlands, natural and scenic waterways, or contaminated or waste disposal sites. If the bore will pass through, or in close proximity to, a contaminated area, special spoils monitoring and disposal procedures must be followed, consistent with applicable Federal, state, or local regulations.

5.4.1 *Drilling Fluid*—The most common drilling fluid additive is bentonite, a naturally occurring clay. When added to water, the resulting fluid provides desired properties including viscosity, low density, and lubricity. The bentonite material used should be National Sanitation Foundation (NSF) certified. Disposal should be in accordance with local laws and regulations. The bentonite-water slurry is not a hazardous material unless it becomes mixed with toxic pollutants. The waste material is usually considered as typical excavation spoils and can be disposed or by means similar to other spoils. If other additives are of concern or hazardous material disposal is required, it may be necessary to de-water the spoils, transport the solids to an appropriate disposal site, and treat the water to meet disposal requirements.

5.4.2 The utility access pits which may be present at both ends of the bore are convenient receptacles for collecting used drilling fluid. If not present for utility access, small pits should be provided at both ends to serve as such receptacles. Depending upon soil permeability, the pits may be lined with an appropriate material or membrane. The pits should be emptied as necessary. Some maxi-HDD systems use drilling fluid recirculating systems to reduce the volume of spoils. If the geotechnical investigation revealed the existence of soil conditions conductive to fluid migration, such as through pre-fractures in surrounding clay or soil mass permeability, this condition must be anticipated and accounted for in the drilling operation.

6. Regulations and Damage Prevention

6.1 *General Considerations*—The owner of the proposed pipeline should obtain any required drilling permits and is responsible for obtaining approvals from the Federal, state, or local jurisdictions or other agencies that may be affected by the work. The preliminary investigations (Section 4) should identify appropriate site locations and paths, including safe separations from other facilities such as electric power, natural gas, or petroleum lines. If the constraints for a particular maxi-HDD bore are such as to be in the vicinity of known facilities, the affected owners must be contacted and strict procedures for location and marking followed. If a maxi-HDD bore interconnects points under the jurisdiction of several states or governing bodies, then the regulations of all parties must be considered, including relevant permits. Special restrictions may exist, including restoration regulations, in environmentally sensitive habitat areas.

6.2 *Environmental, Health, and Safety Plan*—When required, each contractor that will work on the project must submit an environmental, health, and safety plan. Items to consider are the responsibilities of the plan, reporting, employee training, MSDS sheets for materials being used, emergency telephone numbers for police, fire department, and medical assistance, fire prevention, sanitation, and industrial hygiene.

6.3 *Environmental and Archaeological Impact Study*—Most projects using maxi-HDD will require procurement of various environmental permits. When an environmental permitting plan must be prepared, it should include a list of required permits (for example, USAE, USEPA), the time needed to prepare permits, and an estimated date of issuance. Items to consider are solid and hazardous materials and waste management, wetlands, burial grounds, land use, air pollution, noise, water supply and discharge, traffic control and river and railroad transportation.

6.4 *Waterways* (see ANSI/EIA/TIA-590)—The U.S. Army Corps of Engineers (USAE) regulates activities involving interstate bodies of water, including marshes and tributaries, as well as intrastate waters which could affect interstate or foreign commerce. The organization is responsible for work affecting such waterways, including to the headwaters of freshwater streams, wetlands, swamps and lakes. The Regional District Engineer of the USAE will advise applicants of the types of permits required for such proposed projects. In addition, a state or local, or both, agency environmental review and permit may be required.

6.5 *Railroad Crossings* (see ANSI/EIA/TIA-590)—The chief engineer of the railroad should be consulted for the approved methods of crossing the railroad line. For spur tracks or sidings, the tract owner should be consulted. Railroads normally require cased pipes at crossings to prevent track washouts or damage in the event of pipeline rupture. (At the time of writing of this standard, an American Railway Engineering Association (AREA) committee is studying the use of HDD for uncased and cased crossing of railroads for both plastic and steel gas pipelines.)

7. Bore Path Layout and Design

7.1 *General Considerations*—For maxi-HDD projects, such as river crossings, the bore path should be designed and specified by the engineer representing the owner prior to the contractor bidding process. Based upon the preliminary surface

and subsurface investigations, the path will be selected to place the pipe within stable ground and isolated from river activities for the design life of the utility line. The ground through which the path will traverse must be compatible with maxi-HDD technology. In general, for maxi-HDD projects, the design path will lie within a vertical plane. If necessary, lateral curvature is possible, consistent with the capabilities of the equipment and the product pipe. The path should be clearly designated in an integrated report summarizing the results of the surface and subsurface investigations, and should be used for pricing, planning, and executing the operation.

7.2 *Steering and Drill Rod Constraints*—The planned path must be consistent with the steering capability of the drill string and the allowable radius of curvature of the steel drill rods based upon the corresponding bending stresses in the steel rods and joints. Although some soil conditions will inhibit sharp steering maneuvers, path limitations will often be based upon fatigue strength considerations of the rods. A given rod may be able to withstand a single bend cycle corresponding to a relatively sharp radius of curvature, but the rotation of the rod during the boring operation results in flexural cycles which may eventually cause cumulative fatigue failure. The diameter of the drill rod is an important parameter affecting its stiffness, steering capability, and the allowable bend radii. A conservative industry guideline indicates the minimum bend radius should be approximately:

$$(R_{rod})_{min} = 1200\, D_{rod} \quad (1)$$

where:

$(R_{rod})_{min}$ = medium recommended bend radius of drill rod, in. (mm), and
D_{rod} = nominal diameter of drill rod, in. (mm).

This applies to bends in horizontal (plan) or vertical (profile) planes.

7.3 The proposed path should avoid unnecessary bends. Such trajectories may be difficult to follow and may lead to oversteering and excessive bends, resulting in increased stresses in the drill rods and greater required pulling forces during the installation of the pipe. The local radius of curvature of the path at any point may be estimated by:

$$R = \frac{\Delta S}{\Delta \varphi} \quad (2)$$

where:

R = local radius of curvature along path segment, ft (m),
ΔS = distance along path, ft (m), and
$\Delta \varphi$ = angular change in direction, rad.

NOTE 4—The angle in radians is equal to the angle in degrees × 0.0175. (One radian equals 57.3°.)

Thus, if ΔS is selected to be equal to 30 ft (10 m) (for example, one rod length for some maxi-HDD machines) a change of 0.1 rad (6°) corresponds to a radius of curvature of 300 ft (100 m).

7.4 *Bore Paths Profile (Vertical Plane) Trajectory* **(2,3)** —A typical obstacle crossing, such as that represented by a river is illustrated in Fig. 1.

7.4.1 The following parameters must be specified in defining the bore path:

7.4.1.1 Bore entry (pipe exit) point,
7.4.1.2 Bore exit (pipe entry) point,
7.4.1.3 Bore entry (pipe exit) angle,
7.4.1.4 Bore exit (pipe entry) angle,
7.4.1.5 Depth of path, (for example, depth of cover of pipe beneath river bottom), and
7.4.1.6 Path curvatures.

7.4.2 *Bore Entry (Pipe Exit)*—The bore entry point must be accurately specified consistent with the pipe route, equipment requirements, and preliminary topographical investigations. Bore entry angles should be in the range of 8 to 20° (0.15 to 0.35 rad) from the ground surface, preferably 12 to 15° (0.20 to 0.25 rad) from the ground surface. These angles are compatible with typical equipment capabilities.

7.4.3 *Bore Exit (Pipe Entry)*—The bore exit point must also be accurately specified consistent with the pipe length and topographical investigations. Bore exit angles should be relatively shallow, preferably less than 10° (0.15 rad). A shallow angle will facilitate the insertion of the pipe into the bore hole while maintaining the minimum radius of curvature requirements. Relatively steep angles will require greater elevation of the pipe to maintain the required bend radii.

7.4.4 *Path Profile*—The proposed path should optimally lay within a vertical plane including the bore entry and exit points. The arcs of the bore path and straight sections (that is, after achieving desired depth) must be defined, including the radii of curvature and approximate points of tangency of curved and straight segments. The curvatures must be compatible with both the steel drill rods (Eq 1) and the PE pipe or conduit (Section 8). It should be noted that even larger bend radii (lower curvatures) will further reduce lateral flexural bending loads on the pipe and drill rods as they traverse the route, thereby helping avoid additional increases in tensile loads associated with their stiffness effects. Typically, the path should ensure a minimum depth of cover of 15 ft (5 m) beneath the river bottom as projected over the design life of the pipe line, including allowance for scouring **(3,5)**. This will overcome buoyancy effects and help overcome the tendency for the drill head to rise towards the free surface, thereby complicating the steering operation.

NOTE 5—The Directional Crossing Contractors Associations (DCCA) **(8)** recommends a minimum depth of 20 ft beneath the river bottom.

7.4.4.1 *Average Radius of Curvature* —The average radius of curvature for a path segment (that is, A-B or C-D in Fig. 1) reaching to or from a depth required to pass beneath an obstacle, may be estimated from the bore exit or entry angle, respectively, and the depth of the bore:

$$R_{avg} = \frac{2H}{\theta^2} \quad (3)$$

where:

R_{avg} = average radius of curvature along path segment, ft (m),
θ = bore exit or entry angle to surface, rad, and
H = depth of bore beneath surface, ft (m).

The corresponding horizontal distance required to achieve the depth or rise to the surface may be estimated by:

$$L = \frac{2H}{\theta} \quad (4)$$

where:

L = horizontal transition distance, ft (m).

It must be noted that departures from a uniform radius will result in locally smaller radii.

7.4.4.2 The resultant path will determine the stresses to be exerted upon the pipe during the installation and service life. The product pipe design must therefore be analyzed based upon the final selected path, following the pipe design and selection procedures given in Section 8.

8. Pipe Design and Selection Considerations

8.1 *General Guidelines:*

8.1.1 Maxi-HDD applications typically require detailed analysis of the pipe or conduit in relation to its intended application. Due to the large anticipated pulling loads and potentially high external pressure, a careful analysis of the PE pipe must be performed, subject to the route geometry, to verify or determine an appropriate DR (or pipe wall thickness). The analysis should consider both the installation forces occurring during pull-back and the long-term operational loads.

8.1.2 *PE Pipe*—Pipes made from either high density polyethylene (HDPE) or medium density polyethylene (MDPE) are suited for directional drilling. PE pipe specifications include Specifications D2447, D2513, D3035, and F714. If such pipe is provided in short segments, the individual units should be joined using a butt-fusion technique in accordance with Practice F2620. This will allow the inherent strength of the PE pipe to be maintained during the placement process and when subjected to other operational stresses. Small diameter pipe of continuous length may be provided on reels. Table X1.1 gives modulus and strength values for typical pressure-rated HDPE and MDPE resins.

8.1.3 *Cable Conduit Applications* —For cable conduit applications, including electric power and telecommunications, small diameter pipe may be supplied on a continuous reel including internal pull line or the cable itself, as pre-installed by the manufacturer. In addition, the pipe may be provided with the interior surface pre-lubricated. Such features will be in accordance with that specified by the owner or engineer. Requirements for telecommunications applications, including HDPE pipe with various internal surface profiles, including smoothwall or ribbed are specified in TR-NWT-000356.

8.2 *Pipe Loading:*

8.2.1 *Operational and Installation Loads*—The pipe will be subject to loads during its long-term operation and during the installation process. It is the responsibility of the owner (or the owner's contractor or engineer) to determine the design and selection of the pipe to serve the function intended and withstand the operational stresses at the directionally drilled section as well as at other sections along the pipe line. This practice deals primarily with the loads imposed during the directional drilling process and earth and groundwater loads during operation (post-installation).

8.2.2 *Internal (Operational) Pressure Loads*—It is the responsibility of the owner (or owner's contractor or engineer) to determine the nominal diameter and wall thickness appropriate for the intended application. For example, if the pipe will be used for the pressurized flow of liquids or gases, it is necessary to determine the nominal diameter based on flow capacity requirements and the minimum wall thickness (or DR) to withstand the corresponding circumferential stresses on a long term basis. Specification D2513, D3035, or F714 may be used to determine an initial estimate of the corresponding maximum dimension ratio (DR) for PE pipe.

8.2.3 *External (Operational) Hydraulic and Earth Loads*—The pipe will be subjected to hydrostatic external pressure due to the height of water or drilling fluid (or slurry) above the maximum depth of placement relative to the entry or exit point, and earth loads and liveloads due to load transfer through the deformation of the soil around the borehole (**9**). If borehole deformation is minimal (such as in rock) or does not deform the pipe, the only loading applied to the pipe is the hydrostatic external pressure. When earth load does reach the pipe, load reductions from the geostatic stress (arching) may be anticipated. The reductions may be significant when the in situ soil is normally- or over-consolidated. On the other hand, in under-consolidated soils such as river deposits, the earth load on the pipe may equal the prism load (adjusted for buoyancy in the case of a river crossing). The external pressure applied to the pipe equals the total stress, that is, it is the sum of the effective earth pressure, reduced for arching, and the hydrostatic pressure. In some cases, the mud-slurry pressure will offset the earth pressure. As the earth load applied to directional drilled pipe is dependent on the depth of cover, borehole diameter, mud-slurry properties, drilling and back-reaming techniques, and the in situ soil properties, among other things, a geotechnical engineer should be consulted. See X2.2 for a discussion earth load calculations. Liveload pressure can be transmitted to shallow directional drilled pipe. For shallow applications, it is likely that the pipe is subjected to the same liveload and earth pressures as an entrenched pipe.

8.2.3.1 *Net External Pressure*—The net external pressure, P_{net}, is the differential pressure between the inside and outside of the pipe. The external operational load applied to the pipe may be decreased or totally off-set by internal pressure occurring within the pipe. Likewise, the external load may increase with the occurrence of negative pressure (vacuum) inside the pipe. The net external pressure may vary at different times in the life of the pipeline. For instance, during pressurized flow, the net external pressure may be zero but during a shut-down or prior to service, considerable external pressure may be applied. An analysis should be made of all potential external loadings, internal pressurization or vacuum events, and of their duration of occurrence, so that the net external pressure and its duration is determined for each cycle of the pipeline's service life.

8.2.4 *Pipe Resistance to External Loads*—The pipe must be of sufficient thickness (or DR ratio) to withstand the net external pressure without collapsing or deflecting unduly during each cycle of the operational life of the pipeline. (The

effects of external hydrosatic loads applied during the installation phase are discussed in 8.2.8.2.)

NOTE 6—Spangler's Iowa Formula is typically not applicable to directional drilled pipes as the mud-slurry (unless cemented) on setting develops only the consistency of a soft clay which will not provide significant side-support for the pipe.

8.2.4.1 *Pipe Deflection (Ovality)*—Deflection reduces the pipe's resistance to external collapse pressure. Earth loads, longitudinal bending (bore path curvature), and buoyancy forces during installation will produce ring deflection in the pipe. Formulas for calculating earth load deflection, buoyancy deflection, and curvature-induced deflection along with permissible deflection limits are given in Appendix X2. When bore path curvature is limited to the guidelines given in Note 7 and the DR is 21 or less, ovality due to longitudinal bending can generally be ignored. Filling the pipe with water during the placement operation will reduce the buoyancy force (see 8.2.6) and greatly eliminate the possible short-term collapse. The effective external pressure would then be equal to that corresponding to the actual external differential pressure due to the head of drilling slurry minus the internal pressure due to that of the water inside the pipe.

8.2.4.2 *Unconstrained Collapse*—The following version of Levy's equation may be used to determine the allowable external pressure for directional drilled pipe:

$$P_{ua} = \frac{2E}{(1-\mu^2)}\left(\frac{1}{DR-1}\right)^3 \frac{f_o}{N} \quad (5)$$

where:

P_{ua} = allowable external collapse pressure, psi (kPa),
E = apparent (time-corrected) modulus, psi (kPa), for the grade of material used to manufacture the pipe, and time and temperature of interest,
μ = Poisson's Ratio (long term loading = 0.45, short term loading = 0.35),
DR = dimension ratio (OD/t),
f_o = ovality compensation factor (see Fig. 2), and
N = safety factor, generally 2.0 or higher.

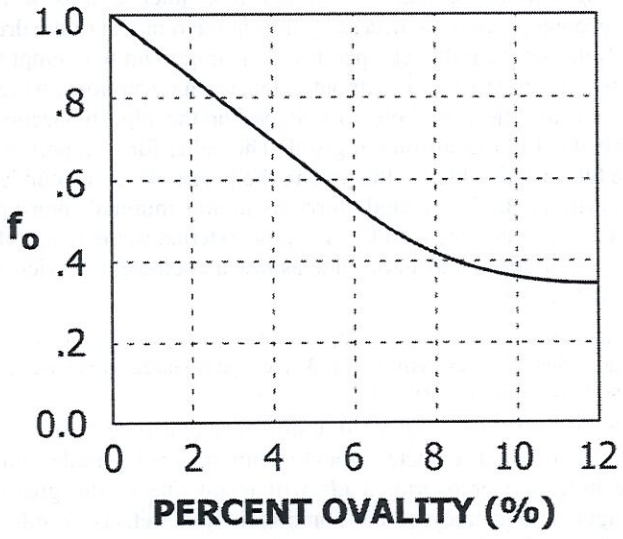

FIG. 2 Ovality Compensation Factor

For design, the allowable collapse pressure, P_{ua}, must equal or exceed the net effective pressure, P_{net}. The modulus of elasticity and Poisson's ratio are a function of the duration of the anticipated load. Modulus values are given in Table X1.1. If the safety factor in Levy's equation is set equal to one, the equation gives the critical collapse (buckling) pressure. Table X1.3 gives the critical collapse pressure for different DR's of HDPE pipe. For design purposes, the critical collapse pressure must be reduced by a safety factor and by ovality compensation to obtain an allowable stress, P_{ua}. When using Table X1.3 for determining pipe's resistance to buckling during pull-back, an additional reduction for tensile stresses is required. In general, if the resulting DR value is lower than that determined by the initial selection criteria based upon internal pressure considerations, the lower value must be used as corresponding to a required thicker, stronger pipe.

8.2.4.3 For a pipe that will be supported by grouting, the allowable external collapse pressure increases (is enhanced) by a factor of approximately 4 (**2**). Accordingly, the allowable pressure obtained from Levy's Equation, Eq 5, can be increased by a factor of 4. However, the enhancement will not apply to unsupported pipe until the grouting is fully effective. A period of 1 week may be conservatively assumed.

8.2.5 *Axial Bending Stress*—The radii of curvature for segments of the bored path, as indicated in Fig. 1, must be sufficiently large to ensure minimal bending strains and stresses within the pipe or conduit. The recommended minimum bend radius may be provided by the manufacturer, and corresponds to the following peak axial strain level:

$$\varepsilon_a = \frac{D}{2R} \quad (6)$$

where:

ε_a = peak axial strain, in./in. (mm/mm),
D = outer diameter of pipe, in. (mm), and
R = local radius of curvature, in. (mm).

The corresponding axial bending stresses may be calculated by:

$$\sigma_a = E_a \varepsilon_a \quad (7)$$

where:

σ_a = peak axial stress, psi (kPa),
E_a = apparent modulus of elasticity, psi (kPa) (see Table X1.1).

NOTE 7—Some PE pipe manufacturers recommend an allowable bending radius to diameter ratio of approximately 40 or 50 to 1 during pull-back to minimize the effect of ovaling due to tensile loads.

See X2.5 for calculating ovality induced by bending curvature.

8.2.5.1 *PE Pipe*—In general, the relatively stiff drill rods will require considerably larger bending radii than the flexible PE pipe. The resulting path radii for passing beneath a major obstacle, such as a river, are typically at least an order of magnitude greater than the minimum recommended for the plastic pipe. The corresponding bending strains and stresses are therefore usually not of major significance. However, the curvature required for the pipe to enter or exit the bore hole may be more severe and must be externally controlled to avoid excessive strains or stresses in these areas.

8.2.6 *Pulling Force*—The pipe pullback operation is illustrated in Fig. 1, which shows the geometry of the path including the depth, entry and exit curves, and the possibly straight interim segment beneath the river or obstacle to be crossed. The required tensile force at the leading end of the product pipe will vary during the operation and is, in general, less than that experienced at the drill rig due to the additional load on the balance of the drill string still within the bore hole and that due to any simultaneous reaming operation. The tensile forces on the pipe result from the fractional drag forces acting on the sides of the pipe due to the weight or buoyancy forces as it is pulled into and along the hole, force amplifications due to pulling the pipe around the curves, and resistance due to the pipe stiffness. The resultant forces will depend upon whether the pipe is empty or deliberately weighted (for example, filled with ballast) to reduce the buoyancy. For the purposes of estimating the peak force on the product pipe, the load is calculated at the 4 transition points, A, B, C, D shown in Fig. 1 (2). The greatest load on the pipe would typically be at point D. The corresponding loads may be estimated by the following equations:

$$T_A = \exp(v_a\alpha)\ (v_a w_a(L_1+L_2+L_3+L_4)) \quad (8)$$

$$T_B = \exp(v_b\alpha)\ (T_A+v_b|w_b|L_2+w_bH - v_a w_a L_2\exp(v_a\alpha)) \quad (9)$$

$$T_C = T_B+v_b|w_b|L_3 - \exp(v_b\alpha)(v_a w_a L_3\exp(v_a\alpha)) \quad (10)$$

$$T_D = \exp(v_b\beta)\ (T_C+v_b|w_b|L_4 - w_bH - \exp(v_b\alpha)(v_a w_a L_4\exp(v_a\alpha))) \quad (11)$$

where:

T_A = pull force on pipe at point A, lbf (N),
T_B = pull force on pipe at point B, lbf (N),
T_C = pull force on pipe at point C, lbf (N),
T_D = pull force on pipe at point D, lbf (N),
L_1 = additional length of pipe required for handling and thermal contraction, ft (m),
L_2 = horizontal distance to achieve desired depth, ft (m),
L_3 = additional distance traversed at desired depth, ft (m),
L_4 = horizontal distance to rise to surface, ft (m),
H = depth of bore hole from ground surface, ft (m),
$\exp(X)$ = e^X, where e = natural logarithm base (e = 2.71828),
v_a = coefficient of friction applicable at the surface before the pipe enters bore hole,
v_b = coefficient of friction applicable within the lubricated bore hole or after the (wet) pipe exits.
w_a = weight of empty pipe, lbf/ft (N/m),
w_b = net upward buoyant force on pipe in bore hole, lbf/ft (N/m),
α = bore hole angle at pipe entry (or HDD exit, at side opposite drill rig), rad, and
β = bore hole angle at pipe exit (or HDD entry, at same side as drill rig), rad.

The exponential factors correspond to the capstan effect, reflecting increased bearing pressure caused by the pipe pulled against the inside surface of the bend.

NOTE 8—Although the actual value of L_1 may be considered to be approximately 100 ft (30 m) to allow for handling at both ends of the bore, including possible thermal contraction, it is recommended that a larger value of L_1 (for example, 200 to 250 ft (60 to 75 m)) be used in Eq 8 to account for the actual path length along the arc. In some cases, L_3 may be equal to zero.

NOTE 9—Eq 8-11 are based on the assumption that the borehole is open with no collapses, curvature is gradual (for example, no dog-legs from steering corrections), cuttings removal is mostly complete, a low-viscosity slurry is present, and fluid circulation is maintained throughout the bore. The calculated pullback force, TD, will typically be less than the actual pullback force experienced during installation. The closer the bore matches the above conditions the closer the calculated value should be to the actual pullback force (10, 11). Engineering judgment should be applied when bore conditions deviate from conditions described above.

8.2.6.1 If additional pipe length (to accomn.odate subsequent elastic, viscoelastic, or thermal contractions) is pulled through the bore hole by using a pulling force applied in a horizontal direction at the drill rig side, resulting in an additional bend of angle β at the surface, there may be a further increase in the pull force T_D. The total force would correspond to that of multiplying the value of T_D, as calculated by Eq 11, by the additional factor $\exp(v_b\beta)$. Furthermore, depending upon the total force magnitude and the local bend radius at this point, the corresponding sidewall bearing pressure at the inside of the bend may cause collapse of the pipe or conduit. This procedure should therefore be avoided in preference to pulling additional pipe length in a direction along the pipe exit (bore entry) angle.

8.2.6.2 *Pipe Stiffness*—The equations in 8.2.6 do not explicitly account for the resistance due to the pipe stiffness at curves along the bore path. This effect will be reduced for sufficiently large radii and greater clearance within the bore hole, but may still represent a significant contribution. Thus, Eq 8-11 and associated calculations should be considered primarily as estimates for the purposes of investigating the overall feasibility of the installation and providing an understanding of the effect of the other parameters. The operational procedures (Section 9) include methods for limiting the actual pulling force applied to the pipe to provide confidence in the integrity of the installed pipeline.

8.2.6.3 *Coefficient of Friction*—The coefficient of friction depends on the characteristics of the surfaces bearing against each other, the presence of any lubrication, and whether there is relative motion between the surfaces. The degree of friction immediately prior to slippage is generally greater than the level during subsequent sliding. Although brief interruptions in the placement process are necessary during the removal of the drill rods during the pullback operation, it is important to attempt to complete the operation without extensive interruptions, which may allow the bore hole to collapse or the pipe to become embedded in the surrounding soil. The value for v_b represents the lubricated value for the pipe in the bore hole as surrounded by drilling fluid and mud slurry assuming minimal interruptions. It is recommended that the pipe external to the bore hole be supported such as to provide as low a coefficient of friction v_a as possible.

NOTE 10—Suggested design values for the frictional coefficients v_a and v_b are 0.5 and 0.3, respectively (2). Where pipe is placed on rollers, v_a is typically considered equal to 0.1.

8.2.6.4 *Multiple Pipes*—If more than one pipe (that is, a bundle of small diameter pipes) is simultaneously pulled into the hole, higher overall loads will result due to the greater weight or buoyancy of the combination as well as an effectively amplified coefficient of friction v_b within the hole. The

degree of amplification will depend upon the relative pipe and hole diameters and will be minimized for greater clearance within the borehole.

8.2.6.5 *Effective Weight and Buoyancy Forces*—The weight of the vacant pipe or conduit may be obtained from the manufacturer, or may be calculated by the following formula:

$$w_a = \pi D^2 \frac{(DR-1)}{DR^2} \rho_w \gamma_a \quad (12)$$

where:

w_a = weight of empty pipe, lbf/in. (N/mm),
γ_a = specific gravity of pipe material (for example, 0.955 for PE),
ρ_w = weight density of water times length unit conversion factor, lbf/in.^{3} (N/mm^3), and
D = outside diameter of pipe, in. (mm).

NOTE 11—The density of water is 3.61 × 10^{-2} lbf/in.^{3} (9.80 × 10^{-6} N/mm^3).

The net (upward) buoyant force on the vacant pipe surrounded by a drilling fluid or mud slurry may be calculated by:

$$w_b = \frac{\pi D^2}{4} \rho_w \gamma_b - w_a \quad (13)$$

$$w_b = \pi \frac{D^2}{4} \rho_w \left(\gamma_b - \frac{4\gamma_a (DR-1)}{DR^2} \right) \quad (14)$$

where γ_b equals specific gravity of mud slurry.

NOTE 12—The specific gravity of the mud slurry may be conservatively assumed to be 1.5 (see 8.2.3).

If the pipe is filled with water or fluid to serve as ballast, the buoyant force is reduced and is given by either:

$$w_b = \pi \frac{D^2}{4} \rho_w \left(\gamma_b - \gamma_c \left(1 - \frac{2}{DR} \right)^2 \right) - w_a \quad (15)$$

$$w_b = \pi \frac{D^2}{4} \rho_w \left(\gamma_b - \gamma_c \left(1 - \frac{2}{DR} \right)^2 - \frac{4\gamma_a (DR-1)}{DR^2} \right) \quad (16)$$

where γ_c equals specific gravity of ballast fluid.

If the pipe is filled with water, then $\gamma_c = 1$; if the pipe is filled with mud slurry (that is, if an open-ended pulling grip is used that allows the drilling fluid or slurry to enter the pipe), then $\gamma_c = \gamma_b$, and the above formula becomes:

$$w_b = \pi D^2 \rho_w (\gamma_b - \gamma_a) \frac{(DR-1)}{DR^2} \quad (17)$$

For PE pipe, these procedures will typically result in a lower required pull force as calculated by Eq 8-11.

8.2.6.6 *Hydrokinetic Pressure*—A pressure gradient exists during the pipe pullback operation corresponding to that required to exhaust the drilling fluid out of the hole, towards the pipe entry area. Additional pressure surges are possible due to nonuniform pulling rates **(2,3)**. The flow of the drilling fluid along the length of the pipe results in a drag force which may be estimated by considering a balance of the forces acting on the fluid annulus in the bore hole due to the hydrokinetic pressure and the lateral shear forces acting on the pipe and walls of the bore hole:

$$\Delta T = \Delta P \frac{\pi}{8} (D_{hole}^2 - D^2) \quad (18)$$

where:

ΔT = pulling force increment, lbf (N),
ΔP = hydrokinetic pressure, psi (kPa × 10^{-3}), and
D_{hole} = backreamed hole diameter, in. (mm).

NOTE 13—ΔP is estimated to be 10 psi (70 kPa) **(2,7)**.

The term ΔT may be added to the pulling forces calculated by Eq 8-11 to obtain the total pull force at each corresponding point of the installation. This is shown explicitly in Eq 19.

NOTE 14—For a bundle of pipes, the term D^2 in Eq 18 is replaced by an equivalent sum of the corresponding quantities (diameters squared) for the individual pipes.

8.2.7 *Axial Tensile Stress*—The average axial stress acting on the pipe cross-section at point A, B, C, or D, including the increment for hydrokinetic pressure, is given by:

$$\sigma_i = (T_i + \Delta T) \frac{1}{\pi D^2} \left(\frac{DR^2}{DR-1} \right) \quad (19)$$

where:

T_i = T_A, T_B, T_C, or T_D, lbf (N), and
σ_i = corresponding stress, psi (kPa × 10^{-3}).

The highest average axial stress will occur at the pulling head. However, depending on the curvature of the borepath, the peak tensile stress may not occur at the pulling head, but in a curve. In the curve, the maximum tensile stress due to bending occurs in the outer fibers of the pipe. For each curve, the maximum tensile stress equals the sum of the bending stress, as in Eq 7, due the curvature and the average axial stress at that point due to pulling. The maximum tensile stress for each curve should be determined and compared with the average axial stress at the pulling head to determine the peak tensile stress, σ_p, occurring in the pipe:

$$\sigma_{pi} = \sigma_i + \sigma_{ai} \quad (20)$$

where:

σ_{pi} = peak tensile stress at i-th point (where i = A, B, C, or D), psi (kPa),
σ_i = average axial tensile pull stress i-th point (where i = A, B, C, or D), psi (kPa), and
σ_{ai} = outerfiber tensile stress (Eq 7) at i -th point (where i = A, B, C, or D), psi (kPa).

8.2.7.1 *Allowable Tensile Stress*—The peak tensile stress, σ_p, should be compared to the allowable stress at the anticipated installation temperature. Thus, it is required that:

$$\sigma p \leq SPS \quad (21)$$

where *SPS* equals safe pull tensile stress, psi (kPa × 10^{-3}) at the anticipated installation temperature. Under continuous load, polyethylene undergoes creep deformation. Therefore, the safe pull stress values are time and temperature dependent. See Table X1.1 for typical SPS values. The time interval for the installation depends upon the length and rate of pullback of the pipe. Pullback rates are on the order of several feet per minute, depending upon the soil conditions. If it is anticipated that the back-reaming process will be slow and difficult (see Section 9), it is recommended that a separate pre-reaming operation be used to allow a subsequent faster pipe pullback and shorter time interval for installation pull forces to be applied.

8.2.7.2 If necessary, the stress on the PE pipe or conduit may be reduced by increasing the pipe wall thickness (that is, lower SDR value) or, possibly, reducing the net buoyant force by filling the pipe with fluid ballast (as described in 8.2.7.1).

8.2.8 *Torsional Stress*—Torsional stresses are eliminated or minimized by the use of a swivel at the leading end of the pipe. Section 9 provides information for the selection of an appropriate swivel.

8.2.9 *Combined Loads During Installation*—The calculations allow a preliminary selection of the pipe DR consistent with the anticipated application, installation, and path characteristics. It is necessary, however, to finally consider the overall installation stresses due to the combination of loads which many be present simultaneously. If the combined stresses are not within the desired overall design margin, it may be necessary to select a thicker wall pipe or modify the installation parameters to relieve the resultant stresses.

8.2.9.1 *Reduced PE Collapse Strength*—For PE pipe, the presence of an axial tensile load will have a tendency to reduce the pipe's short-term resistance to collapse under external pressure, as otherwise estimated from Eq 5 (**2**). In addition, the hydrokinetic pressure increment at the leading end of the pipe also increases the external hydrostatic pressure during this period. The modified equation to account for these effects is:

$$P_{pba} = \frac{2E}{(1-\mu^2)}\left(\frac{1}{DR-1}\right)^3 \frac{f_a f_R}{N} \tag{22}$$

where f_R, the tensile pull reduction factor, is given by:

$$f_R = \sqrt{5.57 - (r+1.09)^2} - 1.09 \tag{23}$$

and

$$r = \frac{\sigma_i}{2(SPS)} \tag{24}$$

σ_i = maximum average axial tensile pull stress from Eq 19, psi (kPa), and
SPS = safe pull tensile stress, psi (kPa).

The allowable collapse pressure, P_{pba}, should equal or exceed the sum of the net effective pressure during pull-back and the hydrokinetic pressure:

$$P_{pba} \geq P_{eff} + \Delta P \tag{25}$$

where:

P_{eff} = net effective pressure acting on pipe during pull-back, psi (kPa), and
ΔP = hydrokinetic pressure, psi (kPa).

NOTE 15—The modulus value used in Eq 22 and in the deflection calculation for determining ovality for use in Eq 22 during pull-back should be selected to match the time-interval of the pull-back.

8.2.9.2 The net effective external pressure term, P_{eff}, in Eq 25 corresponds to the external head of drilling fluid or slurry reduced by the internal pressure due to any fluid used as ballast. For the case of an open-ended pulling grip allowing the drilling fluid to serve as ballast (see 8.2.6.5), the net effective external pressure, P_{eff}, including the hydrokinetic pressure, is negligible and the possibility of collapse due to external pressure during the installation stage is essentially eliminated.

8.2.9.3 *Thermal Effects*—Potential effects due to thermal expansion may be minimized by allowing the pipe to reach temperature equilibrium with the soil before cutting the pipe to length to complete the installation.

8.2.10 *Combined Loads During Operation*—In general, it is the responsibility of the owner or owner's contractor or engineer to ensure that the design will be compatible with the long term operation of the pipe line, including sections away from that being placed by the drilling operation, as well as sections in the vicinity of the crossing, both at the surface and passing beneath the obstacle.

8.2.10.1 *Thermal Stress*—Thermal stresses due to temperature differentials existing during the placement process may be considered small, as discussed in 8.2.10. However, possible thermal effects during long-term operation due to seasonal expansion or contraction at the surface, including at sections away from the drilled crossing, are not specific to the HDD process and should be considered by the owner as for non-drilled pipe lines, in combination with the other stress contributions.

9. Implementation

9.1 Due to the magnitude of the typical operation and complexity of the equipment and control systems, maxi-HDD requires a highly trained crew. See Mini-Horizontal Directional Drilling Manual. It is beyond the scope of this guide to provide operational procedures for the various equipment. Such training is generally provided by the manufacturer. Contractors should be required to demonstrate evidence of proper training for their crews, including classroom and field experience for the primary personnel. The following items represent some of the issues related to the implementation process for placement of pipe or conduit.

9.1.1 *Machine Size & Capability*—The size and capacity of the drilling equipment must be compatible with the thrust and torque required to perform the drilling, reaming, and pipe pullback operations. It is difficult to estimate the drill rig forces associated with the reaming operation, which may be significantly greater than that directly applied to the pipe itself during pullback (as estimated by the formulas in 8.2.4), particularly when both operations are performed simultaneously. The estimated forces applied to the pipe may be considered a minimum equipment requirement.

9.1.2 *Drill Unit Positioning*—The drill rig unit is positioned consistent with the discussion in Section 7 and the desired bore route and pipe depth. Proper anchoring is especially important for soft or sandy soils.

9.1.3 *Boring and Drill Rods*—HDD operations begin with the initial pilot bore. Different ground conditions will require different type drill heads for the pilot bore operation. The drill rods should be as least as strong as the equipment capability. The planned bore route should also be compatible with drill rod capabilities with respect to cumulative fatigue stresses (Section 7). Proper care and handling of the drill rods is important to avoid breakage during boring or backreaming. The rod threads must be cared for and properly coated (greased) when inserted into the drill string. Proper torque should initially be applied to the drill rods as added at the bore entry to avoid potential loosening of the rods and loss of connection in the ground.

9.1.4 *Washover Pipe*—For many maxi-HDD operations, a washover pipe is inserted over the drill string as the bore

progresses to support the hole and reduce torque. This steel pipe may be removed during the backreaming operation. If reaming is not required, the washover pipe may be left in place and used as a casing into which a group of small plastic pipes may be placed by a later independent pulling operation.

9.1.5 *Drilling Fluid Usage*—Drilling fluids serve a critical role in maxi-HDD operations. The fluid powers the mud-motor at the front of the drill string that bores the pilot hole. The fluid also provides lubrication during the pilot boring, reaming, and pullback operations to reduce the required torque and thrust or pullback loads. In addition, the drilling fluid stabilizes the bore hole, cools the drill head (and internal circuitry), and removes cuttings and spoils. The crew must be trained in the proper use of drilling fluids and the appropriate types for various ground conditions. Note that excessive drilling fluid pressures or volumes may result in greater disposal problems or appearances at undesired surface locations as the fluid penetrates through fissures.

9.2 *Tracking and Locating:*

9.2.1 *Location Interval*—In order to maintain the actual bore along the planned path, the pilot bore must be carefully tracked, and path confirmation established at least once each 30 ft (10 m) interval (for example, when adding drill rods). For paths with horizontal or vertical turns, or in critical areas including the vicinity of other obstacles, shorter intervals for example, 15 ft (5 m) are recommended. In areas with pockets of cobbles or other obstacles that may divert the drill head, measurements should be made whenever contact with such obstacles is suspected. A misdirected drill head must be corrected as soon as possible.

9.2.2 *As-Built Drawings*—A record of the actual as-built bore path, including plan and profile views and vertical and horizontal deviations, indicating the relation to the planned path, must be submitted to the owner. Any information obtained during the initial bore regarding soil characteristics, etc. should be added. The experiences gained during the initial bore may be used to provide guidance for the backreaming operating, as well as for subsequent operations in the project area. Additional information should also be included, such as steering or correction commands, drilling fluid usage, and the type of drill head being used. Regarding the reaming and pullback operations, the pipe insertion velocity, duration, type and size of reamers (cutters or compactors), final bore hole size, drilling fluid usage, and required pullback forces should be recorded.

9.3 *Reaming*—In some maxi-HDD applications, a backreaming operation to increase the hole size may not be required (for example, when a small pipe is to be pulled back into the initial bore hole or, possibly, a bundle of small pipes is to be pulled into the remaining washover pipe by a separate procedure after completion of the HDD operation). However, a backreaming operation is typically performed to produce a hole size sufficiently large to readily install the pipe(s) or conduit. Appropriate cutters and compactors compatible with the soil conditions are required, including proper usage of drilling fluid. In some cases, several reaming (that is, pre-reaming) operations may be required. In general, pre-reaming is not required for placing pipe 20 in. (500 mm) or less in diameter, and the reaming and pipe pullback may be performed simultaneously. The pre-reaming operations allow relatively large holes to be created in stages, reducing the required torque and thrust loads at the machine. For difficult installations for which a high pulling load is anticipated, a pre-reaming operation will help ensure that the capability of the machine is not exceeded due to the combined forces due to increasing the hole diameter and pulling the pipe. The pullback operation may also then be performed at a faster rate, reducing the time the pipe is under axial load. In addition, pre-reaming reduces the possibility of voids or surface heaving or settlement, including unanticipated drilling fluid appearances. Hole diameter increments should be restricted to approximately 10 in. (250 mm) or less during a single pass. The final hole diameter is typically 50 % greater than the outer diameter of the pipe (or pipe bundle) to provide clearance for pipe grips, allow spoils flow, and reduce the required loads during the pipe pullback operation. During pre-reaming, additional drill rods must be available at the pilot bore exit which are connected to a swivel at the rear of the reamer and pulled into the hole to maintain the path.

9.3.1 *Grouting*—If grouting has been specified to fill the annulus of the hole surrounding the pipe(s), it may be pumped during the pullback operation, serving as drilling fluid. However, if the pullback encounters any difficulty, the grout can set-up. Consideration should be given to placing grout through a tremie pipe pulled in during pullback. The requirement and formulation of the grouting shall have been established in advance by the owner and the owner's engineer following the preliminary surface and subsurface studies and route planning, for environmental considerations, or to increase the long-term collapse resistance of the pipe or provide additional strength or mechanical protection. The grouting requires proper formulation consistent with desired set-up time; appropriate fluid pumps are required to handle the thicker fluid mixture. In may cases it may only be required to plug the entry and exit penetration points, possibly using a cement-bentonite mixture (**6**).

9.4 *Gripping the Pipe*—If not supplied as a continuous length on a reel, it is assumed that the pipe(s) have been fused and tested prior to completion of the boring operation to avoid unnecessary delays in completing the installation. The bored and reamed hole may tend to close in or collapse after an extended period of time, significantly inhibiting or preventing the insertion of the pipe.

9.4.1 Due to the distance of the operation and the relatively high pullback loads generated, secure gripping procedures must be used. Basket-type or internal only grips are not recommended. The gripping method selected must allow essentially the full tensile rating of the pipe to be developed. Appropriate types may include an internal/external clamping or bolting device, or a fused PE pipe adapter with a built-in pulling eye. In the latter case, a smaller diameter section of the adapter may serve as a breakaway link protecting the main section of pipe (see 9.4.3). In general, the end of the pipe should be plugged or sealed to prevent contamination during the pull-back operation. However, if it is desired to allow the mud slurry to serve as ballast (see 8.2.5), a gripping method should be used that allows the fluid to enter the pipe. Several

pipes may be pulled simultaneously, but the position of the grips should be staggered, if necessary, to avoid a single large bulge.

9.4.2 *Swivel*—A swivel is required between the reamer or compactor preceding the pipe to prevent the transmission of torsional loads to the pipe. The rating of the swivel should be somewhat larger than the lower of the pull force capability of the drill rig or the total strengths of the bundle of pipes to be installed, but not excessively greater. Inefficiencies in overly large swivels may result in relatively significant twist transmitted to small pipes.

9.4.3 *Breakaway Link*—In general, the recorded pulling forces as indicated at the drill rig will exceed the tensions experienced by the pipe or conduit throughout most of the pullback process. Limiting these loads to that of the allowable pipe strength will generally be overly conservative. It is recommended that individual breakaway links be provided between the main swivel and the grip(s) at the pipe(s), to ensure that the pipelines are installed within allowable load levels. Broken links will require removal of the pipe(s) from the entry end, or possibly abandonment. Following a determination of the problem, and an appropriate solution, another attempt may be made, possibly requiring a new bore path.

9.4.3.1 Each breakaway link rating should be within the safe pull tensile load, also called the allowable tensile load of its corresponding pipe. See Table X1.1.

9.4.3.2 Although less desirable, a single breakaway link may be used for a bundle of pipes. The corresponding safe working loads for the individual pipes in the bundle are added to determine the total safe working load and the corresponding rating of the breakaway link. If a breakaway swivel is used as the breakaway link, and not specifically designed for direct exposure with soil, this item should be cleaned well after each application. The use of such a breakaway swivel does not eliminate the need for the main swivel described in 9.4.2.

9.5 *Handling the Pipe*—Extreme care must be exercised when handling the pipe to ensure that it is not subject to excessively sharp bends which may cause a kink or other damage to the pipe. Section 8 provides appropriate guidelines, including discussion of the combined effects of bending loads and tension in the pipe. Particular areas of concern typically include the pipe entry or exit points. It is important to minimize bending of the pipe as it enters the bore hole, consistent with 7.3, 7.4.4 and 8.2.7, and to ensure low friction on the portion of the pipe outside the hole. This may be accomplished by the use of appropriate lifting equipment and roller stands to reduce friction. Due to the potentially high tensile load at the pipe exit, it is especially important to avoid sharp bends at this point.

10. Inspection and Site Cleanup

10.1 *Completion and Inspection*—It is necessary to minimize any residual stresses or strains remaining in the pipe following the installation, due to the imposed pulling forces and potential thermal expansion or contraction. Thus, the pipe should be allowed to achieve mechanical and thermal equilibrium with its surroundings prior to cutting the pipe at either end. Premature cutting of the pipe may allow the ends to shrink back into the hole. The pipe may be cut after it has been verified that there has been insignificant movement at the pipe entry end and negligible residual tensile load at the drill rig end. If any fluid or slurry was allowed to enter the pipe to serve as ballast (see 8.2.6), the fluid must be purged and the pipe thoroughly flushed and cleaned.

10.1.1 *Integrity*—Some pipes, such as for gas or fluid transport, may be required to pass hydrostatic pressure or leakage tests, before or after pullback, or both, as specified by the owner. For pipes to be used as paths for cables, the integrity of the path should be verified by pulling a "pig" through the installed pipe prior to splicing or terminating.

10.1.2 *Visual Inspection*—The pipe exiting the borehole should not show signs of yielding or necking-down. The surface of the pipe should be inspected for gouges or scratches. Gouges or scratches in excess of 10 % of the minimum wall thickness should be assessed as to whether pipe is suitable or not for pressure service.

10.1.3 *Bore Path*—The as-built drawings shall be submitted to the owner's representative to indicate the pipe was placed at the proper location and depth, or within acceptable limits. Maintaining an appropriate minimum depth of cover beneath the river bottom is critical, including margin to account for scouring, to avoid subsequent exposure or damage. Recording of the exact location will help avoid damage during any future construction activities in the area. In addition, records of pullback forces at the drill rig, breakaway link ratings, installation rate, final hole diameter, grouting information, etc., should be recorded and provided.

10.2 *Cleanup*—After inspection and approval by the owner or representative, the surface area must be restored to its original condition. The site must be cleaned of equipment, tools, and spoils. All drilling fluid must be cleaned from the site or its vicinity and properly disposed of, consistent with Section 6.

APPENDIXES

(Nonmandatory Information)

X1. MATERIAL PROPERTIES OF POLYETHYLENE

X1.1 *Material Properties of Polyethylene*—Typical values for the apparent modulus of elasticity and tensile strength at 73°F (23°C) for medium density (PE 2406) and high density polyethylene (PE3408) resins are presented in Table X1.1. Consult the manufacturer for specific applications.

TABLE X1.1 Apparent Modulus of Elasticity and Safe Pull Tensile Stress at 73°F

Typical Apparent Modulus of Elasticity			Typical Safe Pull Stress		
Duration	HDPE	MDPE	Duration	HDPE	MDPE
Short-term	110 000 psi (800 MPa)	87 000 psi (600 MPa)	30 min	1300 psi (9.0 MPa)	1000 psi (6.9 MPa)
10 h	57 500 psi (400 MPa)	43 500 psi (300 MPa)	60 min	1200 psi (8.3 MPa)	900 psi (6.2 MPa)
100 h	51 200 psi (350 MPa)	36 200 psi (250 MPa)	12 h	1150 psi (7.9 MPa)	850 psi (5.9 MPa)
50 years	28 200 psi (200 MPa)	21 700 psi (150 MPa)	24 h	1100 psi (7.6 MPa)	800 psi (5.5 MPa)

X2. POST–INSTALLATION LOADS AND DEFLECTION OF HORIZONTAL DIRECTIONAL DRILLED PIPES

X2.1 Allowable Tensile Load—The safe pull tensile load for a pipe is equal to its allowable tensile load ATL, which can be calculated from the safe pull tensile stress SPS, as follows:

$$ATL = (SPS)\,\pi\,D^2\left(\frac{1}{DR}-\frac{1}{DR^2}\right) \qquad (X2.1)$$

where:

D = pipe outer diameter, in. (mm),
SPS = safe pull stress, psi (kPa), and
DR = pipe dimension ratio (outer diameter/minimum wall thickness).

For gas pipes, see Practice F1804 for determining ATL.

X2.2 *Earth Pressure Calculation*—The soil load on directional drilled pipe is essentially dependent on the depth of cover, borehole diameter, mud-slurry properties, and the in situ properties. Earth and live-load pressures are transferred to the pipe through the deformation of the soil around the borehole. As the deformation occurs, a cavity of loosened soil forms above the borehole. This cavity is filled by soil sloughing from above it. The process causes the soil to bulk, that is, the density of the sloughed soil is less than the density of the undisturbed soil. The sloughing process continues until an equilibrium is reached where the stiffness of the sloughed soil is sufficient to resist further sloughing from the soil above. This bulking state results in arching of load around the pipe (that is, the earth load applied to the pipe is less than the geostatic stress (or prism load).) There is a lack of published equations for calculating earth loads on directional pipes. However, equations have been published for calculating loads on jacked pipe. Although the applicability of these equations to directional drilling has not been confirmed, they are likely applicable where the PE is installed in a mud slurry. The normal jacking procedure like the directional drilled process overcuts the hole but the overcut is typically less than 10 % of the pipe diameter with jacked pipe, whereas with directional drilled pipes the overcut may be 50 %. Equations for calculating the loads occurring on jacked-pipe due to the bulking process are given by O'Rourke et al. Another interpretation of arching above jacked-pipe is given in (12). Stein's method in Ref. (12) considers the process of arching to be similar to trench arching. Only Stein's method is given below as O'Rourke's method in Ref. (13) involves extensive calculations and typically results in lesser load than Stein's method. Credit for arching should only be considered where the depth of cover is sufficient to develop arching (typically exceeding five pipe diameters), dynamic loads such as traffic or rail loads are insignificant, the soil has sufficient internal friction to transmit arching, as confirmed by a geotechnical engineer.

X2.2.1 Use of Terzaghi's equation as given in Eq X2.2 for calculating earth loads on jacked pipe is suggested in Ref. (12). Note that the friction angle, has been reduced in Terzaghi's equation by 50 %.

$$P_{EV} = \frac{\kappa\gamma H}{144\ \frac{in.^2}{ft^2}} \qquad (X2.2)$$

$$\kappa = \frac{1-exp\left(-2\frac{KH}{B}\tan\left(\frac{\delta}{2}\right)\right)}{2\frac{KH}{B}\tan\left(\frac{\delta}{2}\right)} \qquad (X2.3)$$

[For metric units, the conversion factor of 144 in^2/ft^2 should be dropped]

where:

P_E = external earth pressure, psi (kPa),

Y = soil weight, pcf (kN/m^3),
H = depth of cover, ft (m),
κ = arching factor,
B = "silo" width, ft (m),
δ = angle of wall friction, degrees (for directional drilling, assume $\delta = \varphi$, and φ = angle of internal friction, degrees.), and
K = earth pressure coefficient given by:

$$K = \tan^2\left(45 - \frac{\varphi}{2}\right) \quad \text{(X2.4)}$$

The silo width must be estimated based on the application. It varies between the pipe diameter and the borehole diameter. A conservative approach is to assume the silo width equals the borehole diameter. (If the effective soil weight is used the groundwater pressure must be added back into Eq X2.2 to get the total external pressure acting on the pipe. The effective soil weight is the dry unit weight of the soil for soil above the groundwater level; it is the saturated unit weight less the weight of water for soil below the groundwater level.)

X2.3 *Earth Load Deflection*—Earth load is generally applied at the pipe crown with a reaction at the invert. As slurry provides essentially no side-support, there is little pressure at the springline to restrain vertical deflection. The primary resistance to deflection is provided by the pipe's stiffness. Whereas, actual soil loads will occur over a good portion of the top and bottom halves of the pipe, Ref. **(14)** gives two ring deflection formulas for uniform loading on the top half of a pipe in the Appendix of the text. One formula assumes the pipe's invert is supported on a rigid, flat base while the other assumes the invert reaction load is uniform around the bottom half of the pipe. Neither case fits exactly what occurs with directional drilled pipe but the average of the two formulas may come close.

$$\frac{\Delta}{D} = \frac{0.0125P_E}{\dfrac{E}{12\,(DR-1)^3}} \quad \text{(X2.5)}$$

where:

D = pipe diameter, in. (mm),
Δ = ring deformation, in. (mm),
P_E = earth pressure, psi (kPa),
DR = pipe dimension ratio, and
E = modulus of elasticity, psi (kPa).

X2.4 *Buoyant Deflection*—An external pressure difference between crown and invert occurs when pipe is submerged in grout due to the difference in grout head pressure across the pipe. The pressure difference applies a force which deflects the invert upward toward the crown, thus creating ovality. Deflection is given by Eq X2.6. This can be converted to percent deflection by multiplying it by 100.

$$\frac{\Delta}{D} = \frac{0.1169\gamma_w\left(\dfrac{D}{2}\right)^4}{EI} \quad \text{(X2.6)}$$

where:

Δ = ring deflection, in. (m),
D = pipe diameter, in. (m),
Y_w = weight of fluid in borehole, lbs/in.^{3} (to convert fluid weight from lbs/ft^3 to lbs/in^3 divide by 1728) (kN/m^3),

E = modulus of elasticity, psi (kPa), and
I = moment of inertia of pipe wall cross-section (t^3/12), in.^{4}/in. (m^4/m).

X2.5 *Reissner Effect*—Longitudinal bending of a pipe induces ovality. For entrenched pipes this ovality is usually ignored as it is oriented transverse to earth load deflection. In a directional drilled pipe ovality is additive to earth load deflection. For DR 21 or lower pipes, when the bending radius is greater than or equal to 40 pipe diameters, the ovality is negligible. Ovality in terms of percent deflection can be calculated from the Reissner equation:

$$\frac{\Delta y}{D} = \left(\frac{2}{3}\right) z + \left(\frac{71}{135}\right) z^2 \quad \text{(X2.7)}$$

$$z = \frac{\dfrac{3}{2}(1-\mu^2)(D-t)^4}{16t^3R^2} \quad \text{(X2.8)}$$

where:

μ = Poisson's ratio,
D = pipe OD, in. (mm),
t = pipe wall thickness, in. (mm),
R = radius of curvature, in. (mm), and
$\Delta y/D$ = deflection, in./in. (mm/mm) (convert to percent by multiplying by 100).

X2.6 *Deflection Limits*—The limiting deflection (in percent) is determined by the geometric stability of the deflected pipe, hydraulic capacity, and the strain occurring in the pipe wall. It has been observed that for PE, pressure-rated pipe, subjected to soil pressure only, no upper limit from a practical design point of view seems to exist for the bending strain **(15)**. Therefore, for non-pressure pipes or conduits the safe long-term deflection is 7.5 % of the diameter. When subjected to internal pressure in addition to soil pressure, the localized bending strain resulting from deflection combines with the hoop tensile strain caused by internal pressure to produce a higher, localized tensile fiber-stress. However, as the internal pressure is increased the pipe re-rounds and the bending strain is reduced. At high pressures, the bending strain is reduced and the ring tensile stress approaches that due to internal pressure alone. For calculation method, see Ref. **(16)**. This fact coupled with the ductility of PE permits the designer to ignore the combined effect of pressure and deflection. In lieu of an exact calculation based on allowable strain, the designer can use the safe long-term design deflection values for pressure pipe shown to Table X2.1.

X2.6.1 Design deflections are for use in selecting DR and for field quality control. Field measured deflections exceeding the design deflection do not necessarily indicate unstable or over-strained pipe. In this case, an engineering analysis of such pipe should be performed before acceptance.

TABLE X2.1 Safe Long-Term Design Deflection values for Buried Pressurized Polyethylene Pipe

DR or SDR	Deflection Limits as % of Diameter
21	7.5
17	6.0
15.5	6.0
13.5	6.0
11	5.0
9	4.0
7.3	3.0

X3. CRITICAL BUCKLING PRESSURE FOR HDPE PIPE

X3.1 *Critical Buckling Pressure*—Table X3.1 gives the critical collapse pressure for HDPE pipes. The values do not contain a safety factor nor any compensation for ovality or pulling force. See 9.2.3.1 for discussion.

TABLE X3.1 Critical Collapse Pressure for Unconstrained HDPE Pipe[A,B,C] at 73°F

NOTE 1—**Table does not include ovality compensation or safety factor.**

	Pipe SDR, psi, ft H_2O, in Hg						
Service Life	7.3	9	11	13.5	15.5	17	21
Short-term	1003, 2316, 2045	490, 1131, 999	251, 579, 512	128, 297, 262	82, 190, 168	61, 141, 125	31, 72, 64
100 h	488, 1126, 995	238, 550, 486	122, 282, 249	62, 144, 127	40, 92, 82	30, 69, 61	15, 35, 31
50 years	283, 653, 577	138, 319, 282	71, 163, 144	36, 84, 74	23, 54, 47	17, 40, 35	9, 20, 18

[A] Axial Tension during pull-back reduces collapse strength.
[B] Full vacuum is 14.7 psi, 34 ft water, 30 in Hg.
[C] Multipliers for temperature rerating:

60°F (16°C)	73.4°F (23°C)	100°F (38°C)	120°F (49°C)
1.08	1.00	0.78	0.63

REFERENCES

(1) *TR-46, Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe*, Plastics Pipe Institute, Irving, Texas, 2009.

(2) Svetlik, H. E., "Polyethylene Pipe Design for Directional-Drillings and River-Crossings", *Proceedings, North American Society for Trenchless Technology NO-DIG '95*, April/May 1995.

(3) Hair, J. D., "Design and Project Management Considerations Involved with Horizontal Directional Drilling", *New Advances in Trenchless Technology: An Advanced Technical Seminar*, February 5–8, 1995.

(4) Ingold, T. S., and Thomson, J. C., "Site Investigations Related to Trenchless Techniques", *Proceedings, International Society for Trenchless Technology NO-DIG '89* April, 1989.

(5) Hair, J. D. and Hair, C. W. III," Considerations in the Design and Installation of Horizontally Drilled Pipeline River Crossings," American Society of Civil Engineers, *Proceedings of Pipeline Infrastructure Specialty Conference*, 1988.

(6) Hair, C. W. III, "Site Investigation Requirements for Large Diameter HDD Projects", *New Advances in Trenchless Technology: An Advanced Technical Seminar*, 1995.

(7) Iseley, D.T. and Cowling, D.H. "Obstacle Detection to Facilitate Horizontal Directional Drilling", prepared by the *Trenchless Technology Center for the American Gas Association*, January 1994.

(8) *Guidelines for a Successful Directional Crossing Bid Package*, The Directional Crossing Contractors Association, Dallas, Texas, 1995.

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(10) Duyvestyn, G.M., Knight, M.A. "Behavior of 180 m long MDPE and HDPE pipes installed using a midi HDD rig", No-Dig 2002, Montreal, Canada.

(11) Baumert, M.E., Allouche, E.A., and Moore, I.D. "Experimental Investigation of Pull Loads and Borehole Pressures During Horizontal Directional Drilling Installations", Canadian Journal of Geotechnical Engineering, CGS, August, 2004.

(12) Stein, D., Mollers, K., Bielecki, R., *Microtunnelling*, Ernst & Sohn, Berlin, Germany, 1989.

(13) O'Rourke, T.D., El-Garbawy, S.L., Stewart, H.E., "Soil Loads at Pipeline Crossing", American Society of Civil Engineers Specialty Conference on Pipeline Crossings, 1991.

(14) Watkins, R.K. and Anderson, L.R., *Structural Mechanics of Buried Pipes*, Department of Civil Environmental Engineering, Utah State University, Logan, Utah, 1995.

(15) Janson, L.E.," Long-Term Studies of PVC and PE Pipes Subjected to Forced Constant Deflection", Report No. 3, KP-Council, Stockholm, Sweden, 1991.

(16) Janson, L.E., *Plastics Pipes for Water Supply and Sewage Disposal*, Borealis, Stockholm, Sweden, 1995.

SUMMARY OF CHANGES

Committee F17 has identified the location of selected changes to this standard since the last issue (F1962–05 ε1) that may impact the use of this standard.

(1) Add reference to PPI TR-46, "Guidelines for the Use of Mini-Horizontal Directional Drilling for Placement of Polyethylene Pipe."

(2) Replaced references to Practice D2657 with Practice F2620.

CELMN-ED-F

Revised: January, 2010

Guidelines for Permit Review

Installing Pipelines by Nearsurface
Directional Drilling Under Levees

Applications for directional drilling permits in congested urban areas will not be allowed. Variations may be considered in urban areas where population density and land use allow adequate room so that total expeditious replacement of the flood protection, should fracture occur and additionally the applicant must show financial responsibility for such replacement.

Note: This list of general criteria is not intended to be all inclusive of the concerns of the Corps of Engineers. Some additional elements must be considered on a case-by-case basis. It is recommended that all applicants or their representatives schedule a meeting with the Corps of Engineers to discuss these guidelines in the early stages of planning a directionally drilled crossing to discuss how these guidelines apply to their permit applications. Permit applications for directional drilling beneath levees/floodwalls will be entertained by the New Orleans District, however they will be closely examined for their affect upon the integrity of the flood protection provided by the system. HDD installations are complicated civil engineering works and only experienced professional engineers should undertake their design.

The following general criteria apply to the actual drilling operations:

1. All work on, around and under levees or flood protection is season sensitive. Some levee/flood wall systems serve as hurricane protection, some are for river flooding and still others are for a combination of these. There may be a season during which the sensitivity of the flood control system will not allow work, this should be known to the applicant early in the application process. The applicant should make every effort to discern the alternate methods of providing interim flood protection, which may be required of him during his work phases.

2. The proposed pipeline entry or exit point, when located land-side of a levee, should be set back sufficiently from the land-side toe of the levee such that (a) the pipeline reaches its horizontal level (maximum depth), and/or (b) the pipeline contacts the substratum sands or some other significant

horizon, at least 300 feet land-side of the levee toe.

3. When the proposed pipeline entry and/or exit point, are located on the batture (riverward of the levees), the entry and/or exit points should be positioned such that the pipeline is (a) landward of the projected 50-year bankline migration; and (b) at least 20 feet riverward of the levee stability control line based on the applicable project factor-of-safety and (c) at least 10-ft. landward of the existing revetment. The purpose of this restriction is to avoid the inclusion of a potential source of seepage any closer to the levee than the levee stability control line, and also to help assure the pipeline retains adequate cover.

4. The applicant must furnish Engineering evaluations and computations addressing the following concerns and giving specific measures of problem avoidance, dimensions, distances, pressures, weights, and all other pertinent data.

   a. The pilot hole cutter head must not be advanced beyond/ahead of the wash pipe more than a distance such that return flow would be lost. Also, the wash pipe ID should be sufficiently greater than the OD (cutting diameter) of the pilot cutter head such that return flow is enhanced. The applicant should directly address the methodology, which he plans to employ in his efforts to keep the return of flow up the drill hole during his entire operation. These requirements are to assure that blockage of the annular space between the wash pipe and drill pipe and associated pressure build-up do not occur.

   b. Drilling mud must be of sufficient noncolloidal lubricating admixtures to (a) assure complete suspension and removal of sands and other "solids" cuttings/ materials; and (b) provide adequate lubrication to minimize bridging by cohesive materials thereby facilitating surface returns flow along the annular space.

   c. The fly cutter used in the prereamer run must have an OD (cutting diameter) sufficiently greater than the OD of the production pipe such that the hole diameter remains adequate to minimize hang-ups of the production run and thereby, associated stresses on surrounding soils. The applicant must at the same time address the increased seepage potential caused by this annular space developed during drilling.

   d. Prereamer runs must be a continuous operation at least through the down-slope and up-slope cutting sections to

prevent undue stress on the surrounding soils during re-start operations.

e. The applicant must address the ratio of drill diameter versus installed pipe diameter and how seepage through the annular space will be avoided. The applicant should not over ream the final drill hole, as seepage will potentially result.

Seepage through annulus and drill ϕ vs pipe ϕ?

5. As part of his submittal of a permit application, the applicant must furnish to the Corps of Engineers proof that his operation will not create a hydraulic fracture of the foundation soil beneath and near the levee. The applicant must submit calculations in accordance with paragraph 4, demonstrating that the downhole mud pressure during the drilling operation results in a **minimum factor of safety equal to 2.0 against hydraulic fracture** of the levee foundation within 300-ft of the levee toe. The calculations must bear the stamp of a registered civil engineer. In addition, the applicant must submit in writing his plan for mitigating the potential problem of hydrolock in the borehole due to unanticipated clogging of the return fluid, and the potential loss of drilling fluid return to the surface as a result of other unforeseen downhole problems.

a. The basic relationship for hydraulic fracture pressure (P_f) for undrained conditions is simply a function of the in-situ minimum principal total stress, σ_3, i.e. the sum of the overburden pressure plus the undrained shear strength s_u at the point of rupture (This Does Not Include Any Side Forces on the Soil Column).

[1] $$P_f = \sigma_3 + s_u$$

b. Undrained conditions assume no flow of the borehole fluid into the soil formation. For bores in South Louisiana soils, employing a bentonite drilling fluid with good wall cake, it is reasonable to assume that undrained conditions exist. The downhole or borehole mud pressure is composed of hydrostatic pressure (position head) and circulation pressure. **The minimum factor of safety of 2.0 against hydraulic fracture** is defined here as the ratio of the existing overburden pressure (hydraulic fracture pressure P_f) to the downhole mud pressure (P_m). – ?

[2] $$F.S. = (\sigma_3 + s_u)/P_m$$

6. Shut-off capability in the production pipeline should be provided to immediately cutoff flow through the pipeline should leakage occur.

✓ 7. Positive seepage cutoff or control and impacts of future levee settlements on the pipeline must be addressed and supported by Corps approved engineering analyses.

✓ 8. Monitoring of the project by Corps representatives will be a permit requirement. The applicant will reimburse the Corps for all costs, including salaries and per diem, associated with monitoring the entire project. Additionally it is an applicant responsibility to inform the Corps Operations Division permits representative 36 hours in advance of beginning of installation. The Drilling beneath the levee must begin to be performed during the daylight hours Monday through Friday to facilitate inspection operation. The applicant must estimate his work schedule and inform the Corps so that inspection forces may have adequate time to inspect the site.

✓ 9. Should any damage to the levee occur as a result of the drilling operation, the owner/applicant is liable for replacing/repairing the damaged levee to the Corps of Engineers satisfaction. Damage is defined as drilling fluid returns to the surface inside the levee cross-section. As example of the damage to levees, which occurred on previous projects, the levee was hydraulically fractured and drilling fluid exited on the crown and/or toe of the levee. Repair may include total replacement of the levee and installation of a grout curtain to the depth of the pipe. This repair/ replacement will be performed in an expedited fashion to Corps specifications. A typical sketch of this repair is enclosed for information only.

✓ 10. The applicant must furnish a plan to replace the flood protection should damage occur as a normal part of the application process, see the typical repair enclosed.

✓ 11. Down hole pressure monitoring tool must be used during drill and reaming operations and must be within 5 feet of bit or reamer.

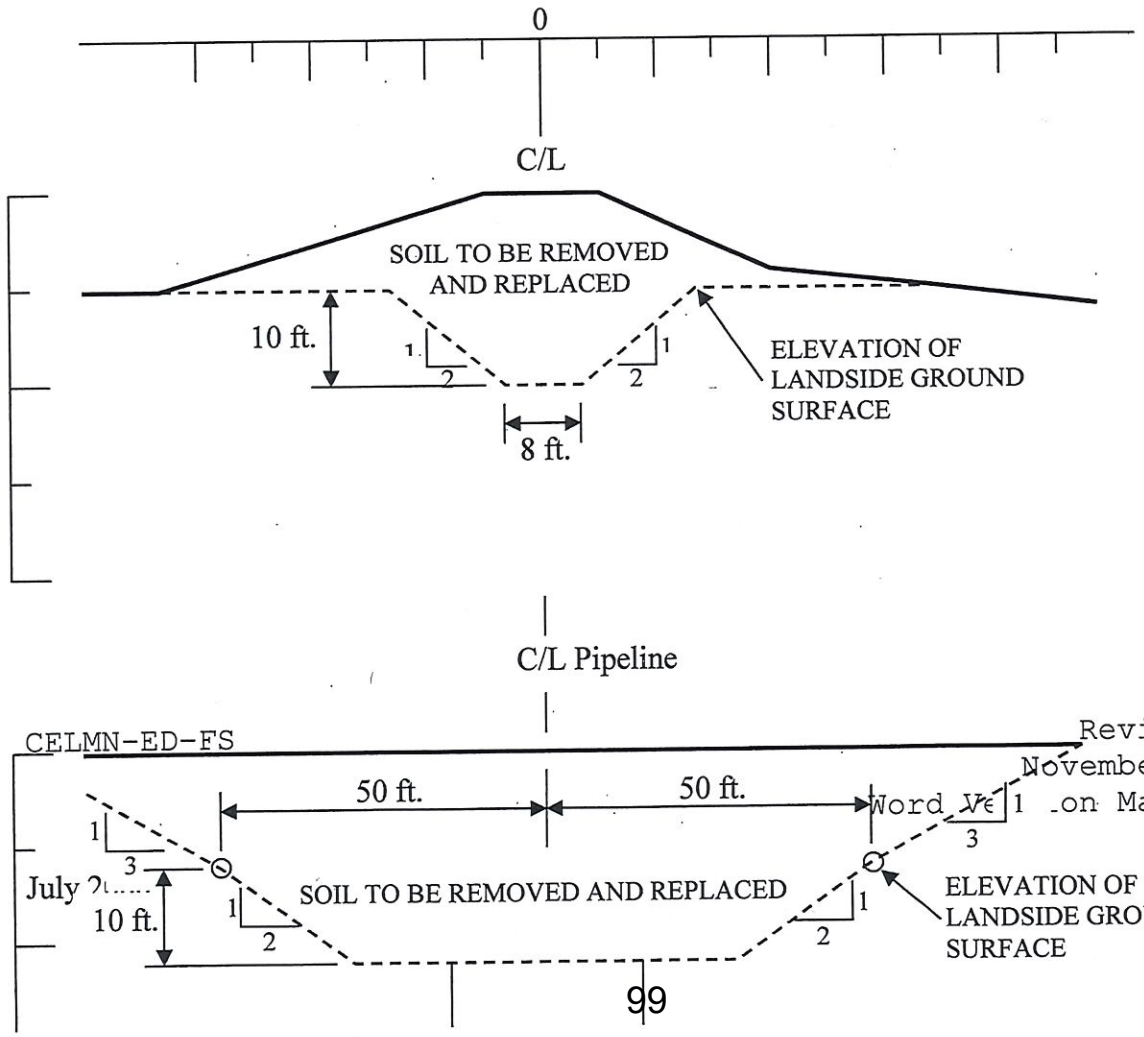
✓ 12. **A secondary survey monitoring system such as Tru Tracker or ParaTracker shall to employed to verify the drill bit location within the zone of concern (300 feet either side of**

the levee footprint).

13. Annualar solids will need be below 20 percent, forward movement must stop and annular space cleaned out.

14. Reaming advancement will be limited to 1.5 feet per minute and calculated annular solids must be keep to less than 20 percent.

TYPICAL FLOOD PROTECTION REPAIR



Guidelines for Permit Review

Installing Pipelines by Nearsurface
Directional Drilling Not Under Levees

Note: It is recommended that all applicants and/or their representatives schedule a meeting with the Corps to discuss these guidelines.

1. All work on or around levees or flood protection is season sensitive. Some levee/flood wall systems serve as hurricane protection, some are for river flooding and still others are for a combination of these. There may be a season during which the sensitivity of the flood control system will not allow work, this should be known to the applicant early in the application process. The applicant should make every effort to discern the restrictions to work; on, crossing or adjacent to levees/ floodwalls and what may be required of him during his work phases.

2. When the proposed pipeline entry and/or exit point, are located on the batture (riverward of the levees), the entry and/or exit points should be positioned such that the pipeline is: (a) landward of the projected 50-year bankline migration; (b) at least 20 feet riverward of the levee stability control line. The pipeline shall be a minimum of twenty (20) feet flood side of the levee stability control line, based on the applicable project factor-of-safety, at all points; and (c) at least 10-ft. landward of the existing revetment. The purpose of this restriction is to avoid the inclusion of a potential source of seepage any closer to the levee than the levee stability control line, and also to help assure the pipeline retains adequate cover.

3. The applicant must furnish Engineering evaluations and

computations addressing the following concerns and giving specific measures of problem avoidance, dimensions, distances, pressures, weights, and all other pertinent data.

a. The pilot hole cutter head must not be advanced beyond/ahead of the wash pipe more than a distance such that return flow would be lost. Also, the wash pipe ID should be sufficiently greater than the OD (cutting diameter) of the pilot cutter head such that return flow is enhanced. The applicant should directly address the methodology, which he plans to employ in his efforts to keep the return of flow up the drill hole during his entire operation. These requirements are to assure that blockage of the annular space between the wash pipe and drill pipe and associated pressure build-up do not occur.

b. Drilling mud must be of sufficient noncolloidal lubricating admixtures to (a) assure complete suspension and removal of sands and other "solids" cuttings/ materials; and (b) provide adequate lubrication to minimize bridging by cohesive materials thereby facilitating surface returns flow along the annular space.

c. The fly cutter used in the prereamer run must have an OD (cutting diameter) sufficiently greater than the OD of the production pipe such that the hole diameter remains adequate to minimize hang-ups of the production run and thereby, associated stresses on surrounding soils. The applicant must at the same time address the increased seepage potential caused by this annular space developed during drilling.

d. Prereamer runs must be a continuous operation at least through the down-slope and up-slope cutting sections to prevent undue stress on the surrounding soils during re-start operations.

e. Drilling fluid pumping pressures should be kept to a minimum to preclude ground uplift and "boils".

Automatic shut-off valves in the production pipeline should be provided to immediately cut-off flow through the pipeline should leakage occur.

"General Decision Number: LA20250008 06/20/2025

Superseded General Decision Number: LA20240008

State: Louisiana

Construction Type: Heavy Industrial

Counties: Acadia, Ascension, Bossier, Caddo, Calcasieu, East Baton Rouge, Jefferson, Lafayette, Lafourche, Livingston, Orleans, Ouachita, Plaquemines, Rapides, St Bernard, St Charles, St James, St John the Baptist, St Landry, St Martin, St Tammany, Terrebonne and Webster Counties in Louisiana.

HEAVY CONSTRUCTION PROJECTS (Industrial, Processing Plants, and Refineries)

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.75 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2025.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2025

1	01/24/2025
2	02/28/2025
3	04/04/2025
4	04/18/2025
5	05/02/2025
6	06/20/2025

BOIL0037-001 01/01/2021

	Rates	Fringes
BOILERMAKER	$ 30.49	23.13

CARP0729-001 01/01/2023

	Rates	Fringes
MILLWRIGHT	$ 36.00	13.30

CARP1098-001 07/01/2022

ASCENSION, EAST BATON ROUGE, LIVINGSTON AND ST. JAMES (North of the Mississippi River) PARISHES

	Rates	Fringes
CARPENTER (including drywall hanging/framing, metal studs, and formsetting/formbuilding)	$ 29.04	10.86

CARP1098-009 07/01/2022

BOSSIER, CADDO, OUACHITA, RAPIDES AND WEBSTER PARISHES

	Rates	Fringes
CARPENTER (including drywall hanging/framing, metal studs, and formsetting/formbuilding)	$ 29.04	10.86

CARP1098-010 07/01/2022

ACADIA, LAFAYETTE, ST. LANDRY AND ST. MARTIN PARISHES

	Rates	Fringes
CARPENTER (including drywall hanging/framing, metal studs, and formsetting/formbuilding)	$ 29.04	10.86

CARP1098-011 07/01/2022

CALCASIEU PARISH

	Rates	Fringes
CARPENTER (including drywall hanging/framing, metal studs, and formsetting/formbuilding)	$ 29.04	10.86

CARP1846-003 07/01/2022

JEFFERSON, LAFOURCHE, ORLEANS, PLAQUEMINES, ST. BERNARD, ST. CHARLES, ST. JAMES (South of the Mississippi River), ST. JOHN THE BAPTIST, ST. TAMMANY, and TERREBONNE PARISHES

	Rates	Fringes
CARPENTER (including drywall hanging/framing, metal studs, and formsetting/formbuilding)	$ 29.09	10.27

ELEC0130-004 12/02/2024

JEFFERSON, LAFOURCHE, ORLEANS, PLAQUEMINES, ST. BERNARD, ST. CHARLES, ST. JAMES, ST. JOHN THE BAPTIST, ST. MARTIN (Southern Portion), AND TERREBONNE PARISHES

	Rates	Fringes
ELECTRICIAN (including low voltage wiring)	$ 35.00	16.03

ELEC0194-008 09/02/2024

BOSSIER, CADDO, and WEBSTER PARISHES

	Rates	Fringes
ELECTRICIAN (including low voltage wiring)	$ 34.00	15.22

ELEC0446-005 09/01/2024

OUACHITA PARISH

	Rates	Fringes
ELECTRICIAN (including low voltage wiring)	$ 28.95	1.75%+13.52

ELEC0576-007 03/01/2025

RAPIDES PARISH

	Rates	Fringes
ELECTRICIAN (including low voltage wiring)	$ 29.00	4.25%+10.70

ELEC0861-007 09/01/2024

ACADIA, CALCASIEU, LAFAYETTE, AND ST. MARTIN (Northern Portion) PARISHES

	Rates	Fringes
ELECTRICIAN (including low voltage wiring)	$ 31.98	4.34%+13.75

ELEC0995-007 01/01/2025

ASCENSION, EAST BATON ROUGE, LIVINGSTON, AND ST. LANDRY PARISHES

	Rates	Fringes
ELECTRICIAN (including low voltage wiring)	$ 29.47	13.50

* ELEC1077-004 05/26/2025

ST. TAMMANY PARISH

	Rates	Fringes
ELECTRICIAN (including low voltage wiring)	$ 30.35	3%+11.55

ENGI0406-016 07/01/2010

	Rates	Fringes
Power equipment operators: (Acadia, Bossier, Caddo, Calcasieu, Lafayette, Ouachita, Rapides, St. Landry, St. Martin, and Webster Parishes)		
Crane, 50 to 150 tons	$ 25.15	7.95
Crane, below 50 tons	$ 24.90	7.95
Crane, over 150 tons	$ 25.40	7.95
Power equipment operators: (Ascension, Livingston, and St. James Parishes)		
Crane, 50 to 150 tons	$ 25.15	7.95
Crane, below 50 tons	$ 24.65	7.95
Crane, over 150 tons	$ 26.15	7.95
Power equiment operators: (Lafourche, St. Bernard, St. Charles, St. John the Baptist, St. Tammany, and Terrebonne Parishes)		
Crane, 50 to 150 tons	$ 25.15	7.95
Crane, below 50 tons	$ 24.65	7.95
Crane, over 150 tons	$ 26.15	7.95
Power Equipment Operators (East and West Baton Rouge)		
Crane, 50 to 150 tons	$ 25.15	7.95
Crane, below 50 tons	$ 24.65	7.95
Crane, over 150 tons	$ 26.15	7.95
Power equipment operators: (Orleans, Jefferson, Plaquemines)		
Crane, 50 to 150 tons	$ 25.15	7.95
Crane, below 50 tons	$ 24.65	7.95
Crane, over 150 tons	$ 26.15	7.95

IRON0623-004 01/01/2025

ASCENSION, EAST BATON ROUGE, LAFAYETTE (Eastern Portion), LIVINGSTON, ST. JAMES (Northwestern Portion), ST. LANDRY, and ST. MARTIN PARISH

	Rates	Fringes
IRONWORKER, STRUCTURAL AND REINFORCING	$ 34.75	13.86

IRON0623-009 01/01/2025

BOSSIER, CADDO, AND WEBSTER PARISHES

	Rates	Fringes
Ironworker, reinforcing and structural	$ 34.75	13.86

IRON0623-013 01/01/2025

ACADIA, CALCASIEU, LAFAYETTE (Western Portion), OUACHITA, AND RAPIDES PARISHES

	Rates	Fringes
Ironworker, reinforcing and structural	$ 34.75	13.86

IRON0623-019 01/01/2025

JEFFERSON, LAFOURCHE, ORLEANS, PLAQUEMINES, ST. BERNARD, ST. CHARLES, ST. JAMES (Southeastern Portion), ST. JOHN THE BAPTIST, ST. TAMMANY, and TERREBONNE PARISHES

	Rates	Fringes
Ironworker, reinforcing and structural	$ 34.75	13.86

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* LABO0099-005 07/01/2006

CALCASIEU PARISH

	Rates	Fringes
Laborer, common	$ 12.79 **	1.73

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* LABO0099-007 07/01/2006

JEFFERSON, LAFOURCHE, ORLEANS, PLAQUEMINES, ST. BERNARD, ST. CHARLES, ST. JAMES, ST. JOHN THE BAPTIST, ST. TAMMANY, AND TERREBONNE PARISHES

	Rates	Fringes
Laborer, common		
Jefferson, Orleans, St. Bernard, and Terrebonne Parishes	$ 12.79 **	1.73
Lafourche, Plaquemines, St. Charles, and St. John the Baptist Parishes	$ 11.19 **	1.73
St. James and St. Tammany Parishes	$ 10.00 **	1.73

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* LABO0099-008 01/01/2005

ACADIA, FRANKLIN, LAFAYETTE, OUACHITA, RAPIDES, ST. LANDRY, AND ST. MARTIN PARISHES

	Rates	Fringes
Laborer, common	$ 11.00 **	3.50

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* LABO0099-011 09/01/2005

ASCENSION, EAST BATON ROUGE, AND LIVINGSTON PARISHES

	Rates	Fringes
Laborer, common	$ 15.00 **	2.77

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* LABO0692-001 05/01/2005

BOSSIER, CADDO, AND WEBSTER PARISHES

	Rates	Fringes
Laborer, common	$ 12.00 **	2.10

PAIN1244-003 11/01/2019

NEW ORLEANS AREA - ASCENSION, EAST BATON ROUGE, JEFFERSON, LAFAYETTE, LAFOURCHE, LIVINGSTON, ORLEANS, PLAQUEMINES, ST. BERNARD, ST. CHARLES, ST. JAMES, ST. JOHN THE BAPTIST, ST. LANDRY, ST. MARTIN, ST. TAMMANY, AND TERREBONNE PARISHES

	Rates	Fringes
PAINTER (brush, roller, spray, and sandblaster)	$ 21.91	9.73

PAIN1244-004 11/01/2019

LAKE CHARLES AREA - ACADIA AND CALCASIEU PARISHES

	Rates	Fringes
PAINTER (brush, roller, spray, and sandblaster)	$ 21.91	9.73

PAIN1244-005 11/01/2019

SHREVEPORT AREA - BOSSIER, CADDO, OUACHITA, RAPIDES, AND WEBSTER PARISHES

	Rates	Fringes
PAINTER (brush, roller, spray, and sandblaster)	$ 21.91	9.73

PLUM0060-001 06/05/2023

JEFFERSON, LAFOURCHE, ORLEANS, PLAQUEMINES, ST. BERNARD, ST. CHARLES, ST. JAMES (Southeastern Portion), ST. JOHN THE BAPTIST, ST. TAMMANY, AND TERREBONNE PARISHES

	Rates	Fringes
PIPEFITTER (excluding HVAC pipe)	$ 31.70	13.85
PLUMBER (including HVAC pipe and setting system)	$ 31.70	13.85

PLUM0141-001 08/01/2023

BOSSIER, CADDO, and WEBSTER PARISHES

	Rates	Fringes
PLUMBER/PIPEFITTER (including HVAC pipe and setting system)	$ 28.48	14.47

PLUM0141-007 08/01/2024

OUACHITA PARISH

	Rates	Fringes

PLUMBER/PIPEFITTER (including
HVAC pipe and setting system)....$ 28.75 11.86

PLUM0198-001 12/08/2022

ASCENSION, EAST BATON ROUGE, LIVINGSTON, ST. JAMES
(Northwestern Portion), AND ST. MARTIN (Eastern Portion)
PARISHES

	Rates	Fringes
PLUMBER/PIPEFITTER (including HVAC pipe and setting system)....$	32.42	16.50

PLUM0198-008 06/01/2014

ACADIA, CALCASIEU, LAFAYETTE, ST. LANDRY, and ST. MARTIN
(Western Portion) PARISHES

	Rates	Fringes
PLUMBER/PIPEFITTER (including HVAC pipe and setting system)....$	25.90	13.65

PLUM0247-001 05/01/2020

RAPIDES PARISH

	Rates	Fringes
PLUMBER/PIPEFITTER (including HVAC pipe and setting system)....$	26.50	13.39

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* SULA2004-005 05/19/2004

	Rates	Fringes
Cement Mason/Concrete Finisher...$	16.89 **	2.45
Power Equipment Operator Oiler.....$	11.16 **	3.09

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.75) or 13658 ($13.30). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including

preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by

computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"