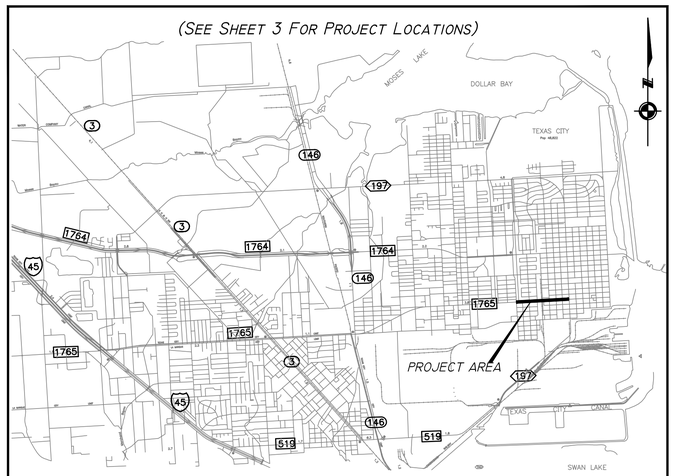
Galveston County, Texas

Texas Avenue Reconstruction

14th Street to Loop 197

October, 2019



LOCATION MAP
Not to Scale

THE STATE OF TEXAS
COUNTY OF GALVESTON

COUNTY JUDGE

Mark Henry

COMMISSIONERS

Darrell Apffel - Precinct 1
Joe Giusti - Precinct 2
Stephen D. Holmes - Precinct 3
Ken Clark - Precinct 4

COUNTY ENGINEER

Michael C. Shannon, P.E.

ASSISTANT COUNTY ENGINEER

Nancy Baher, P.E.

DRAWINGS INDEX

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT ENERGY AT 713-207-2222

NOTICE:

For your safety, you are required by Texas Law to call 811 at least 48 hours before you dig so that underground line can be marked. This verification does not fulfill your obligation to call 811.

VERIFICATION OF PRIVATE UTILITY LINES

Date

CenterPoint Energy/Natural Gas Facilities Verification ONLY.
(This signature verifies that you have shown CNP Natural Gas lines correctly – not to be used for conflict verification.) (Gas service lines are not shown.)
Signature valid for six months.

Date

Texas New Mexico Power Co.
(Approved Only for Crossing Underground Ductlines, Unless Otherwise Noted.)
Valid at Time of Review Only.

AT&T

Date

Approval for AT&T Texas/SWBT underground conduit facilities only.
Signature valid for one year.

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • Fax (713) 400-2754 • www.arkkengineers.com • TX PE Firm No. 13872

ARKK JOB NO. 18-015

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

SUBMITTED BY: _____ DATE: 10/14/2019

JOHN D. RUDLOFF, P.E.
ARKK ENGINEERS, LLC

General Notes:

1. The Contractor shall verify locations of all underground utility lines prior to commencing construction.
2. It is the contractor's responsibility to verify the existence, size, depth, location and material of all existing utilities prior to construction which may conflict with the proposed construction. The Contractor is made aware of the conflicts with existing utilities including but not limited to water, sewer, storm, gas, cable, electric, petrochemical pipelines which may not be shown on the drawings. The Contractor is responsible for taking adequate precautions to maintain the integrity of the lines during construction at no additional cost to the project.
3. It is the Contractor's responsibility to verify and determine the depth, location, elevation, alignment and existence of all surface or underground utilities and structures in and around the vicinity of the work to be performed prior to commencing construction. The Contractor shall notify the Owner of any conflicts found prior to commencing construction. The Contractor shall allow adequate time to the Owner to determine a resolution to the conflict. The Contractor shall be aware there is a potential for delay due to conflicts and shall allow such time in his project cost and construction schedule. No additional payment shall be made for any downtime costs due to such conflicts length for additional time due to the conflicts will be considered if requested by the contractor on a case by case basis.
4. The Contractor shall contact all pertinent utility and pipeline companies 48 hours (minimum) prior to excavation in a project area. The Contractor shall contact Lonestar Notification Center at (713) 223-4567, DIG TESS Notification Center at 1-800-DIG (344)-TESS(8377) and TEXAS ONE CALL Notification Center at 1-800-245-4545 to provide utility locations. All utilities (including but not limited to pipelines, natural gas lines, fiber optic cable, buried electric, telephone, television, water, sanitary sewer, storm sewer, etc.) shall be identified prior to excavation.
5. The Contractor shall verify all dimensions and conditions in the field before commencing work. It shall be the Contractor's responsibility to report any and all discrepancies to the Owner in a timely manner.
6. The Contractor shall adequately protect existing structures, utilities, trees, shrubs, landscaping and other objects. All costs for repair and/or replacement of damage due to Contractor's operations shall be paid by Contractor at no additional cost to project.
7. Trees within the Street Right-of-Way shall not be removed or disturbed. Where tree roots must be cut, follow the repair methods described in the Specifications. All landscaping (trees, bushes, shrubs (all kinds) damaged or removed to facilitate construction shall be replaced with equal kind at no cost to the project, unless stated otherwise in the bid proposal. The Contractor shall utilize the services of a Professional Urban Forester to protect existing landscaping including but not limited to trees, shrubs and bushes during the construction operations at no additional cost to the project.
8. The Contractor shall maintain access to Residential and Commercial properties adjacent to work areas at all times at no separate pay.
9. The Contractor shall conduct his operations in a manner such that trucks and other vehicles do not create a dirt nuisance or safety hazard in any streets, public or private. Clean up of streets shall be done daily at no additional cost to the project.
10. Any area of grass which is disturbed or dug up during the construction shall be replaced with St. Augustine sod or grass which matches the grass removed at no additional cost to the project.
11. When construction occurs in the City Right-of-Ways, Alleys, and Easements care shall be taken to prevent construction damage to adjacent areas. Contractor shall remove and replace fence sections as necessary to accomplish the construction at no additional cost to the Project. In the event of damage to driveways, sidewalks, structures, plants, landscaping, etc. the Contractor will replace them with equal product, all at no additional cost to the Project.
12. Relocation of existing water and wastewater utilities shall be coordinated with the City of Texas City 72 hours prior to relocation. This includes operation of water line valves. Relocation shall be paid at the Contractor's expense unless stated otherwise in the bid proposal. Adjustment of individual water service water lines shall be incidental to the project.
13. The Contractor shall verify all pipe sizes and types prior to commencing construction at no cost to the project.
14. Valves and other utility structures in the construction area shall be adjusted to finished grade at no additional cost. Rim elevations for manholes shall be set flush with the finished grade for all manholes located in pavement. Rim elevations shall be 3 inches above natural ground for all manholes located in other areas, unless otherwise shown. For manholes outside of pavement, sloped fill shall be added for storm water drainage away from manhole rim. (No separate pay)
15. No excavations shall be left open overnight. All excavations which cannot be backfilled overnight shall be covered with steel sheeting when in paved areas; steel sheeting, wood planking or material which is approved by Engineer or pertinent entity (TxDOT, County, City) in other areas. The excavation area shall be protected with traffic barricades equipped with flashing yellow lights. The excavation areas must be completely cordoned off with plastic construction fencing material meeting the City's and pertinent entity's (TxDOT's or County's) requirements. The excavation area must be adequately protected and made safe.
16. Existing pavement, curb, sidewalk, driveway, and landscaped areas damaged during construction by the Contractor shall be replaced by the Contractor to original condition at the Contractors expense.
17. Where any street or any section of a street is closed, the Contractor shall furnish and maintain adequate barricades, warning and directing signs, red flags and lights and/or flagman at the end of each street and at all intersections along the street within the limits of the work area. All expenses incurred for the above work shall be paid by the Contractor. All warning signs and barricades shall conform to the Texas Manual of Uniform Traffic Control Devices-Latest Edition.
18. The Contractor shall not use Residents water.
19. Maintain clearances as required between the proposed storm sewer and all gas lines, petroleum lines and all other utilities proposed or existing. All clearances shall be obtained in writing from the appropriate company or utility. A copy of all documentation shall be provided to the Engineer by the Contractor.
20. On all pavements to be removed, including driveways and sidewalks, the pavement shall be sawcut prior to removal. No separate pay.
21. The Contractor shall employ off-duty Police Officers or Certified Flagman to maintain traffic flow as described in the specifications.
22. In the event a Gas Line, Petrochemical product line or pipe line is exposed during excavation and is in need of relocation, the appropriate company shall be contacted by the Contractor to have the status of the line verified. Contractor is responsible for contacting and coordinating with the line owner to relocate the lines. The Owner is not responsible for any claims or delays resulting from such relocation.
23. Texas Law Article 1436c, prohibits all activities in which persons or equipment may come within six feet of energized overhead power lines, and Federal Regulations, Title 29, Part 1910. 180 (l) and Part 1926. 550 (a) (15) require a minimum clearance of ten feet from these facilities. The above laws carry both criminal and civil liabilities, with Contractors and owners being legally responsible for the safety of workers under these laws. If the Contractor must work near overhead power lines, call Texas New Mexico Power Company at (409) 945-2386 for the lines to be de-energized and/or moved at the Contractors expense.
24. The Contractor shall be aware that utilities and petrochemical pipelines exist or may exist in the construction area which:
    a. Have not been field verified (NFV)
    b. Have not been located on the drawings
    c. May not be shown accurately on the drawings
    d. May exist in the construction area and not shown on the drawings

    It is the Contractors responsibility to verify the location, size and depth of all existing utilities and petrochemical pipelines prior to excavation at no additional cost to the project. Contractor shall include costs in his bid for work associated with locating unknown lines and dealing with issues associated with lines that fall in the above noted category.
25. Removal and replacement of street signs, traffic signs and mail boxes shall be considered incidental to the cost of the project except where specifically included as a Bid Item.
26. The Contractor shall coordinate with the Owner as necessary, and when required, regarding "Special Events" that may be affected by construction. These events may require consideration by the Contractor (construction schedule or sequence, cleanup, street and sidewalk cleaning, removal and disposal of debris, etc.). The Contractor shall perform this work at no additional cost to the project.
27. Contractor shall verify alignment of sidewalk, in the field, with the Engineer prior to construction of new sidewalk.
28. Prior to building and construction the contractor shall contact Texas New Mexico Power Co. for approved method of bracing the existing power poles in the construction area. It is the contractors responsibility to protect existing power poles in accordance with Texas New Mexico Power Co. requirements.
29. There shall be no separate pay for items covered in these notes unless specifically established in the bid proposal.
30. VERIFICATION OF STRUCTURE LIMITS:
    Contractor shall verify the limits of all structures which may impact the proposed improvements prior to construction. This shall include, but us not limited to the horizontal and vertical limits of above ground and below ground structures, supports, foundations, piers, pilings, etc.
31. PROTECTION OF UTILITIES, PIPELINES, STRUCTURES:
    It is anticipated that a special shoring system, and or sheet piling or special protection system will be necessary at various locations within the project to help protect existing pipelines, structures, and existing utilities. The Contractor shall contact and coordinate with the pertinent companies and identify such locations based on his anticipated method of construction and shall include all such supporting and protection efforts (shoring and/or sheet piling or other techniques) as incidental to the cost of the project. Contractor shall fully evaluate the location of the proposed storm sewer in relation to the existing utilities and pipelines in determining the need for such special systems for protection and safety. Such special bracing, supporting and protection efforts shall be to the satisfaction of the pipeline Company, at no additional cost to the project.
32. The contractor on behalf of the owner, shall Obtain all construction permits (City of Texas City, TXDOT) prior To the commencement of work at no additional cost to the project.
33. The work area shall be barricaded and properly illuminated during darkness and periods of inactivity, when in an area of direct public access.
34. The contractor shall be responsible for the storage of material and equipment in a safe and workman like manner to prevent injuries, during and after working hours until project completion.
35. The Contractor is made aware that the presence of cement stabilized sand and/or concrete encasement around existing utilities may be encountered during construction. The Contractor shall utilize appropriate equipment when crossing such utilities. No additional payment shall be made for increased efforts resulting from the presence of such encasement.

Drainage & Paving Notes:

1. Drainage is of utmost importance to this Project. The Contractor is responsible for the verification of key design elevations. The Contractor shall also take care to obtain all grades designated on the Drawings. He shall perform all transitions to existing pavements and driveways so that positive drainage is maintained and ponding is prevented. Transitions shall be performed so that a smooth driving surface is maintained. Contractor shall transition driveways so that vehicles will not "bottom out".
2. Relocate all existing utilities as necessary for Storm Sewer and Pavement installation. Location and elevations of existing utilities shown on Drawings are approximate and shall be determined by the Contractor prior to construction. Relocation of existing utilities shall be at the Contractor's expense unless stated otherwise in the bid proposal.
3. Where new curb is installed, Contractor shall backfill and regrade behind curb (with select fill at no separate pay) as necessary to maintain positive drainage from non-paved areas over top of curb.
4. No fliers shall be placed in mail boxes. A $500.00 fine may be levied by the U.S. Postal Service for each box.
5. Repair or replace drains that pass through existing or proposed curbs. Maintain yard/ROW drainage to new pavement at all times.
6. Limits of sidewalk and driveway replacements shown on the plans are approximate. Limits for replacements for adjustment in grade shall be submitted by the contractor and approved by the Engineer prior to construction.
7. It is the Contractor's responsibility to determine the length of curbs ramps required to comply with federal ADA requirements.
8. The Contractor shall adhere to all ADA requirements including maximum allowable sidewalk cross slope and running slope.
9. Contractor shall cover open excavations with anchored steel plates during non-working hours.
10. Contractor shall comply with OSHA regulations and State of Texas Law concerning excavation, trenching and shoring.
11. Contractor to make necessary precautions to protect root systems of shrubs, plants and trees along the area of excavation.
12. The Contractor shall maintain drainage during construction. The Contractor shall install any temporary storm sewer culverts necessary to maintain drainage at no additional cost to the project. The Contractor shall regrade and restore ditches disturbed by the construction at no cost to the project.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

General Notes I

Job No.: 18-015	Scale:	SHEET
Date: September, 2019	HORZ: N/A	2
Dwn By: D. Fattig	VERT: N/A	OF 52
Chkd By: J Rudloff		

Traffic Control and Pavement Marking:

1. Contractor shall provide and install all traffic control devices as per the latest revision of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

2. All temporary traffic control devices markings, striping and signage required for this project shall be included in the traffic control and regulation costs. Any changes or modifications to traffic control that is necessary due to field conditions and to maintain traffic flow shall be performed at no additional cost to the project.

3. The Contractor shall maintain access to residential and commercial properties adjacent to and in the work areas at all times. Where necessary, Contractor shall construct temporary driveways for access at no cost to project.

4. Contractor shall open all closed roads during non-working hours. The Contractor is responsible for traffic safety and shall adequately and safely cover and/or backfill trench or other excavations prior to opening roads to traffic.

5. Contractor shall notify the City of Texas City, ambulance, police, fire, and other emergency service agencies in writing at least 72 hours prior to closure of any street, intersection, or lane of traffic. Contractor shall make necessary provisions to allow access to Emergency vehicles at all times.

6. Installation and maintenance of signing is sole responsibility of Contractor. This includes repair and/or replacement due to acts of vandalism or accidents.

7. Remove existing stop signs, street name signs, and warning signs that are in conflict with traffic control plans and replace with drum-mounted signs. Replace existing signs upon completion of work (no separate pay).

8. The construction traffic control signs, devices and barricades on these drawings constitute minimum requirements and not intended to cover special circumstances or other conditions that may arise due to field conditions. The Contractor shall place and maintain sufficient additional signs, barricades, and warning devices to warn the public and provide for the safe movement of traffic and the construction zone safety. Where project requirements are not fully satisfied by the standards shown hereon, the "Texas Manual on Uniform Traffic Control Devices" shall govern.

9. Heavy Trucks and construction equipment must stay on main roads approved by City and cannot enter side streets for ingress or egress to construction site.

10. Contractor is here by put on notice that other construction contracts may be ongoing that can affect the traffic control plans. It shall be the Contractor's responsibility to coordinate the construction effort with other contractors to provide for the sage movement of traffic and the construction some safety. Any changes to traffic control deemed necessary due to field conditions shall be performed at no additional cost to project.

11. Contractor is made aware of presence of several business along the project alignment. Contractor is responsible for contacting and coordinate with all business and maintaining access at all times. Contractor may have to adjust traffic control plan as necessary to facilitate his work. Any adjustment to the traffic control including provision of traffic control devices is his responsibly and shall be performed at no additional cost to the project.

Pipeline Company Notes:

1. The Contractor shall verify locations of all underground pipelines prior to construction.
2. It is the contractor's responsibility to determine the depth, location and existence of all pipelines which may conflict with the proposed construction. This determination shall be performed in concert with the appropriate pipeline company in a manner that meets their approval.
3. There is the possibility of encountering unknown active and inactive unidentified pipelines. The Contractor is responsible for notifying and coordinating with all the pipeline companies prior to construction. In the event the Contractor encounters an unidentified pipeline crossing that conflicts with the proposed construction, the Contractor shall employ the following sequence:
   A. Notify the City and the Engineer.
   B. The Contractor shall make a concerted effort to identify the Owner of the pipeline and coordinate with the Owner of the pipeline on the relocation efforts. The City is not responsible for any claims and downtime resulting from the delays in the relocation efforts.
   C. In the event the Contractor fails to identify the Owner of the pipeline crossing, the Contractor shall document (telephone calls, coordination, meeting on site, etc.) his efforts expended to identify the Owner of the pipeline and submit a copy to the City. The City will only assist in identifying the Owner of the unknown pipeline company after confirming that the Contractor has made a diligent effort in locating the Owner of the unknown pipeline company. During such time, the Contractor shall either reschedule his Construction activities. Neither the City nor the Engineer are not responsible for any claims and down time resulting from the delays encountered from the unidentified pipeline.
4. The Contractor shall notify pipeline companies prior to excavation or prior to crossing over or under the pipeline company's lines. Clearance between the proposed utility and the existing pipeline shall meet the pipeline company requirements and approval. A copy of all documentation shall be provided to the Engineer by the Contractor.
5. The Contractor shall be aware that pipeline companies may require locating their pipelines by utilized traditional excavation methods or by utilized non destructive equipment (Vacuum Locating Devices or other pertinent equipment) during construction. The methodology utilized for locating the pipeline shall be approved by the pipeline company prior to performance of work. The Contractor shall coordinate with the pipeline company and utilize suitable methods and equipment approved by the pipeline company to perform the work at no additional cost to the project.
6. Contractor shall be aware that protection of pipelines on this project may require special bracing, supporting and protection efforts. Such efforts may include special support systems or structures to meet pipeline Company's satisfaction. Contractor shall fully coordinate such supports and protection efforts with pipeline Company's prior to construction. Such special bracing, supporting and protection efforts shall be to the satisfaction of the pipeline Company, at no additional cost to the project.
7. No equipment, debris, materials or supplies of any kind will be placed, parked or stored in, on or over the pipeline easements.
8. Any crossing of the easements by vehicles and heavy equipment shall be limited and restricted to locations that have been covered by two layers of wooden mats extending the entire width of the easement or as directed by the pipeline company. (No separate pay)

NOTE:
The Contractor is made aware that any produced discharges, such as groundwater, chlorinated flush water, and wastewater from the work performed in TxDOT R.O.W. will need to be discharged into the City's storm system or wastewater collection system as approved by the City. The Contractor will not be allowed to discharge any produced discharges into TxDOT R.O.W. without obtaining a signed agreement from TxDOT. The Contractor will obtain all required permits from TxDOT at no additional cost to the project.

CENTERPOINT ELECTRICAL LINES

WARNING: OVERHEAD ELECTRICAL LINES
Overhead lines may exist on the property. The location of overhead lines has not been shown on these drawing as the lines are clearly visible, but you should locate them prior to beginning any construction. Texas law, Section 752, Health & Safety Code forbids activities that occur in close proximity to high voltage lines, specifically:

- Any activity where person or thing may come within six(6) feet of live overhead high voltage lines: and
- Operating a crane, derrick, power shovel, drilling rig, pile driver, hoisting equipment, or similar apparatus within 10 feet of live overhead high voltage lines.

Parties responsible for the work, including contractors, are legally responsible for the safety of construction workers under this law. This law carries both criminal and civil liability. To arrange for lines to be turned off or removed call CenterPoint Energy at (713) 207-2222.

ACTIVITIES ON OR ACROSS CENTERPOINT ENERGY FEE or EASEMENT PROPERTY
No approval to use, cross or occupy CenterPoint fee or easement property is given. If you need to use CenterPoint property, please contact our Surveying & Right of Way Division at (713) 207-6248 or (713) 207-5769.

CENTERPOINT ENERGY GAS FACILITIES

CAUTION: UNDERGROUND GAS FACILITIES
Locations of CenterPoint Energy main lines (to include CenterPoint Energy, Intrastate Pipeline, LLC where applicable) are shown in an approximate location only. Service lines are usually not shown. Our signature on these plans only indicates that our facilities are shown in approximate locations. It does not imply that a conflict analysis has been made. The contractor shall contact the Utility Coordinating Committee at 1-800-545-6005 or 811 a minimum of 48 hours prior to construction to have main and service lines field located.

- When CenterPoint Energy pipe line markings are not visible, call (713) 945-8036 or (713) 945-8037 (7:00 a.m. to 4:30 p.m.) for status of line location request before excavation begins.
- When excavating within eighteen inches (18") of the indicated location of CenterPoint Energy facilities, all excavation must be accomplished using non-mechanized excavation procedures.
- When CenterPoint Energy facilities are exposed, sufficient support must be provided to the facilities to prevent excessive stress on the piping.
- For emergencies regarding gas lines call (713) 659-3552 or (713) 207-4200.

The Contractor is fully responsible for any damages caused by his failure to exactly locate and preserve these underground facilities.

TEXAS NEW MEXICO POWER

WARNING: OVERHEAD ELECTRICAL FACILITIES
Overhead lines may exist on the property. We have not attempted to mark those lines since they are clearly visible, but contractor shall locate them prior to beginning any construction. Texas law, Section 752, Health & Safety Code, forbids all activities in which persons or things may come within six (6) feet of live overhead high voltage lines. Contractors and owners are legally responsible for safety of construction workers under This law. This law carries both criminal and civil liability. To arrange for lines to be turned off or moved, call TEXAS NEW MEXICO POWER at (409)-945-2386.

AT&T TEXAS SWBT FACILITIES

The locations of AT&T Texas/SWBT facilities are shown in an approximate way only. The Contractor shall determine the exact location before commencing work. He agrees to be fully responsible for any and all damages which might be occasioned by this failure to exactly locate and preserve these underground utilities.

The Contractor shall call 1-800-344-8377 a minimum of 48 hours prior to construction to have underground lines field located.

When excavating within eighteen inches (18") of the indicated location of AT&T Texas/SWBT facilities, all excavations must be accomplished using non-mechanized excavation procedures. When boring the Contractor shall expose the AT&T Texas/SWBT facilities.

When AT&T Texas/SWBT facilities are exposed, the Contractor will provide support to prevent damage to the conduit ducts or cables. When excavating near telephone poles the Contractor shall brace the pole for support.

The presence or absence of AT&T Texas/SWBT underground conduit facilities or buried cable facilities shown on these plans does not mean that there are no direct buried cables or other cables in conduit in the area.

Please contact the AT&T Texas Damage Prevention Manager Mr. Roosevelt Lee Jr. at 713-567-4552 or e-mail him at rl7259@att.com, if there are questions about boring or excavating near our AT&T Texas/SWBT facilities.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

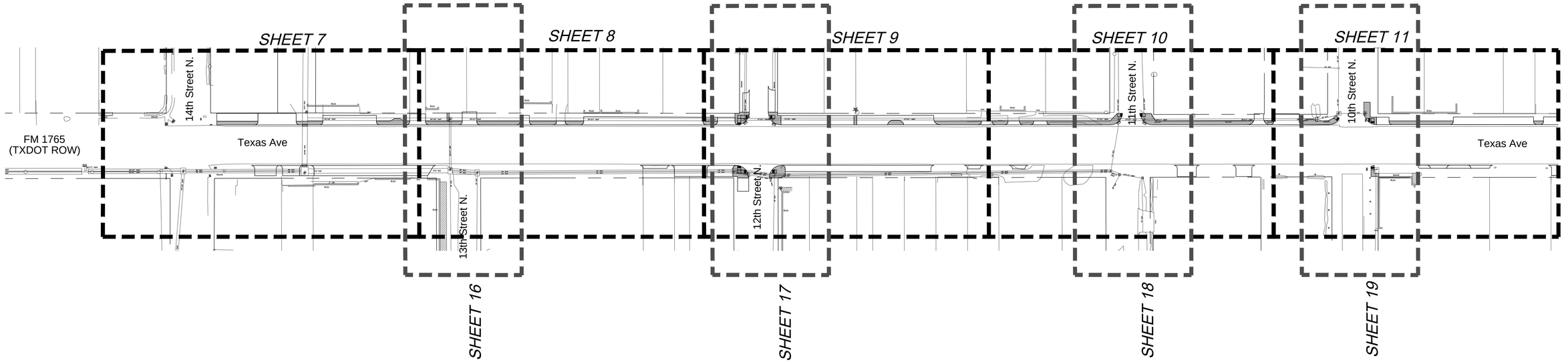
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

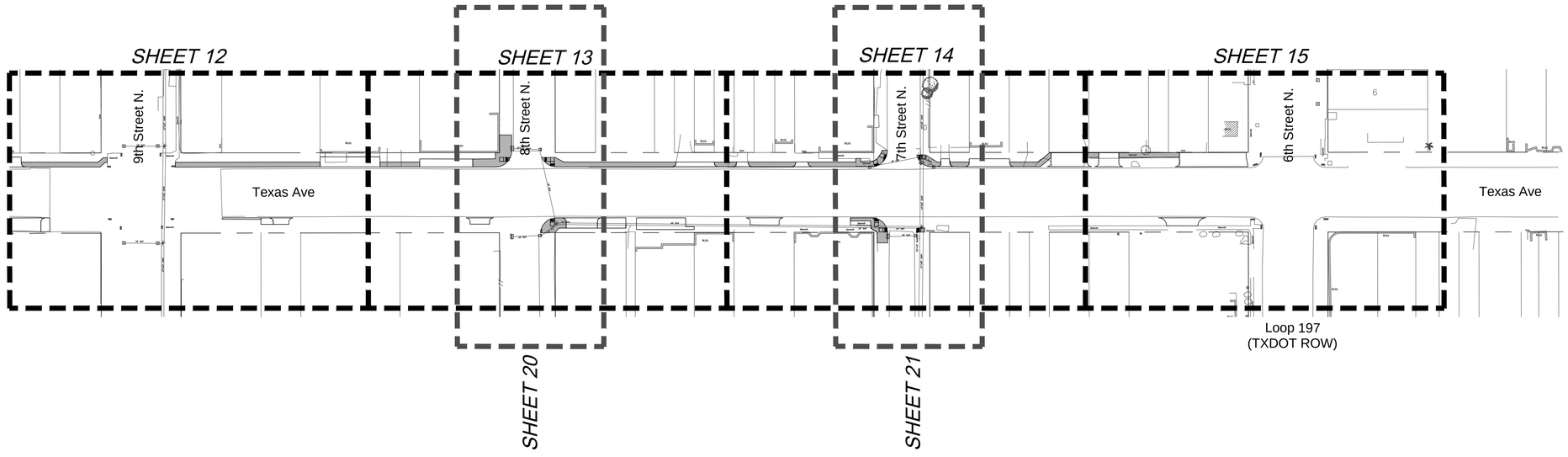
Galveston County.Texas

Texas Avenue Reconstrution

General Notes II

Job No.: 18-015	Scale:	SHEET
Date: September, 2019	HORZ: None	3
Dwn By: D. Fattig	VERT:	OF 52
Chkd By: J Rudloff		





MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

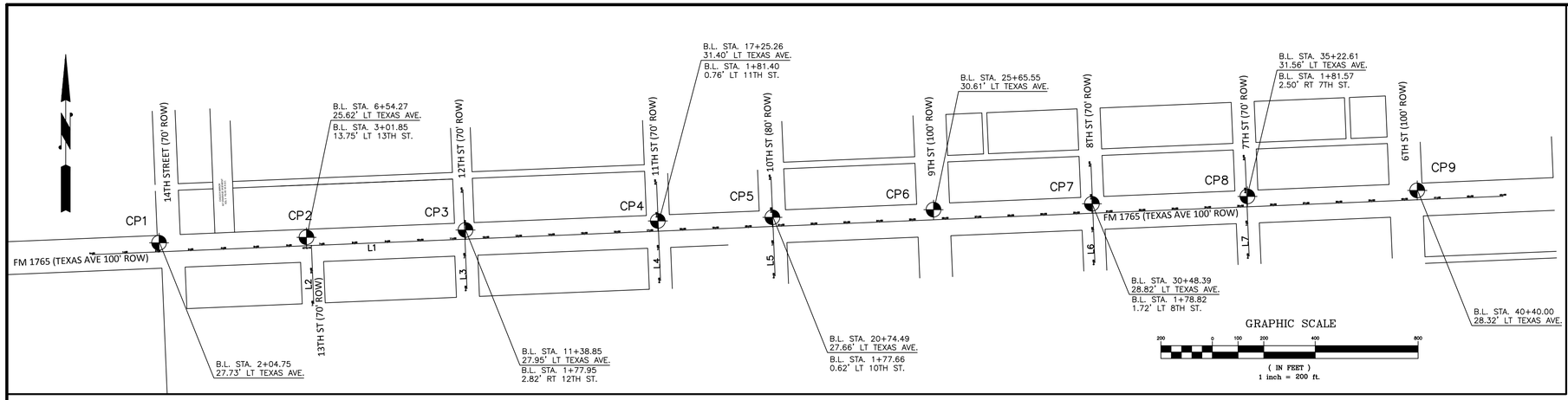
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

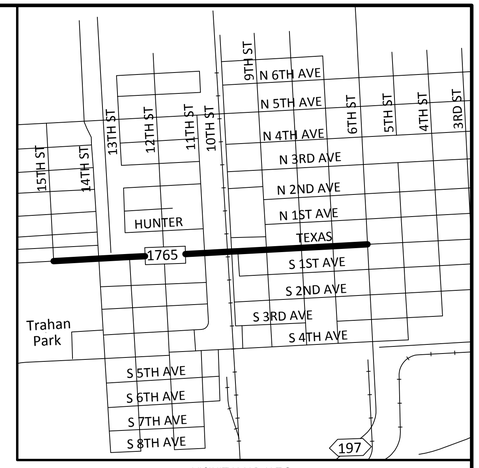
Galveston County.Texas

Texas Avenue Reconstrution

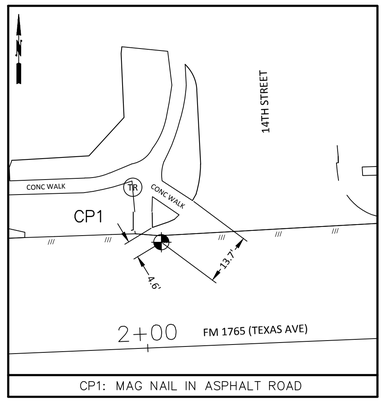
Overall Layout Plan

Job No.: 18-015	Scale: HORZ: 1" = 80' VERT:	SHEET 4 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

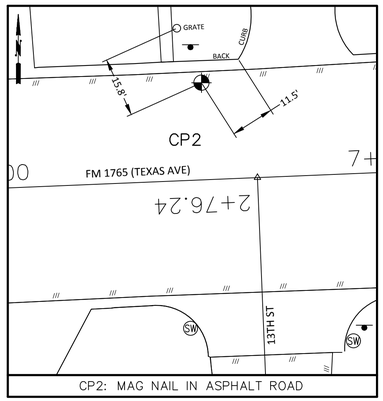




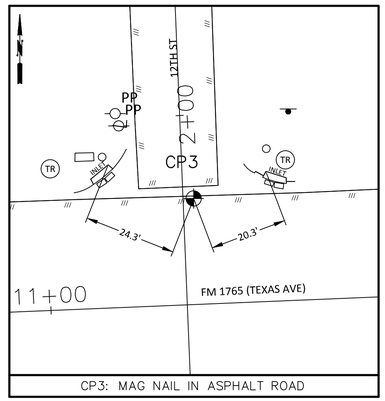
VICINITY MAP N.T.S.



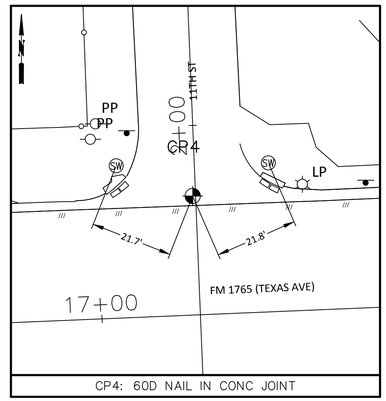
CP1: MAG NAIL IN ASPHALT ROAD



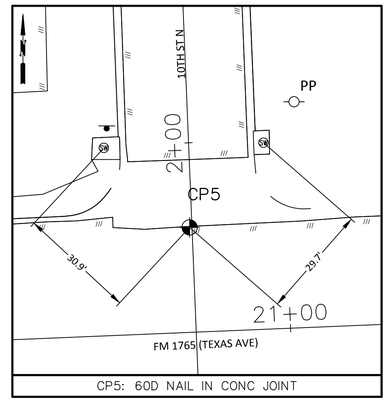
CP2: MAG NAIL IN ASPHALT ROAD



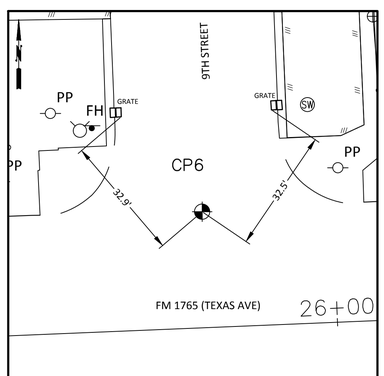
CP3: MAG NAIL IN ASPHALT ROAD



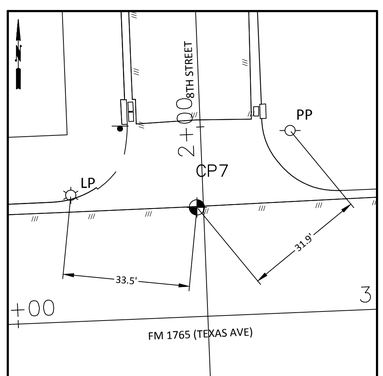
CP4: 60D NAIL IN CONC JOINT



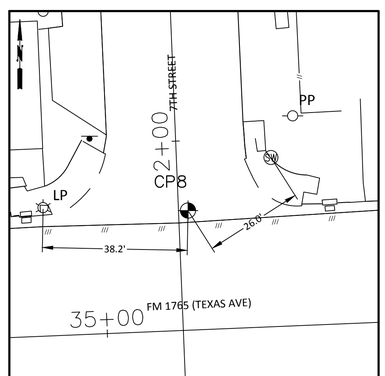
CP5: 60D NAIL IN CONC JOINT



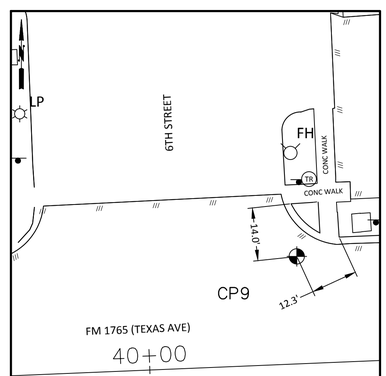
CP6: "X" IN CONC



CP7: MAG NAIL IN ASPHALT ROAD



CP8: MAG NAIL IN CONC JOINT



CP9: MAG NAIL IN ASPHALT ROAD

BENCHMARK

DATUM: NAVD88 GEOID 12B

PRIMARY: NGS CONTROL POINT PID AJ6399 - HGCSD58
RESET ELEV:= 7.82

CP#	NORTHING	EASTING	ELEVATION IN FEET	DESCRIPTION
CP1	13709898.50	3269261.52	6.93	MAG NAIL
CP2	13709915.02	3269710.75	6.69	MAG NAIL
CP3	13709937.43	3270194.81	6.11	MAG NAIL
CP4	13709965.18	3270780.57	6.31	60D NAIL
CP5	13709975.92	3271129.65	8.06	60D NAIL
CP6	13709999.22	3271620.17	8.19	"X" IN CONC
CP7	13710017.44	3272102.67	6.84	MAG NAIL
CP8	13710039.84	3272576.37	6.09	MAG NAIL
CP9	13710058.04	3273093.45	6.91	MAG NAIL

DESIGN BASELINE DATA PROVIDED BY
ARKK ENGINEERS

DESIGN BASELINE LINE TABLE		
LINE	LENGTH	BEARING
L1	4300.00	N87°37'29"E
L2	176.21	N2°19'40"W
L3	300.00	N2°19'40"W
L4	300.00	N2°19'40"W
L5	300.00	N2°19'40"W
L6	300.00	N2°19'40"W
L7	300.00	N2°19'40"W

I, the undersigned, a Registered Professional Land Surveyor of the State of Texas, do hereby certify that this survey was made on the ground and is true and correct to the best of my knowledge and belief.

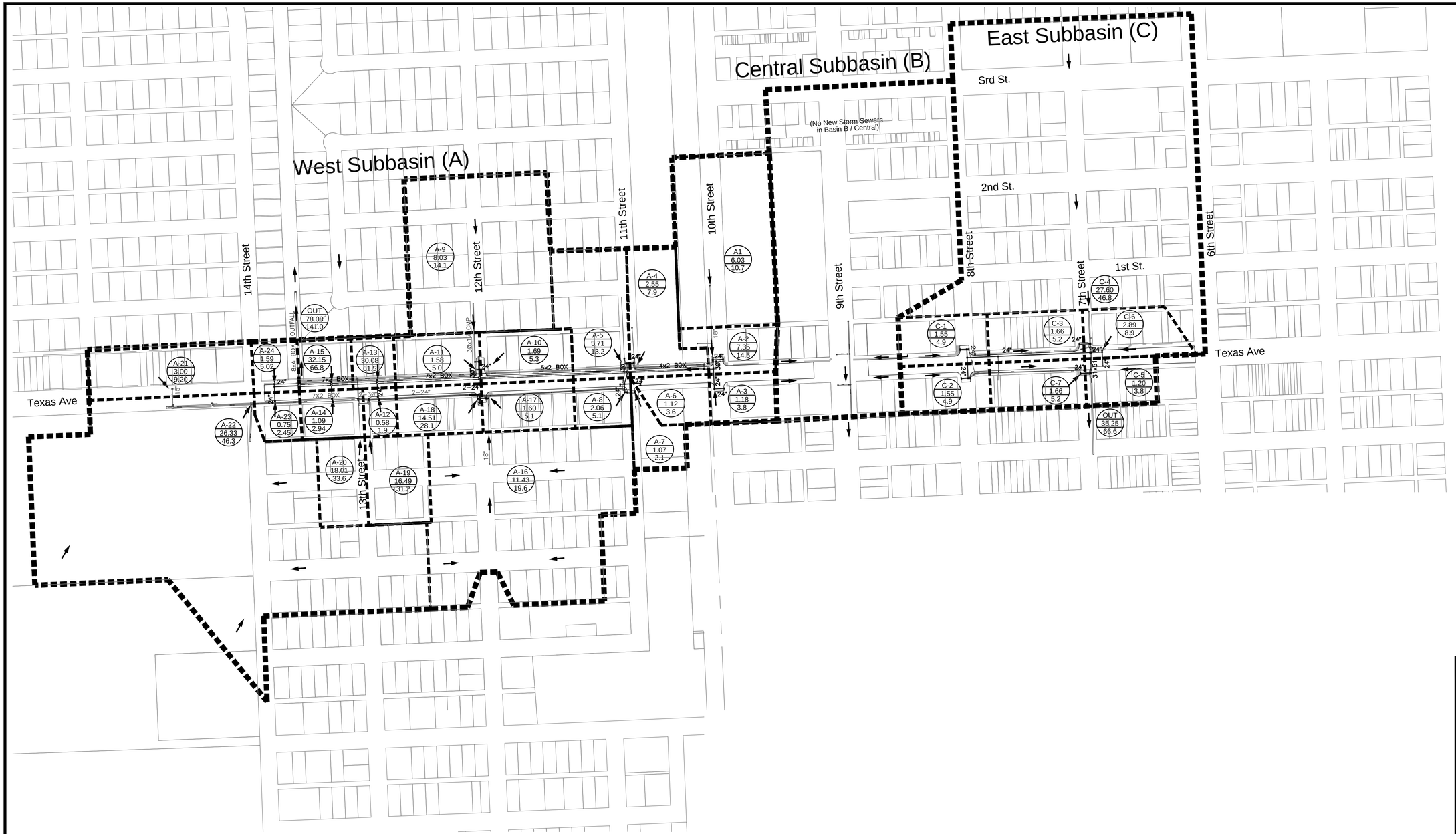
Robert D. Ellis
Registered Professional
Land Surveyor No. 4006

STATE OF TEXAS
REGISTERED
ROBERT D. ELLIS
4006
PROFESSIONAL
LAND SURVEYOR

ELLIS SURVEYING SERVICES
2805 25th Ave. North
Texas City, Texas 77590
Tel. : 409-938-8700

SCALE: 1" = 20'
JOB NUMBER 2675
DATE: 2-27-2018
PHONE: (409)-938-8700
SHEET 5 OF 52

CONTROL SHEET
F.M. 1765 (TEXAS AVENUE)
FROM 6TH STREET TO 14TH STREET
CITY OF TEXAS CITY
GALVESTON COUNTY, TEXAS



LEGEND

A1 / 2.17 / 5.48	Drainage Basin Label, Cumulative Area (acres), Total 2-year Flow (cfs)
	Drainage Basin Boundary
	Drainage Sub-area Boundary
24"	Prop. Storm Sewer
24"	Exist. Storm Sewer
	Flow Path

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9–13–19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Drainage Area Map

Job No.: 18–015	Scale: HORZ: 1"=200' VERT:	SHEET 6 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

Two Year Storm Analysis

TEXAS AVENUE - GALVESTON COUNTY - 2 YEAR STORM

Basin	Sub - basin	Area (Ac.)	C	C x A	Sum C x A	Sum Areas	Tc (min)	I (in/hr)	Total Runoff, cfs	Pipe Type	Existing Pipe?	Pipe Dia (ft)	No. of Barrels	Span	Rise	*Flow Area*	*P*	*R*	*Length*	Pipe Slope	Velocity Full	n	Downstream Hydraulic Grade Line, ft	Upstream Hydraulic Grade Line Elevation, ft	Upstream Top of Curb Elevation, ft
A	1	**6.03**	**0.45**	2.71	2.71	6.03	28.7	3.95	10.71	round	(Exist)	1.50		n/a	n/a	*1.77*	*4.71*	*0.38*	*n/a*	n/a	*6.06*	0.013	6.76	(exist)	out of prj
A	2	**1.32**	**0.75**	0.99	3.70	7.35	29.2	3.91	14.47	round		**2.50**		n/a	n/a	*4.91*	*7.85*	*0.63*	*35*	1.000%	*2.95*	0.013	6.72	6.76	8.13
A	3	**1.18**	**0.75**	0.89	0.89	1.18	25.3	4.27	3.78	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*80*	0.300%	*1.20*	0.013	6.72	6.74	7.74
A	2+3	**0.00**	**0.75**	0.00	4.59	8.53	29.6	3.88	17.78	box		**n/a**		**4.00**	**2.00**	*8.00*	*12.00*	*0.67*	*341*	0.130%	*2.22*	0.013	6.50	6.72	8.13
A	4	**2.55**	**0.75**	1.91	1.91	2.55	26.8	4.12	7.88	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*24*	0.400%	*2.51*	0.013	6.54	6.57	6.42
A	5	**3.16**	**0.45**	1.42	3.33	5.71	28.6	3.96	13.20	RCAP		**n/a**		***36"***	***23"***	*4.50*	*7.85*	*0.57*	*34*	0.100%	*2.93*	0.013	6.50	6.54	6.42
A	6	**1.12**	**0.75**	0.84	0.84	1.12	25.2	4.28	3.59	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*63*	0.200%	*1.14*	0.013	6.56	6.58	6.73
A	7	**1.07**	**0.45**	0.48	0.48	1.07	25.1	4.28	2.06	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*28*	0.700%	*0.66*	0.013	6.58	6.59	6.95
A	8	**0.99**	**0.75**	0.74	1.22	2.06	26.4	4.16	5.09	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*41*	0.150%	*1.62*	0.013	6.56	6.58	6.95
A	6+8	**0.00**	**0.75**	0.00	2.06	3.18	27.3	4.08	8.41	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*49*	0.160%	*2.68*	0.013	6.50	6.56	7.03
A	8+5+3	**0.00**	**0.75**	0.00	9.99	17.42	31.5	3.72	37.19	box		n/a		**5.00**	**2.00**	*10.00*	*14.00*	*0.71*	*585*	0.050%	*3.72*	0.013	5.53	6.50	6.42
A	9	**8.03**	**0.45**	3.61	3.61	8.03	29.4	3.89	14.05	box		**n/a**		**4.00**	**2.00**	*8.00*	*12.00*	*0.67*	*51*	0.100%	*1.76*	0.013	5.56	5.58	6.25
A	10	**1.69**	**0.75**	1.27	1.27	1.69	26.0	4.20	5.32	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*21*	0.500%	*1.69*	0.013	5.56	5.58	6.14
A	11	**1.58**	**0.75**	1.19	1.19	1.58	25.8	4.21	4.99	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*9*	1.110%	*1.59*	0.013	5.56	5.57	6.14
A	10+11+9	**0.00**	**0.75**	0.00	6.07	11.30	30.3	3.82	23.15	box		n/a		**4.00**	**2.00**	*8.00*	*12.00*	*0.67*	*34*	0.100%	*2.89*	0.013	5.53	5.56	6.14
A	11+8	**0.00**	**0.75**	0.00	16.05	28.72	33.1	3.61	58.01	box		n/a		**7.00**	**2.00**	*14.00*	*18.00*	*0.78*	*404*	0.050%	*4.14*	0.013	4.78	5.53	6.14
A	12	**0.58**	**0.75**	0.44	0.44	0.58	24.1	4.39	1.91	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*57*	0.700%	*0.61*	0.013	4.78	4.79	7.17
A	13	**0.78**	**0.75**	0.59	17.07	30.08	33.2	3.60	61.52	box		n/a		**7.00**	**2.00**	*14.00*	*18.00*	*0.78*	*181*	0.050%	*4.39*	0.013	4.41	4.78	7.17
A	14	**1.09**	**0.75**	0.82	0.82	1.09	25.2	4.28	3.50	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*57*	0.300%	*1.11*	0.013	4.41	4.42	6.84
A	15	**0.98**	**0.75**	0.74	18.63	32.15	33.4	3.59	66.84	box		n/a		**7.00**	**2.00**	*14.00*	*18.00*	*0.78*	*127*	0.050%	*4.77*	0.013	4.10	4.41	6.84
A	16	**11.43**	**0.45**	5.14	5.14	11.43	30.4	3.81	19.62	round		**2.00**	**2**	n/a	n/a	*6.28*	*6.28*	*1.00*	*21*	0.100%	*3.12*	0.013	5.96	5.98	6.00
A	17	**1.60**	**0.75**	1.20	1.20	1.60	25.9	4.21	5.05	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*24*	0.400%	*1.61*	0.013	5.96	5.98	6.14
A	18A	**1.48**	**0.75**	1.11	7.45	14.51	31.0	3.76	28.05	round		**2.00**	**2**	n/a	n/a	*6.28*	*6.28*	*1.00*	*54*	0.100%	*4.47*	0.013	5.88	5.96	6.14
A	18B	**0.00**	**0.75**	0.00	7.45	14.51	31.0	3.76	28.05	round	(Exist)	2.00	2	n/a	n/a	*6.28*	*12.56*	*0.50*	*398*	0.075%	*4.47*	0.013	4.35	5.88	6.30
A	19	**1.98**	**0.45**	0.89	8.34	16.49	31.4	3.74	31.17	round	(Exist)	2.50	2	n/a	n/a	*9.81*	*15.70*	*0.63*	*43*	0.010%	*3.18*	0.013	4.29	4.35	7.23
A	20	**1.52**	**0.45**	0.68	9.03	18.01	31.6	3.72	33.55	box	(Exist)	n/a		7.00	2.00	*14.00*	*18.00*	*0.78*	*230*	0.170%	*2.40*	0.013	4.15	4.29	7.70
A	21a	**3.00**	**0.75**	2.25	2.25	3.00	27.1	4.09	9.20	round	(Exist)	1.25		n/a	n/a	*1.23*	*3.93*	*0.31*	*70*	0.100%	*7.50*	0.013	4.79	6.21	out of prj
A	21b	**0.00**	**0.75**	0.00	2.25	3.00	27.1	4.09	9.20	CMAP	(Exist)	n/a	2	42"	29"	*13.00*	*9.42*	*1.38*	*310*	0.060%	*0.71*	0.024	4.76	4.79	out of prj
A	22	**23.33**	**0.45**	10.50	12.75	26.33	32.8	3.63	46.31	round	(Exist)	2.50	2	n/a	n/a	*9.81*	*15.70*	*0.63*	*192*	0.060%	*4.72*	0.013	4.15	4.76	7.10
A	22+20	**0.00**	**0.75**	0.00	21.78	44.34	34.5	3.52	76.59	BOX	(Exist)	n/a		8.00	3.00	*24.00*	*22.00*	*1.09*	*67*	0.300%	*3.19*	0.013	4.10	4.15	7.28
A	23	**0.75**	**0.75**	0.56	0.56	0.75	24.5	4.35	2.45	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*57*	0.200%	*0.78*	0.013	4.15	4.16	6.98
A	24	**0.84**	**0.75**	0.63	1.19	1.59	25.9	4.21	5.02	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*99*	0.170%	*1.60*	0.013	4.10	4.15	6.98
A	24+22+15	**0.00**	**0.75**	0.00	41.60	78.08	36.5	3.39	140.95	BOX	(Exist)	n/a		8.00	4.00	*32.00*	*24.00*	*1.33*	*n/a*	0.300%	*4.40*	0.013	***(Pipe Soffit)***	**4.10**	7.28

Basin	Sub - basin	Area (Ac.)	C	cXa	Sum CXA	Sum Areas	Tc (min)	I (in/hr)	Total Runoff, cfs	Pipe Type	Existing Pipe?	Pipe Dia (ft)	No. of Barrels	Span	Rise	*Flow Area*	*P*	*R*	*Length*	Pipe Slope	Velocity Full	n	Downstream Hydraulic Grade Line, ft	Upstream Hydraulic Grade Line Elevation, ft	Upstream Top of Curb Elevation, ft
C	1	**1.55**	**0.75**	1.16	1.16	1.55	25.8	4.22	4.90	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*33*	0.100%	*1.56*	0.013	6.32	6.33	6.89
C	2	**1.55**	**0.75**	1.16	1.16	1.55	25.8	4.22	4.90	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*82*	0.100%	*1.56*	0.013	6.32	6.35	6.89
C	1+2	**0.00**	**0.00**	0.00	2.33	3.10	27.2	4.08	9.49	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*487*	0.100%	*3.02*	0.013	5.46	6.32	6.97
C	3	**1.66**	**0.75**	1.25	1.25	1.66	25.9	4.20	5.23	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*43*	3.140%	*1.67*	0.013	5.55	5.57	6.26
C	4	**25.94**	**0.45**	11.67	12.92	27.60	32.9	3.62	46.80	RCAP		**n/a**		**51"**	**31"**	*8.90*	*10.99*	*0.81*	*33*	0.090%	*5.26*	0.013	5.46	5.55	6.26
C	5	**1.20**	**0.75**	0.90	0.90	1.20	25.3	4.26	3.84	RCAP		**n/a**		**29"**	**18"**	*2.90*	*6.28*	*0.462*	*56*	0.200%	*1.32*	0.013	5.55	5.57	5.78
C	6	**1.69**	**0.75**	1.27	2.17	2.89	27.1	4.10	8.88	RCAP		**n/a**		**29"**	**18"**	*2.90*	*6.28*	*0.462*	*46*	0.090%	*3.06*	0.013	5.46	5.55	5.78
C	6+4+2	**0.00**	**0.00**	0.00	17.41	33.59	33.6	3.58	62.31	RCAP		**n/a**		**51"**	**31"**	*8.90*	*10.99*	*0.81*	*82*	0.110%	*7.00*	0.013	5.05	5.46	6.41
C	7	**1.66**	**0.75**	1.25	1.25	1.66	25.9	4.20	5.23	round		**2.00**		n/a	n/a	*3.14*	*6.28*	*0.50*	*42*	3.210%	*1.67*	0.013	5.05	5.07	6.14
C	7+6	**0.00**	**0.00**	0.00	18.66	35.25	33.7	3.57	66.57	CMAP	(Exist)	n/a		49"	33"	*8.90*	*10.99*	*0.81*	*336*	0.208%	*7.48*	0.024	***(Pipe Soffit)***	**5.05**	6.14

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9–13–19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

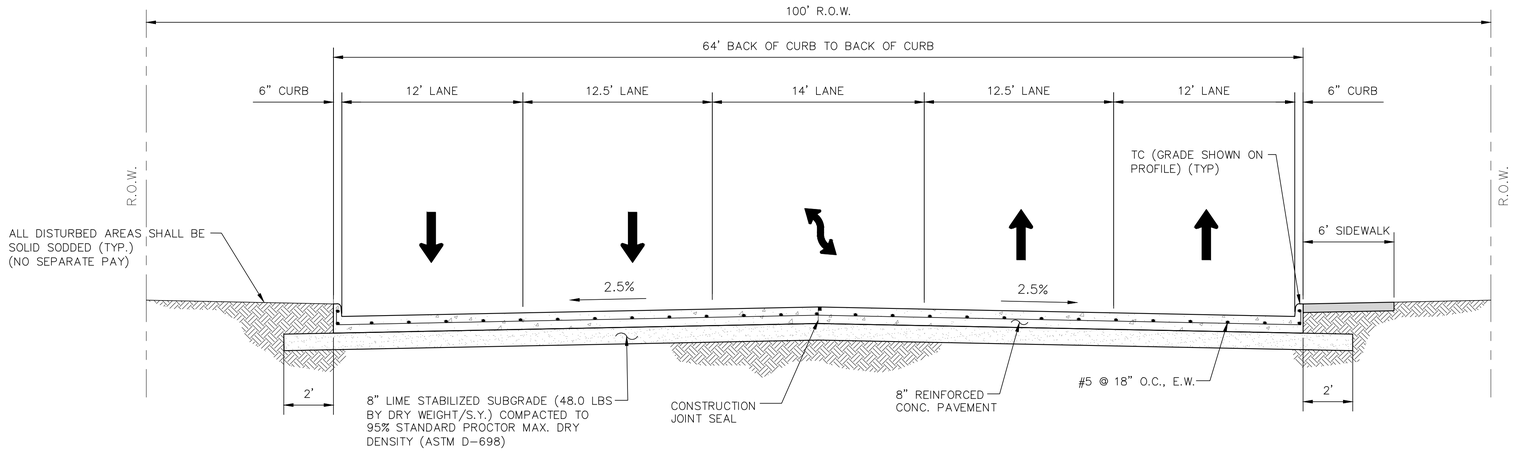
Texas Avenue Reconstrution

Drainage Calculations

Job No.: 18–015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ: n/a
VERT:

SHEET 6a OF 52



PROPOSED TYPICAL PAVEMENT SECTION

Scale: 1"=5'

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Typical Section

Job No.: 18-015	Scale: 1"=5'	SHEET
Date: September, 2019	HORZ:	6b
Dwn By: D. Fattig	VERT:	OF 52
Chkd By: J Rudloff		

PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 1	13709898.50	3269261.52	6.93	MAG NAIL

14th St. S.
(70' ROW)
(Asphalt Pavement)

TEXACO GAS STATION
1402

FM 1765 (TXDOT ROW)

B.L. STA. 1+00.00
N=13709866.45
E=3269158.01

N72°47'39"E ~ 108.36
TO CTRL. PT. 1

N87°37'29"E ~ 4300.00

(PPCA LIMITS 3+00-14+00)

PROP. TYPE "C" INLET
STA. 3+19.70, 31.1' LT.
℄ EL.= 2.37 (S)

PROP. 10 LF 24" RCP
STM. SWR. @ 0.9%

PROP. 4'X4' STM. BOX MH
STA. 3+19.70, 22.5' LT.
℄ EL.= 2.27 (N,S,℄)

PROP. 10'X10 JUNCTION BOX A1
STA. 4+19.13, 22.5' LT.
℄ EL.= 2.10 (N,S,E,W)

PROP. PLUG STORM SEWER

PROP. 127 LF 7'X2' RCB
STM. SWR. @ 0.05%

PROP. TYPE "C" INLET
STA. 5+45.00, 31.2' LT.
℄ EL.= 2.34 (S)

PROP. 10 LF 24" RCP
STM. SWR. @ 1.8%

PROP. 99 LF 24" RCP
STM. SWR. @ 0.17%

PROP. PLUG INLET PER DETAIL

PROP. LIMITS OF HIGH EARLY CONCRETE FROM STA. 2+79.80 TO STA. 7+05.10

PROP. 55 LF 7'X2' RCB
STM. SWR. @ 0.05%

PROP. 10'X5' JUNCTION BOX A2
STA. 5+45.00, 22.4' LT.
℄ EL.= 2.16 (N,S,E,W)

PROP. TYPE "BB" MODIFIED INLET W/GRATE TOP
STA. 5+45.00, 32.7' RT.
℄ EL.= 2.34 (N)

PROP. 57 LF 24" RCP
STM. SWR. @ 0.3%

PROP. TYPE "C" INLET
STA. 3+19.70, 32.8' RT.
℄ EL.= 2.37 (N)

PROP. 57 LF 24" RCP
STM. SWR. @ 0.2%

REMOVE 17 SY CONCRETE PAVEMENT (FILL & SOD AREA)

PROP. PLUG INLET PER DETAIL

Match Line Sta 6+00 See Sheet 8

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

Texas Ave.

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

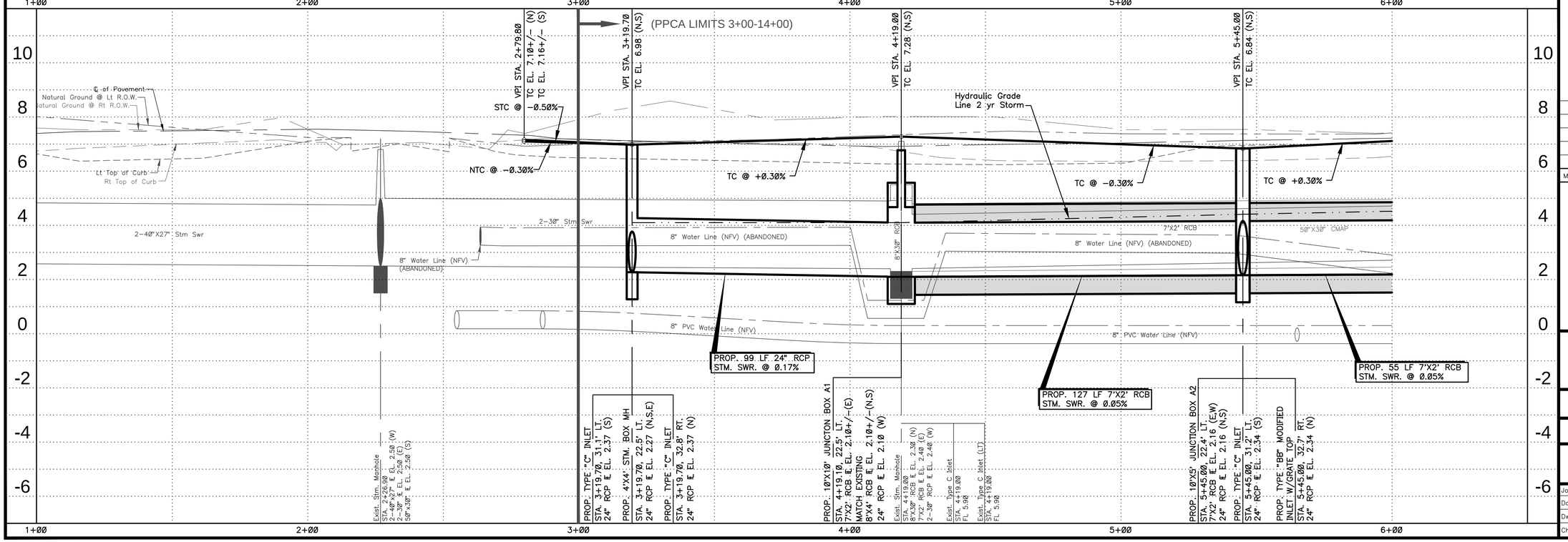
SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

PROP. CONCRETE DRIVEWAY
PROP. 4" CONCRETE SIDEWALK
PROP. 4" CONCRETE PAVEMENT
PROP. ASPHALT PAVEMENT
PROP. REMOVE PAVEMENT
PROP. LIMITS OF HIGH EARLY CONCRETE

#	STATION	OFFSET
1	PT 2+79.80	31.20' LT.
2	PT 2+79.80	33.90' RT.
3	PT 2+87.00	32.80' RT.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9–13–19

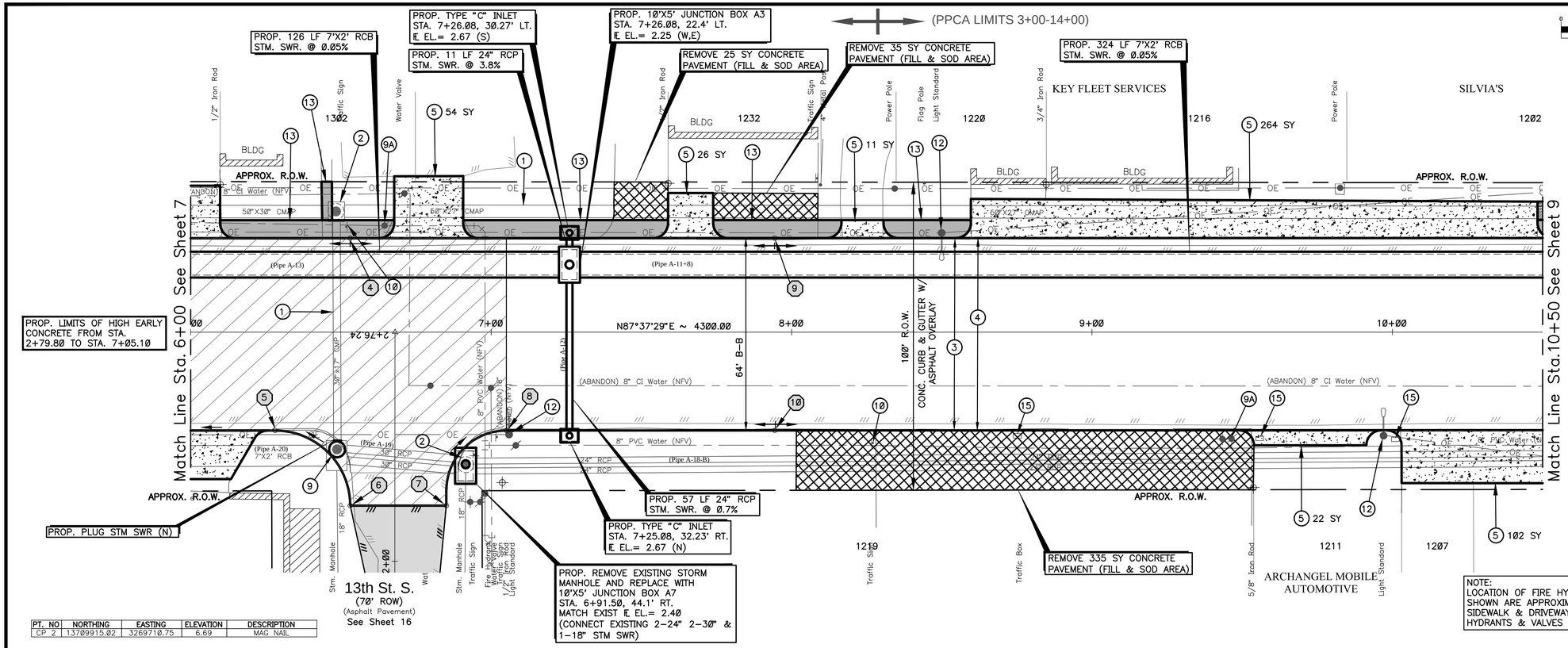
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstruction

Texas Ave.
Sta. 1+00 to Sta. 6+00

Job No.: 18–015	Scale: HORZ: 1" = 20' VERT: 1" = 2'	SHEET 7 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 2	13709915.02	3269710.75	6.69	MAG NAIL

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

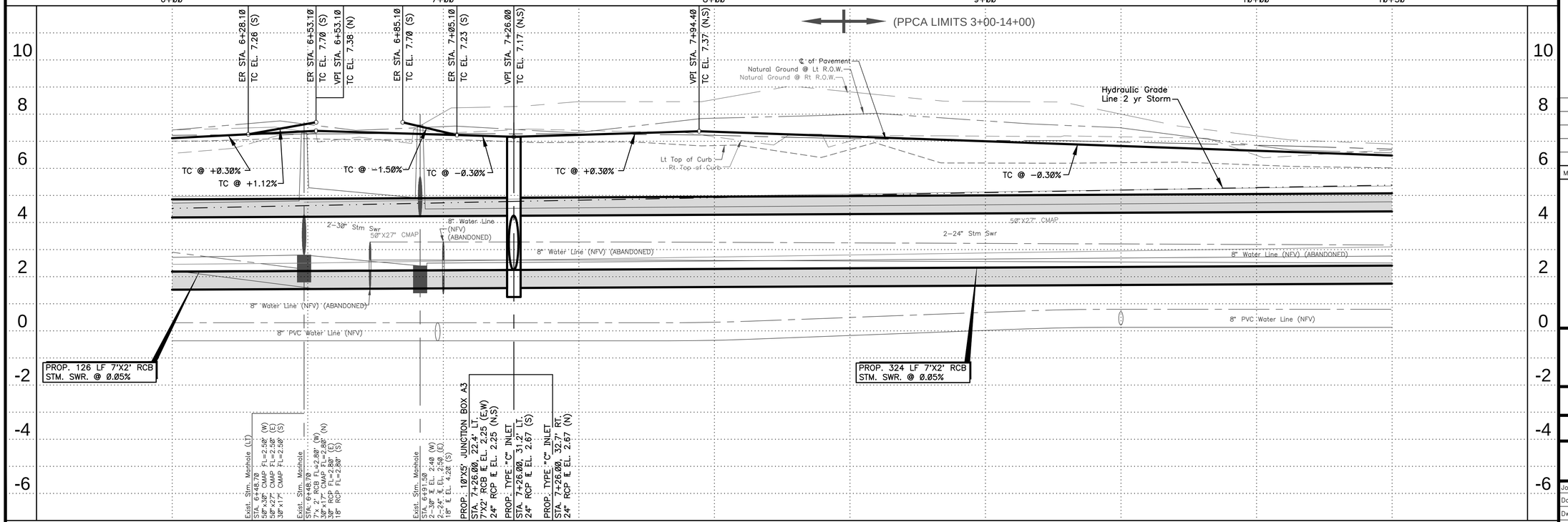
SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

#	STATION	OFFSET
4	PT 6+53.10	31.20' LT.
5	PT 6+28.10	32.70' RT.
6	PT 6+53.10	57.70' RT.
7	PT 6+85.10	57.70' RT.
8	PT 7+05.10	32.70' RT.
9	PT 7+94.40	31.20' LT.
10	PT 7+94.40	32.70' RT.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Texas Ave.
Sta. 6+00 to Sta. 10+50

Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ: 1" = 20'
VERT: 1" = 2'

SHEET 8 OF 52

PROP. 10'X6' JUNCTION BOX A4
STA. 11+30.51, 22.46' LT.
℄ EL.= 2.45 (N,W,E)

12th St. N.
(60' ROW)
(Curb & Gutter w/ Asphalt Pavement)
See Sheet 17

PROP. STM. SWR.

NOTE: CONTRACTOR TO REMOVE ALL TRAFFIC BOXES, CABINETS & SIGNAL POLES AT 12TH STREET INTERSECTION PER BID ITEM

PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 3	13709937.43	3270194.81	6.11	MAG NAIL

(PPCA LIMITS 3+00-14+00)

PROP. 370 LF 5'X2' RCP
STM. SWR. @ 0.05%

REMOVE 53 SY CONCRETE PAVEMENT (FILL & SOD AREA)

PROP. 80 LF 7'X2' RCP
STM. SWR. @ 0.05%

SILVIA'S

TAQUERIA VALLE DE BRAVO

TEXAS AVE GAS STATION

38 SY
15 SY
187 SY
186 SY
12 SY
APPROX. R.O.W.
10'R

Match Line Sta.10+50 See Sheet 8

Match Line Sta.15+00 See Sheet 10

11+00 12+00 13+00 14+00 15+00

N87°37'29"E ~ 4300.00

100' R.O.W.
CONC. CURB & GUTTER W/ ASPHALT OVERLAY

64' B-B

8" PVC Water (NFV)

(ABANDON) 8" CI Water (NFV)

(ABANDON) 8" Water (NFV)

(Pipe A-8+5+3)

(Pipe A-11+00)

(Pipe A-17)

(Pipe A-16)

80 SY
260 SY
14 SY

PLUG. STM. SWR.

PROP. 7'X4' STM. BOX MH
STA. 10+88.00, 42.4' RT.
℄ EL.= 2.79 (E,W)
(CONNECT EXISTING 2-24" STM SWR)

PROP. 39 LF 2-24" RCP
STM. SWR. @ 0.20%

PROP. 7'X7' JUNCTION BOX A5
STA. 11+28.50, 42.1' RT.
℄ EL.= 2.87 (S,W)

12th St. S.
(70' ROW)
(Conc. Pavement)
See Sheet 17

PROP. STM. SWR.

PLUG, ABANDON & GROUT FILL EXISTING 240' LF EACH – 24" RCP STM SWR

CASH'S CAR CLINIC

TAQUERIA LA HACIENDA

EFREN PAINT & BODY SHOP

LOCK SHOP

UNLIMITED MIND TATTOO

1201 1139 1135 1131 1129 1121 1113

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

Texas Ave.

(PPCA LIMITS 3+00-14+00)

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

PROP. CONCRETE DRIVEWAY
PROP. 4" CONCRETE SIDEWALK
PROP. 4" CONCRETE PAVEMENT
PROP. ASPHALT PAVEMENT
PROP. REMOVE PAVEMENT
PROP. LIMITS OF HIGH EARLY CONCRETE

#	STATION	OFFSET
11	PT 11+01.50	31.30' LT.
12	PT 11+21.50	51.30' LT.
13	PT 11+51.50	51.30' LT.
14	PT 11+71.50	31.30' LT.
15	PT 11+00.50	32.60' RT.
16	PT 11+20.50	52.60' RT.
17	PT 11+52.90	52.60' RT.
18	PT 11+72.90	32.60' RT.

10+50 11+00 12+00 13+00 14+00 15+00

(PPCA LIMITS 3+00-14+00)

ER STA. 11+00.53 TC EL. 6.30 (S)
TC EL. 6.30 (S) ER STA. 11+01.51
ER STA. 11+20.53 TC EL. 6.14 (S)
TC EL. 6.14 (S) ER STA. 11+21.51
TC EL. 6.14 (N) ER STA. 11+51.52
ER STA. 11+52.88 TC EL. 6.14 (S)
TC EL. 6.14 (S) ER STA. 11+71.52
TC EL. 6.30 (N) ER STA. 11+72.88
TC EL. 6.30 (S)

Hydraulic Grade Line 2 yr Storm

℄ of Pavement
Natural Ground @ Lt R.O.W.
Natural Ground @ Rt R.O.W.

TC @ -1.00%
TC @ +1.00%
TC @ +0.30%

Lt Top of Curb
Rt Top of Curb

24" Stm Swr
30"X22" CMAP
37"X21" CMAP
22"X13" CMAP Stm Swr
2-24" Stm Swr

8" Water Line (NFV) (ABANDONED)
8" Water Line (NFV) (ABANDONED)
8" Water Line (NFV) (ABANDONED)
8" PVC Water Line (NFV)
8" PVC Water Line (NFV)

PROP. 80 LF 7'X2' RCP
STM. SWR. @ 0.05%

PROP. 39 LF 2-24" RCP
STM. SWR. @ 0.20%

PROP. 7'X4' STM. BOX MH
STA. 10+88.00, 42.4' RT.
2-24" RCP ℄ EL. 2.79 (E)
CONNECT 2-24" RCP TO MANHOLE (W)

Exist. Stm. Manhole
STA. 10+97.40
2-24" ℄ EL. 2.80 (E,W)
30"X17" ℄ EL. 2.80 (SE)

Exist. Type C Inlet (LT)
STA. 11+15.10
30"X17" ℄ EL. 3.50 (N)

Exist. Stm. Manhole (LT)
STA. 11+15.10
50"X27" ℄ EL. 3.20 (W)
50"X27" ℄ EL. 3.20 (E)
30"X17" ℄ EL. 3.50 (S)

Exist. Type C Inlet
STA. 11+15.10
30"X17" ℄ EL. 2.90 (N)
22"X13" ℄ EL. 3.10 (E)

PROP. 7'X7' JUNCTION BOX MH A5
(NOT SHOWN FOR CLARITY)
STA. 11+28.5, 42.1' RT.
2-24" RCP ℄ EL. 2.87 (S,W)

PROP. 10'X6' JUNCTION BOX A4
STA. 11+30.50, 22.4' LT.
7'X2' RCB ℄ EL. 2.45 (W)
5'X2' RCB ℄ EL. 2.45 (E)
4'X2' RCB ℄ EL. 2.45 (N)

Exist. Type BB Inlet
STA. 11+55.50
22"X13" ℄ EL. 3.30 (W)
18" ℄ EL. 3.08 (S)

Exist. Stm. Manhole (LT)
STA. 11+55.50
37"X21" ℄ EL. 3.10 (N)
37"X21" ℄ EL. 3.20 (E)
37"X17" ℄ EL. 3.20 (S)

Exist. Type C Inlet (LT)
STA. 11+15.10
30"X17" ℄ EL. 3.40 (N)
18" ℄ EL. 3.26 (SW)

Exist. Stm. Manhole
STA. 11+61.20
2-24" ℄ EL. 2.90 (E,W)
18" ℄ EL. 3.48 (S)

PROP. 370 LF 5'X2' RCP
STM. SWR. @ 0.05%

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

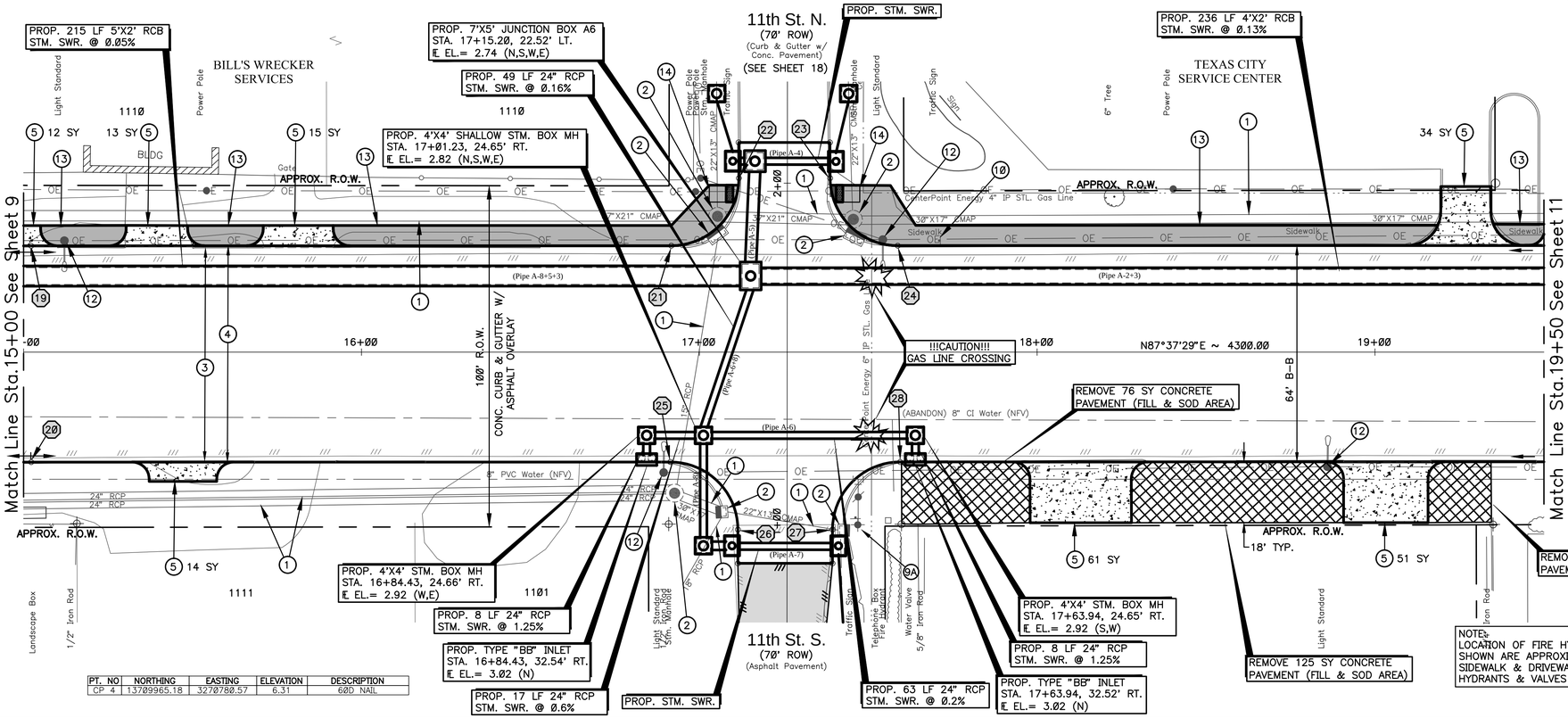
Texas Avenue Reconstruction

Texas Ave.
Sta. 10+50 to Sta. 15+00

Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ: 1" = 20'
VERT: 1" = 2'

SHEET 9 OF 52



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 4	13709965.18	3270780.57	6.31	60D NAIL

0 20 40
SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

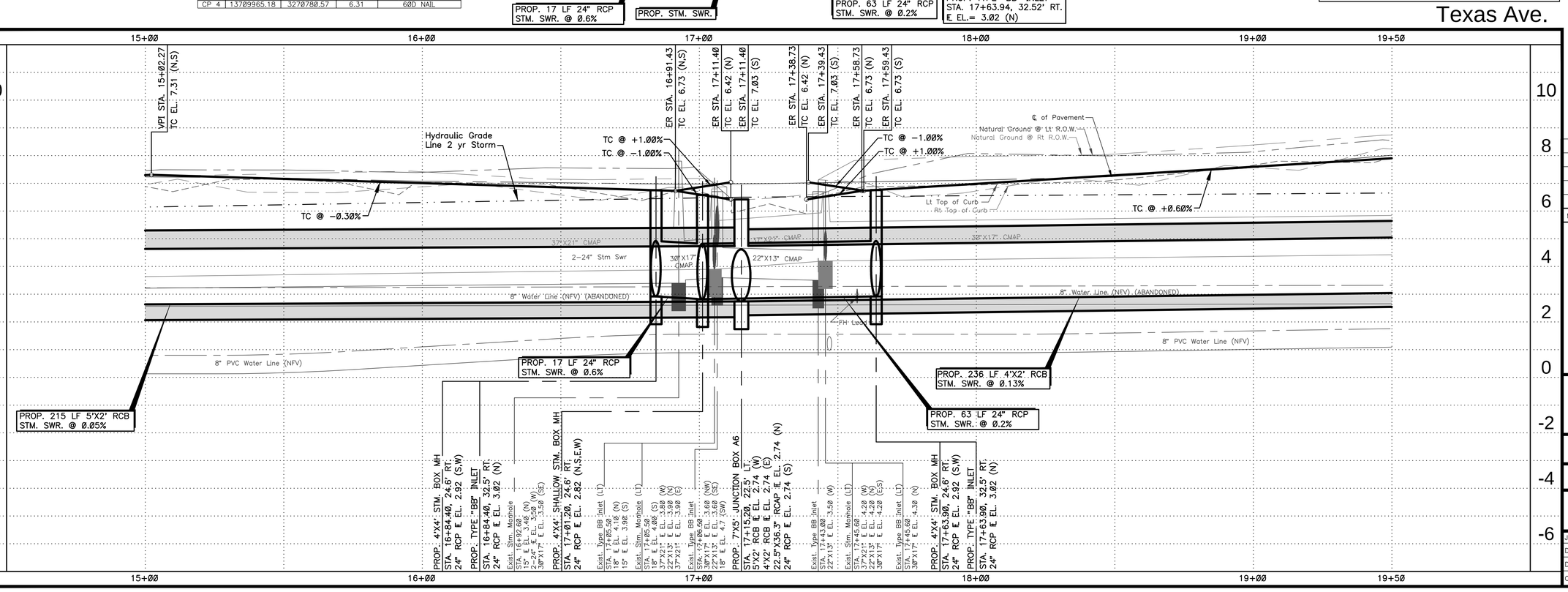
1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

#	STATION	OFFSET
19	PT 15+Ø2.2Ø	31.4Ø' LT.
2Ø	PT 15+Ø2.2Ø	32.5Ø' RT.
21	PT 16+91.7Ø	31.5Ø' LT.
22	PT 17+11.7Ø	51.5Ø' LT.
23	PT 17+38.7Ø	51.5Ø' LT.
24	PT 17+58.7Ø	31.5Ø' LT.
25	PT 16+91.4Ø	32.5Ø' RT.
26	PT 17+11.4Ø	52.5Ø' RT.
27	PT 17+39.4Ø	52.5Ø' RT.
28	PT 17+59.4Ø	32.5Ø' RT.

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

Texas Ave.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

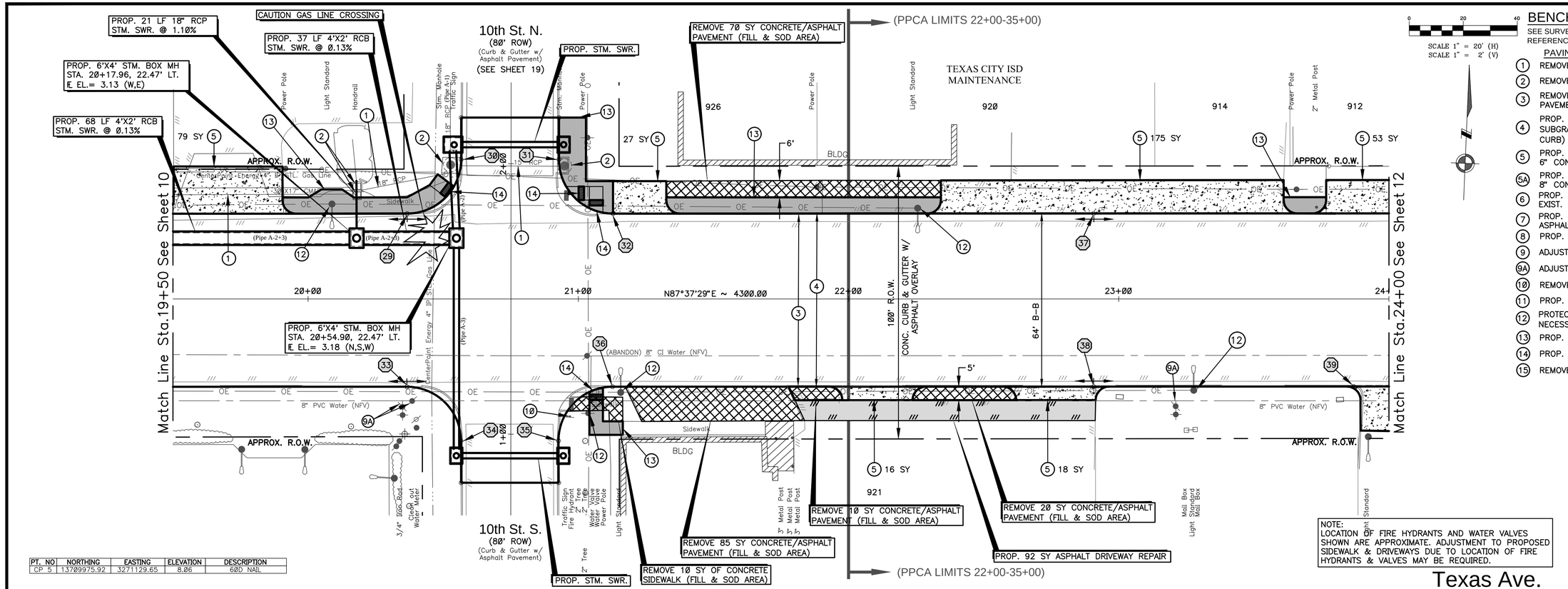
Texas Avenue Reconstruction

Texas Ave.
Sta. 15+00 to Sta. 19+50

Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ: 1" = 20'
VERT: 1" = 2'

SHEET 10 OF 52



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 5	13709975.92	3271129.65	8.Ø6	6ØD NAIL

BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

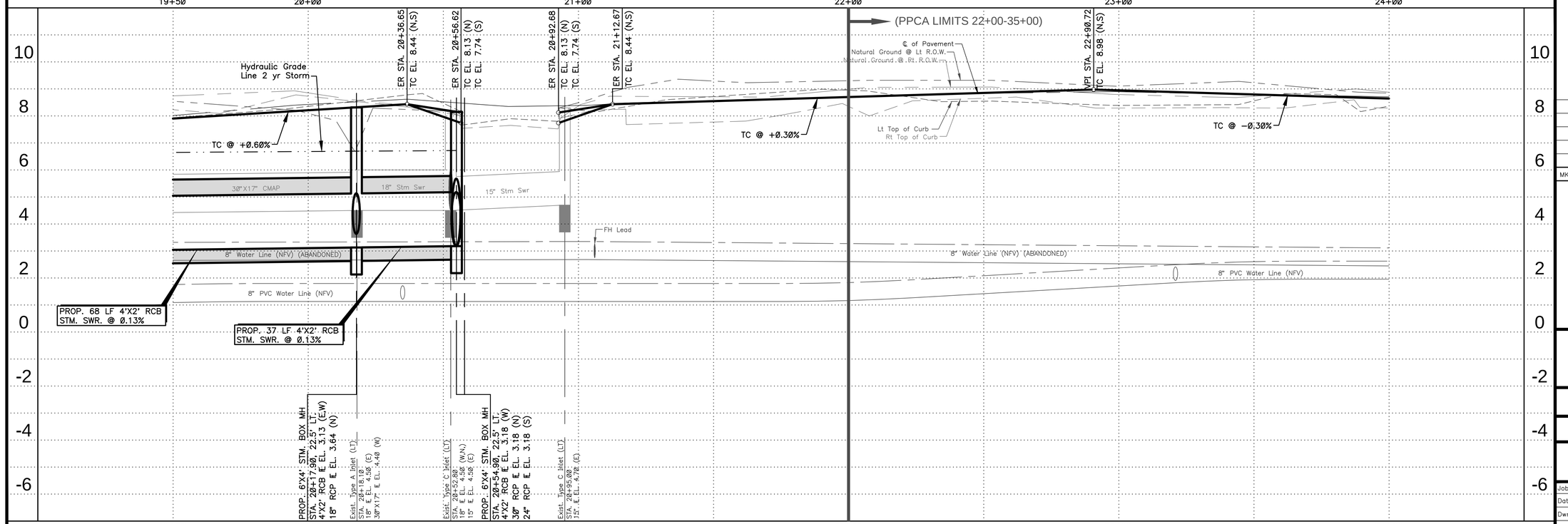
PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
1Ø. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

#	STATION	OFFSET
29	PT 2Ø+36.6Ø	31.5Ø' LT.
3Ø	PT 2Ø+56.6Ø	51.5Ø' LT.
31	PT 2Ø+92.8Ø	51.5Ø' LT.
32	PT 21+12.8Ø	31.5Ø' LT.
33	PT 2Ø+36.6Ø	32.4Ø' RT.
34	PT 2Ø+56.6Ø	52.4Ø' RT.
35	PT 2Ø+92.6Ø	52.4Ø' RT.
36	PT 21+12.6Ø	32.4Ø' RT.
37	PT 22+9Ø.7Ø	31.5Ø' LT.
38	PT 22+9Ø.7Ø	32.4Ø' RT.
39	PT 23+86.9Ø	32.4Ø' RT.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

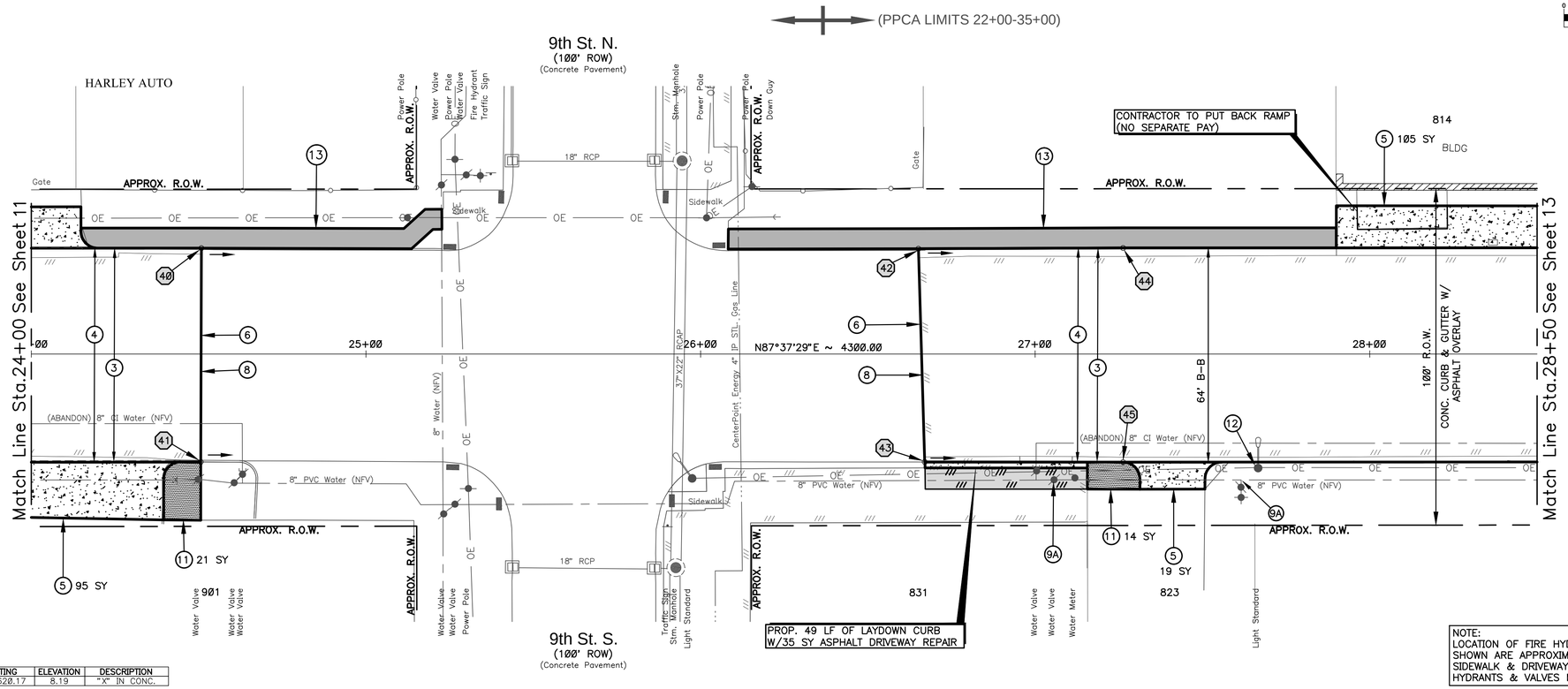
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Texas Ave.
Sta. 19+50 to Sta. 24+00

Job No.: 18-015	Scale: HORZ: 1" = 20' VERT: 1" = 2'	SHEET 11 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 6	13709999.22	3271620.17	8.19	"X" IN CONC.

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

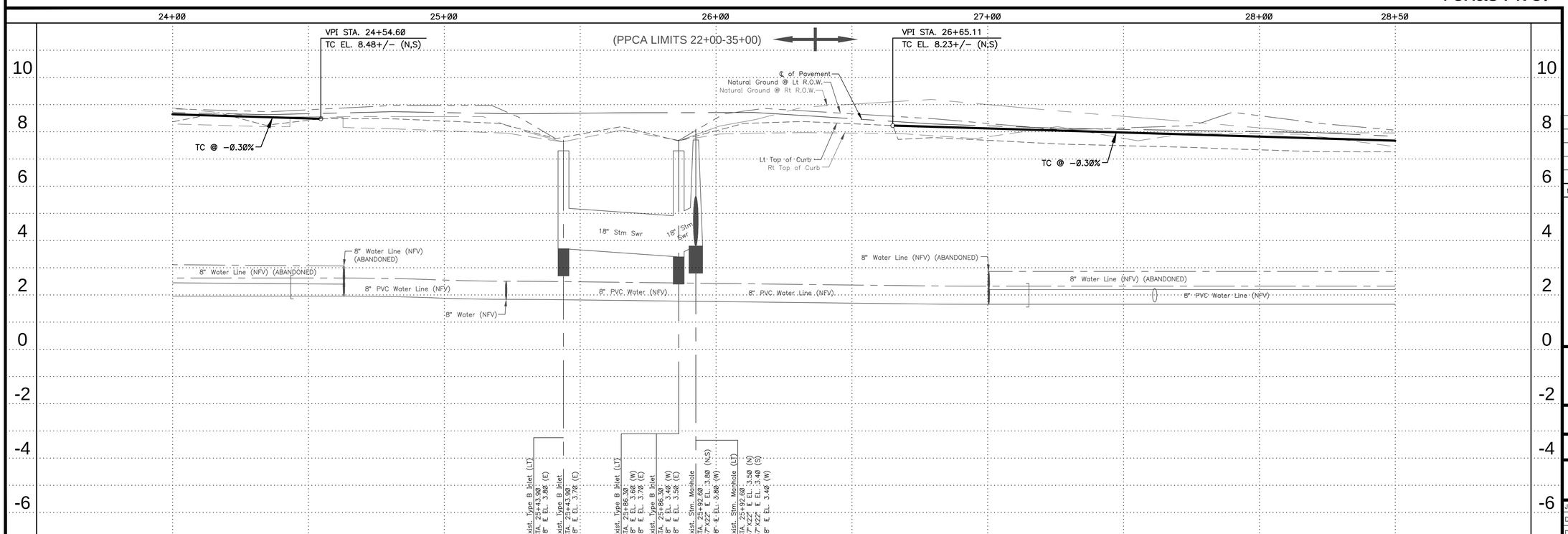
1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

#	STATION	OFFSET
40	PT 24+50.80	31.60' LT.
41	PT 24+50.60	32.20' RT.
42	PT 26+65.10	31.40' LT.
43	PT 26+67.00	32.20' RT.
44	PT 27+26.20	31.60' LT.
45	PT 27+26.20	32.30' RT.

Texas Ave.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

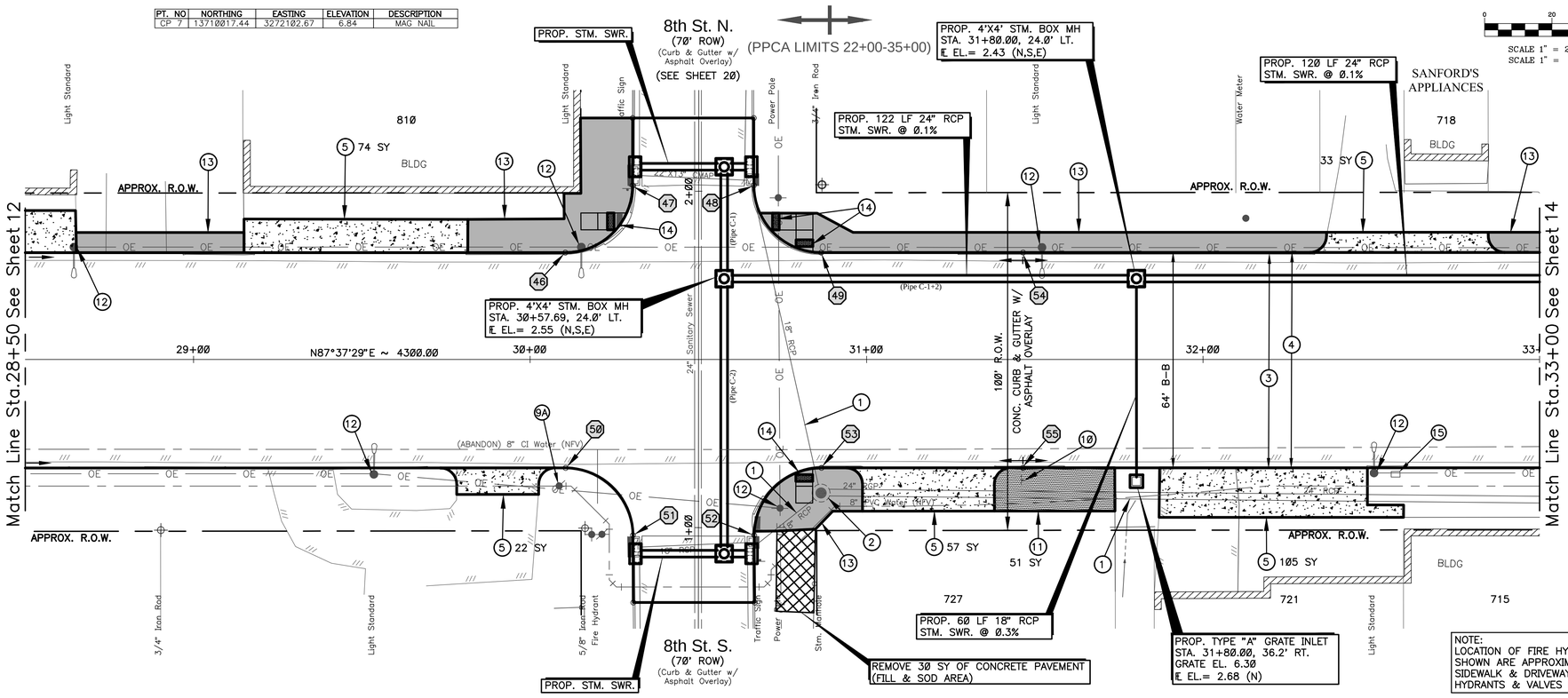
Galveston County.Texas

Texas Avenue Reconstrution

Texas Ave.
Sta. 24+00 to Sta. 28+50

Job No.: 18-015	Scale: HORZ: 1" = 20' VERT: 1" = 2'	SHEET 12 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 7	13710017.44	3272102.67	6.84	MAG NAIL



SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

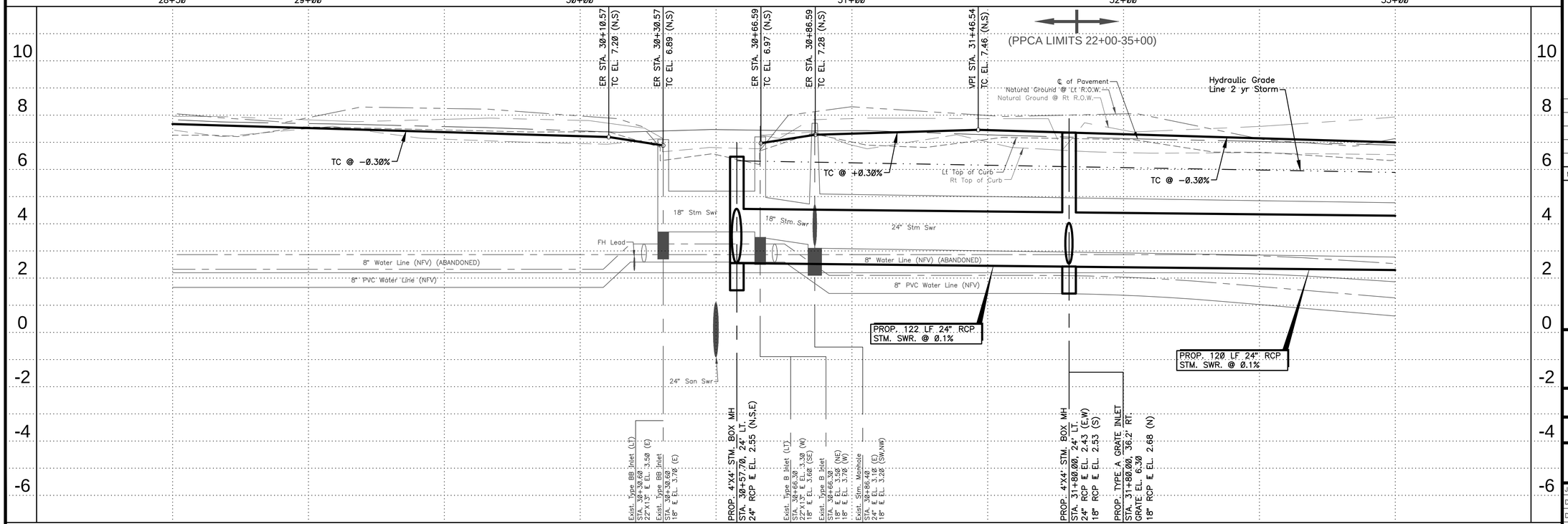
SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

#	STATION	OFFSET
46	PT 30+10.50	31.70' LT.
47	PT 30+30.50	51.70' LT.
48	PT 30+66.50	51.70' LT.
49	PT 30+86.50	31.70' LT.
50	PT 30+10.50	32.20' RT.
51	PT 30+30.50	52.20' RT.
52	PT 30+66.60	53.20' RT.
53	PT 30+86.60	32.20' RT.
54	PT 31+46.50	31.70' LT.
55	PT 31+46.50	32.20' RT.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Texas Ave.
Sta. 28+50 to Sta. 33+00

Job No.: 18-015	Scale: HORZ: 1" = 20' VERT: 1" = 2'	SHEET 13 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 8	13710039.84	3272576.37	6.09	MAG NAIL

PROP. 6'X6' SHALLOW STM. BOX MH
STA. 35+45.11, 24.07' LT.
℄ EL.= 1.63 (N,S)

PROP. 245 LF 24" RCP
STM. SWR. @ 0.1%

(PPCA LIMITS 22+00-35+00)

7th St. N.
(70' ROW)
(Curb & Gutter w/ Conc. Pavement)
(SEE SHEET 21)

PROP. STM. SWR.

PROP. 46 LF 18"X28.5"
RCAP STM. SWR. @ 0.09%

PROP. TYPE "BB" INLET
STA. 35+91.28, 31.86' LT.
℄ EL.= 2.21 (S)

PROP. 8 LF 18"X28.5"
RCAP STM. SWR. @ 1.25%

PROP. 4'X4' STM. BOX MH
STA. 35+91.28, 24.07' T.
℄ EL.= 2.11 (W,N,S)

PROP. 56 LF 18"X28.5"
RCAP STM. SWR. @ 0.2%

CASTILLO'S RECYCLING

710 BLDG

702 BLDG

622 BLDG

616

Match Line Sta.33+00 See Sheet 13

Match Line Sta.37+50 See Sheet 15

APPROX. R.O.W.

100' R.O.W.

(CONC. CURB & GUTTER W/ ASPHALT OVERLAY)

ATT Buried Cables (NFV)

(ABANDON) 8" CI Water (NFV)

8" PVC Water (NFV)

64' B-B

N87°37'29"E ~ 4300.00

34+00 35+00 36+00 37+00

2+00 1+00

18" CMP

24" RCP

18" RCP

44"X25" CMP

32"X19" CMP

(Pipe C-1+2) (Pipe C-3) (Pipe C-4+2) (Pipe C-5) (Pipe C-6) (Pipe C-7)

11 SY 12 SY 13 SY 90 SY 58 SY 21 SY

9'± TYP

705 701

Sidewalk Gate Light Standard Mail Box Traffic Box Traffic Sign Power Pole Stm. Manhole Fire Hydrant Water Valve Sewer Manhole

REMOVE 19 SY OF ASPHALT PAVEMENT (FILL & SOD AREA)

PROP. 75 SY OF ASPHALT DRIVEWAY REPAIR

REMOVE 19 SY OF ASPHALT PAVEMENT (FILL & SOD AREA)

PROP. PLUG STM SWR.

REMOVE 73 SY OF CONCRETE PAVEMENT (FILL & SOD AREA)

PROP. PLUG STM SWR.

PLUG, ABANDON & GROUT FILL EXISTING 115' – 24" RCP STM SWR

7th St. S.
(70' ROW)
(Curb & Gutter w/ Asphalt Overlay)

PROP. STM. SWR.

REMOVE 30 SY OF CONCRETE PAVEMENT (FILL & SOD AREA)

PROP. TYPE "BB" INLET
STA. 35+91.29, 32.14' RT.
℄ EL.= 2.21 (N)

PROP. STM. SWR.

(PPCA LIMITS 22+00-35+00)

Texas Ave.

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

PROP. CONCRETE DRIVEWAY
PROP. 4" CONCRETE SIDEWALK
PROP. 4" CONCRETE PAVEMENT
PROP. ASPHALT PAVEMENT
PROP. REMOVE PAVEMENT
PROP. LIMITS OF HIGH EARLY CONCRETE

#	STATION	OFFSET
56	PT 34+81.90	31.80' LT.
57	PT 35+01.90	51.80' LT.
58	PT 35+38.00	51.80' LT.
59	PT 35+58.00	31.80' LT.
60	PT 34+82.40	32.10' RT.
61	PT 35+02.40	52.10' RT.
62	PT 35+38.10	52.10' RT.
63	PT 35+58.10	32.10' RT.

(PPCA LIMITS 22+00-35+00)

Hydraulic Grade Line 2 yr Storm

TC @ -0.30%
TC @ -1.00%
TC @ -1.50%
TC @ -0.30%
TC @ +0.30%

℄ of Pavement
Natural Ground @ Lt R.O.W.
Natural Ground @ Rt R.O.W.
Lt Top of Curb
Rt Top of Curb

ER STA. 34+82.44 TC EL. 6.45 (N,S)
ER STA. 35+02.44 TC EL. 6.26 (N) TC EL. 6.14 (S)
ER STA. 35+38.11 TC EL. 6.26 (N) TC EL. 6.41 (S)
ER STA. 35+58.11 TC EL. 5.95 (N,S)
VPI STA. 35+91.00 TC EL. 5.78 (N,S)

24" Stm Swr 18" Stm Swr 18" Stm Swr 18" Stm Swr

8" Water Line (NFV) (ABANDONED)
8" PVC Water Line (NFV)
FH Lead

PROP. 245 LF 24" RCP
STM. SWR. @ 0.1%

PROP. 46 LF 18"X28.5"
RCAP STM. SWR. @ 0.09%

Exist. Type B Inlet (LT)
STA. 34+79.80
18" ℄ EL. 3.58 (E)

Exist. Type BB Inlet
STA. 35+02.50
18" ℄ EL. 3.96 (E)

Exist. Type B Inlet
STA. 35+38.00
32"x19" ℄ EL. 2.80 (SE)
18" ℄ EL. 3.0 (W)

PROP. 6'X6' SHALLOW STM. BOX MH
STA. 35+45.10, 24" LT.
31.3"X51.1" RCAP ℄ EL. 1.63 (N,S)
24" RCP ℄ EL. 2.04 (W)
18"X28.5" RCAP ℄ EL. 2.04 (E)

Exist. Stm. Manhole
STA. 35+45.00
44"X25" E EL. 2.40 (N)
51"X38" E EL. 2.30 (S)
24" ℄ EL. 2.26 (W)

Exist. Stm. Manhole (LT)
STA. 35+45.00
44"X25" E EL. 2.30 (N)
44"X25" E EL. 2.10 (S)
18" ℄ EL. 2.76 (W,SE)

Exist. Type B Inlet (LT)
STA. 35+68.10
18" ℄ EL. 3.10 (NW)

PROP. 4'X4' STM. BOX MH
STA. 35+91.20, 24" LT.
18"X28.5" RCAP ℄ EL. 2.11 (W,N,S)

PROP. TYPE "BB" INLET
STA. 35+91.20, 31.8' LT.
18"X28.5" RCAP ℄ EL. 2.21 (S)

PROP. TYPE "BB" INLET
STA. 35+91.20, 32' RT.
18"X28.5" RCAP ℄ EL. 2.21 (N)

33+00 34+00 35+00 36+00 37+00 37+50

10 8 6 4 2 0 -2 -4 -6

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

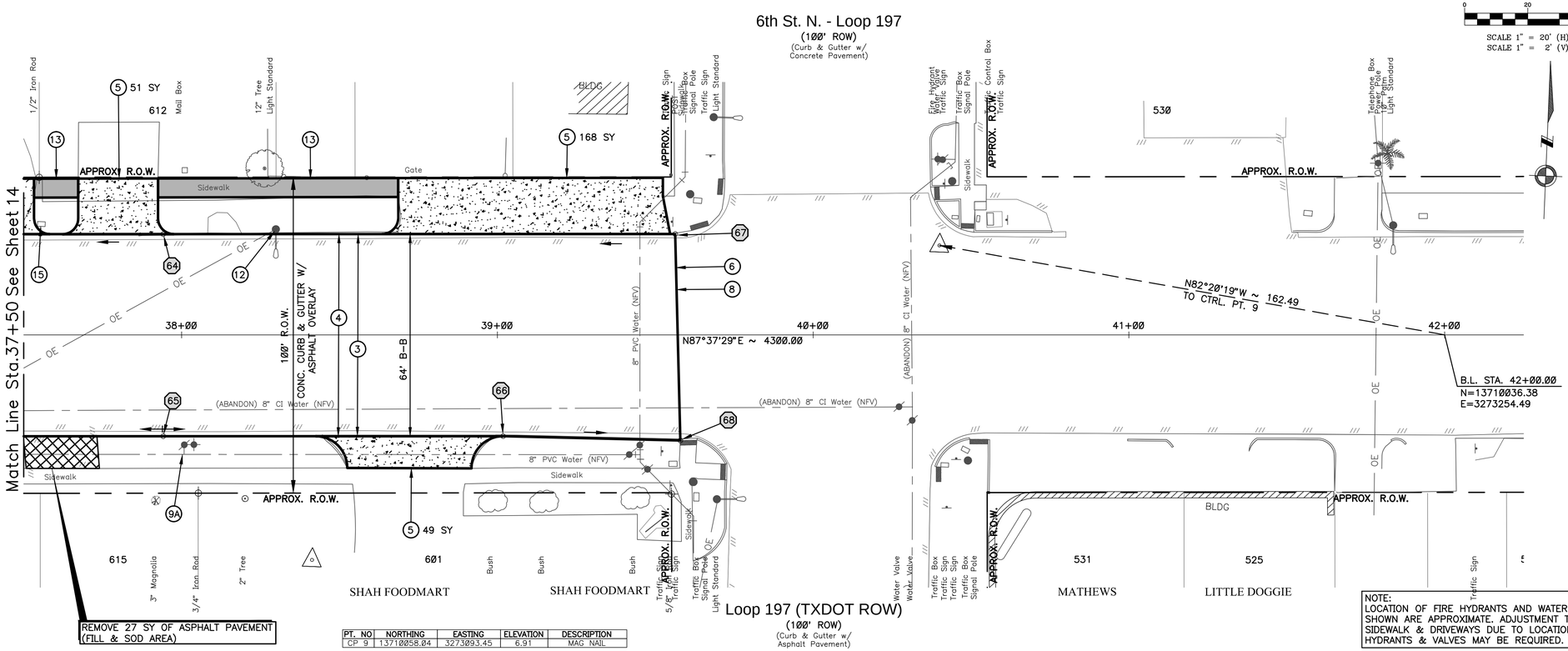
Texas Avenue Reconstrution

Texas Ave.
Sta. 33+00 to Sta. 37+50

Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ: 1" = 20'
VERT: 1" = 2'

SHEET 14 OF 52



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 9	13710058.04	3273093.45	6.91	MAG NAIL

BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

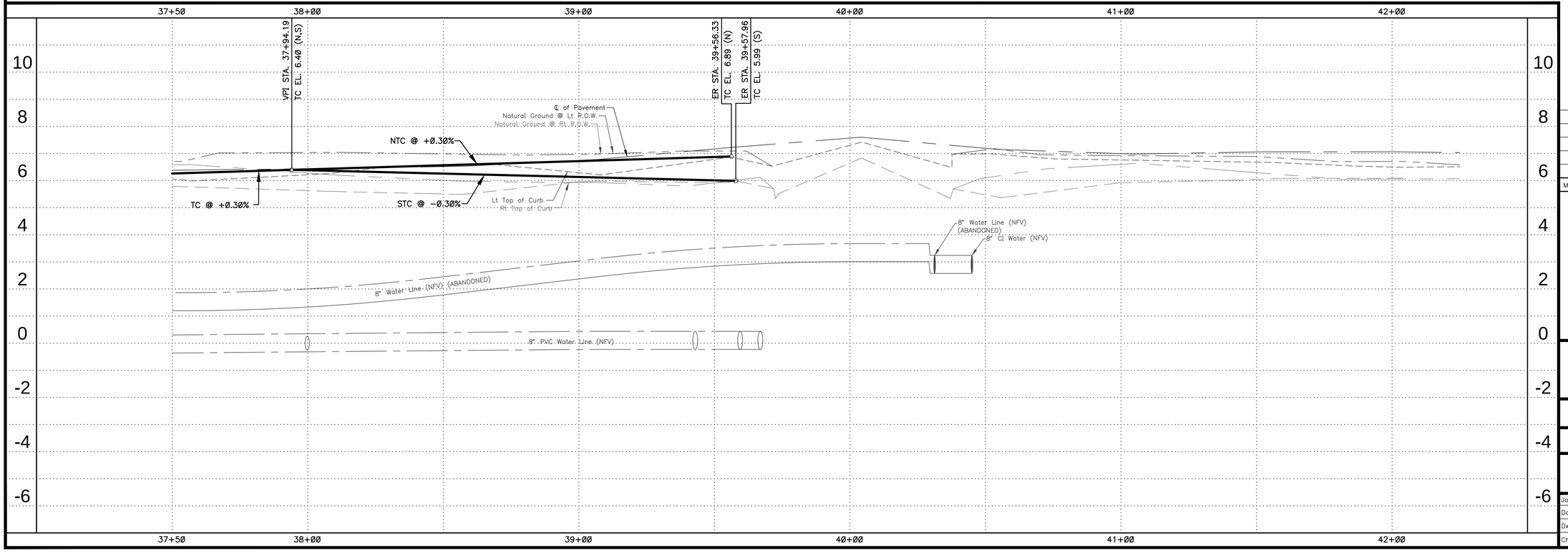
PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

#	STATION	OFFSET
64	PT 37+94.20	31.80' LT.
65	PT 37+94.20	32.00' RT.
66	PT 39+01.80	32.00' RT.
67	PT 39+56.30	31.90' LT.
68	PT 39+57.90	33.40' RT.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9–13–19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

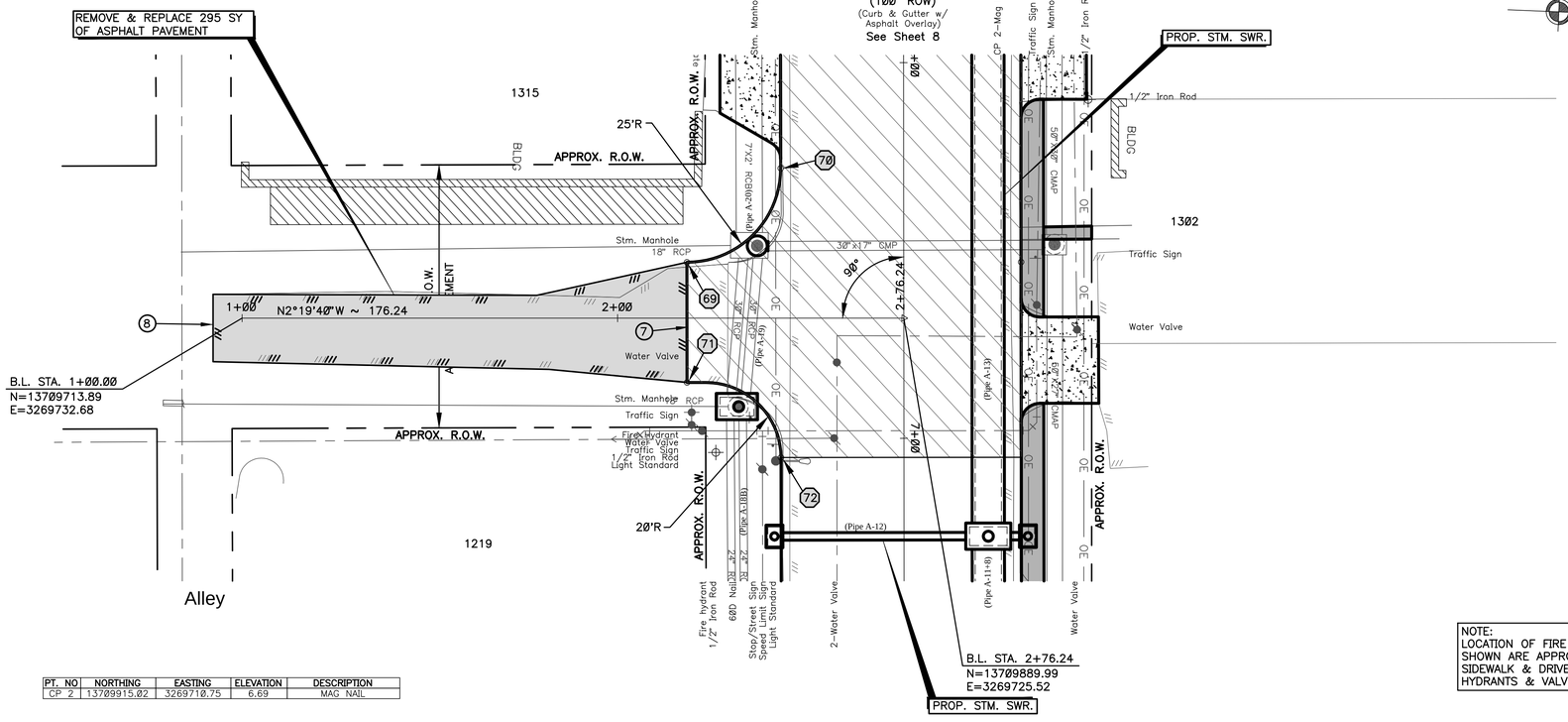
Texas Avenue Reconstrution

Texas Ave.
Sta. 37+50 to End

Job No.: 18–015	Scale: HORZ: 1" = 20' VERT: 1" = 2'	SHEET 15 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

(PPCS LIMITS 3+00-14+00)

FM 1765 - Texas Ave.
(100' ROW)
(Curb & Gutter w/ Asphalt Overlay)
See Sheet 8



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 2	13709915.02	3269710.75	6.69	MAG NAIL

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

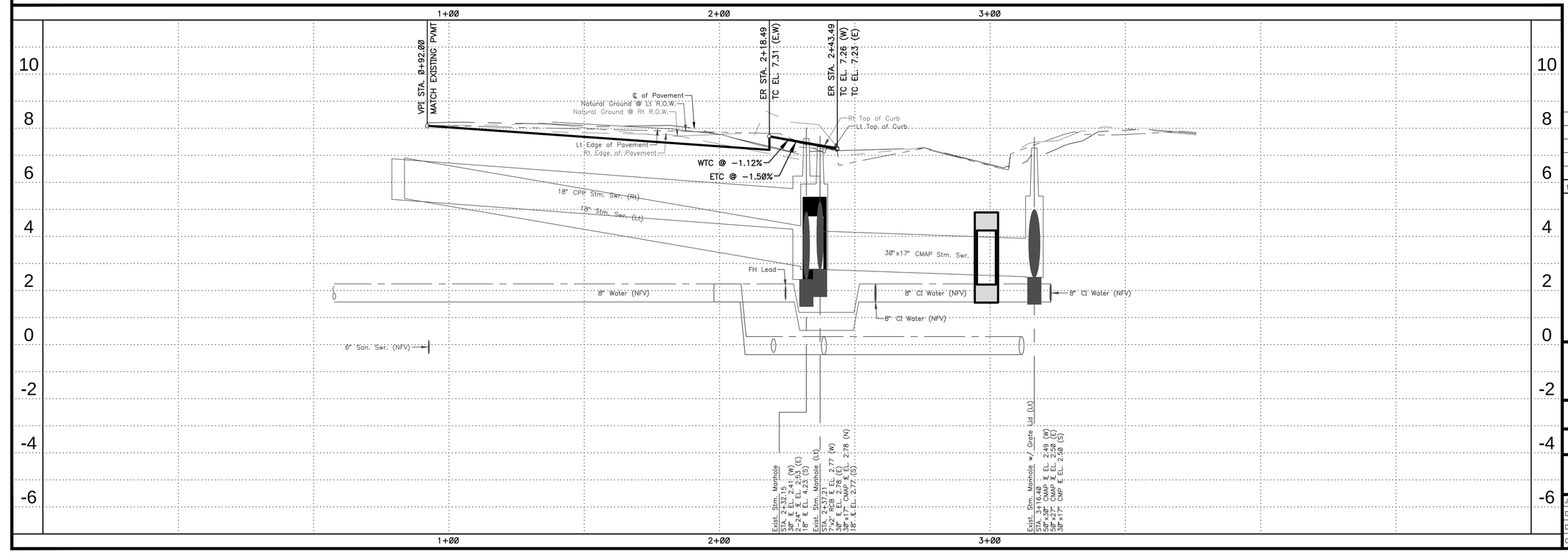
1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

13th St. S.

#	STATION	OFFSET
69	PT 2+18.50	14.80' LT.
70	PT 2+43.50	39.80' LT.
71	PT 2+18.50	17.10' RT.
72	PT 2+43.50	37.10' RT.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

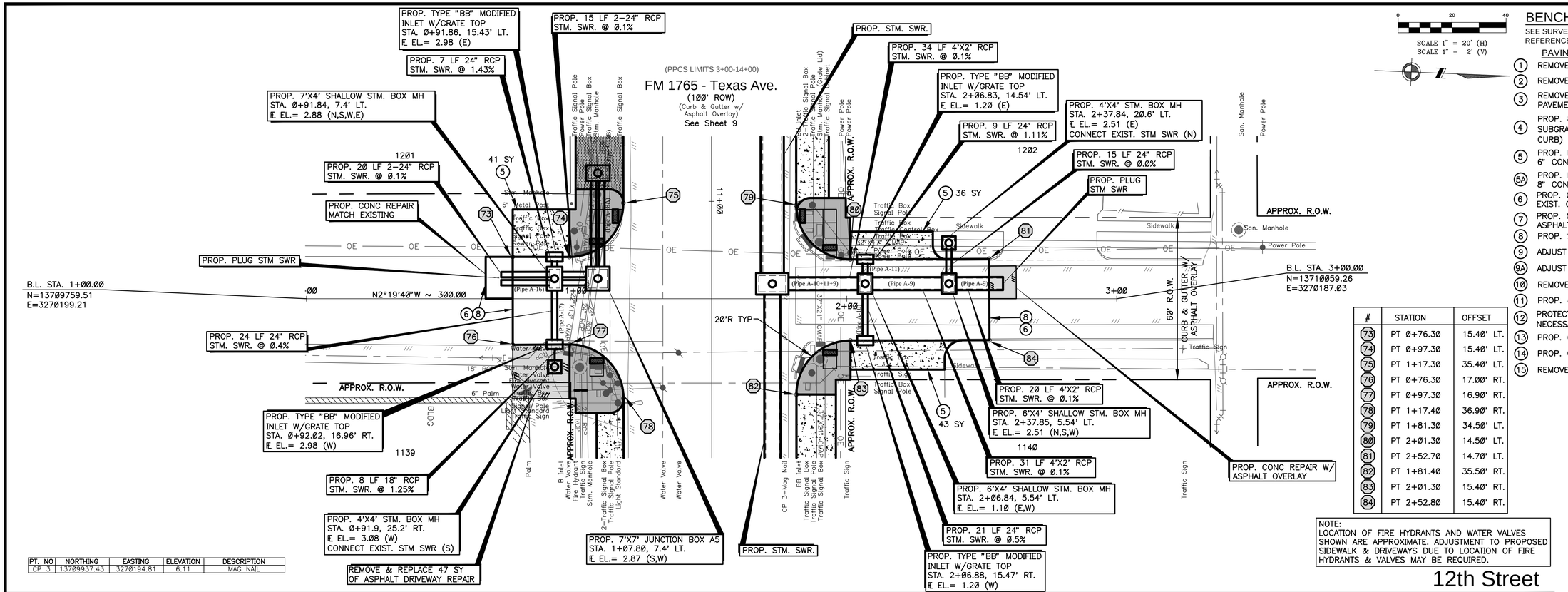
Texas Avenue Reconstrution

13th Street S.
Sta. 1+00 to End

Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ: 1" = 20'
VERT: 1" = 2'

SHEET 16 OF 52



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 3	13709937.43	3270194.81	6.11	MAG NAIL

#	STATION	OFFSET
73	PT Ø+76.3Ø	15.40' LT.
74	PT Ø+97.3Ø	15.40' LT.
75	PT 1+17.3Ø	35.40' LT.
76	PT Ø+76.3Ø	17.00' RT.
77	PT Ø+97.3Ø	16.90' RT.
78	PT 1+17.4Ø	36.90' RT.
79	PT 1+81.3Ø	34.50' LT.
80	PT 2+Ø1.3Ø	14.50' LT.
81	PT 2+52.7Ø	14.70' LT.
82	PT 1+81.4Ø	35.50' RT.
83	PT 2+Ø1.3Ø	15.40' RT.
84	PT 2+52.8Ø	15.40' RT.

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

12th Street

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

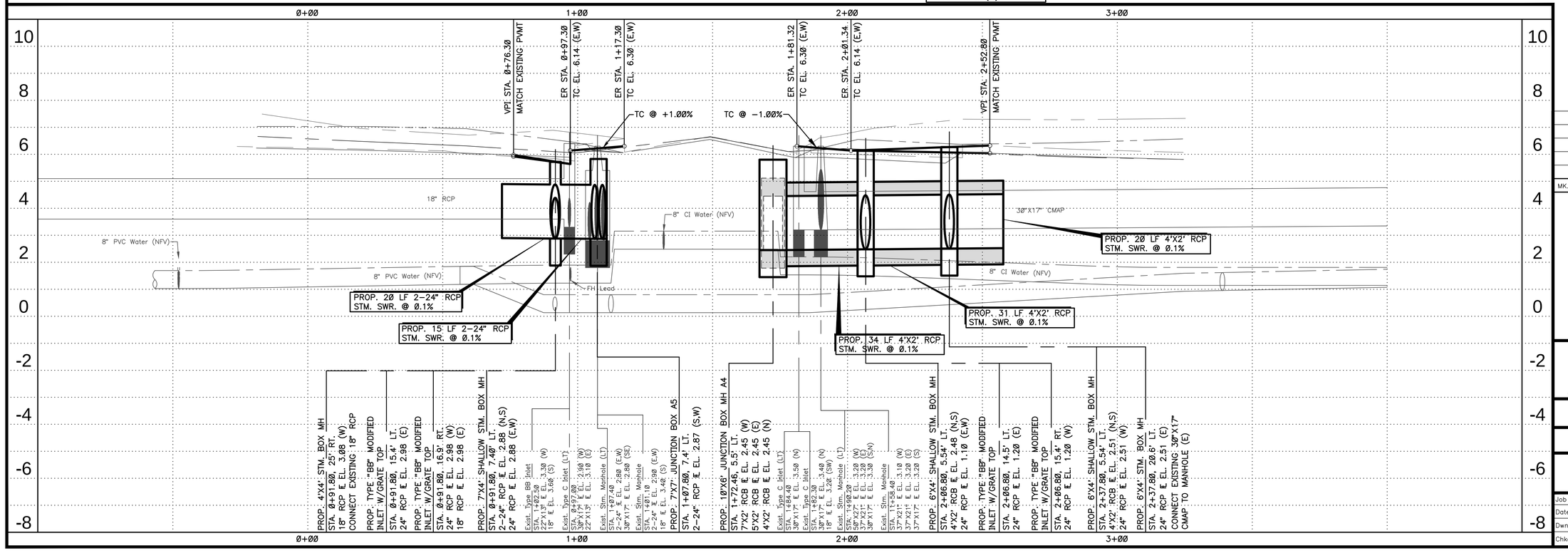
BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

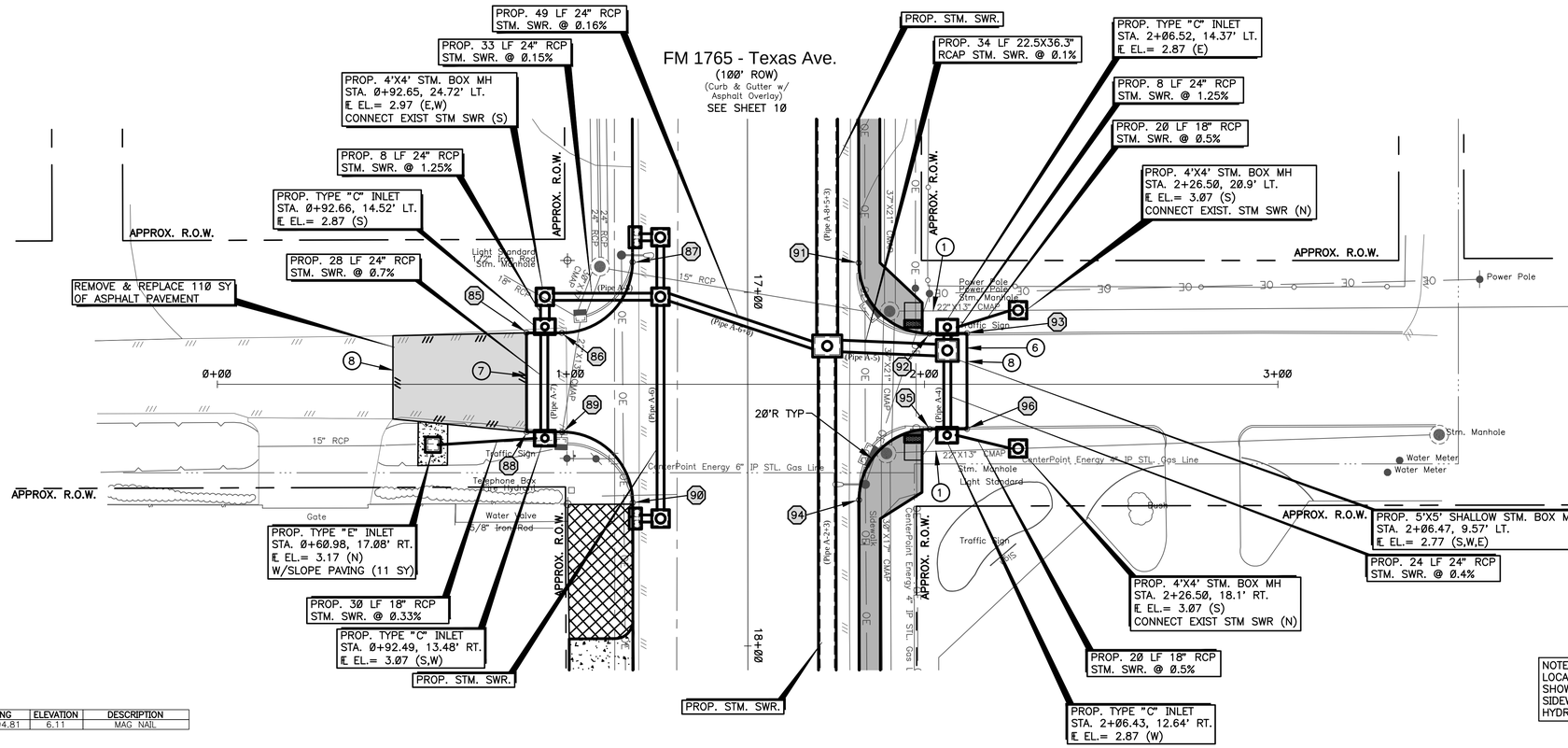
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstruction

12th Street
Sta. 0+00 to End

Job No.: 18-015	Scale: HORZ: 1" = 20' VERT: 1" = 2'	SHEET 17 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 3	13709937.43	3270194.81	6.11	MAG NAIL

#	STATION	OFFSET
85	PT 0+87.40	14.50' LT.
86	PT 0+97.40	14.50' LT.
87	PT 1+17.40	34.50' LT.
88	PT 0+87.40	13.50' RT.
89	PT 0+97.50	13.50' RT.
90	PT 1+17.50	33.40' RT.
91	PT 1+81.40	34.30' LT.
92	PT 2+01.40	14.30' LT.
93	PT 2+12.00	14.40' LT.
94	PT 1+81.50	32.70' RT.
95	PT 2+01.50	12.70' RT.
96	PT 2+12.00	12.60' RT.

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

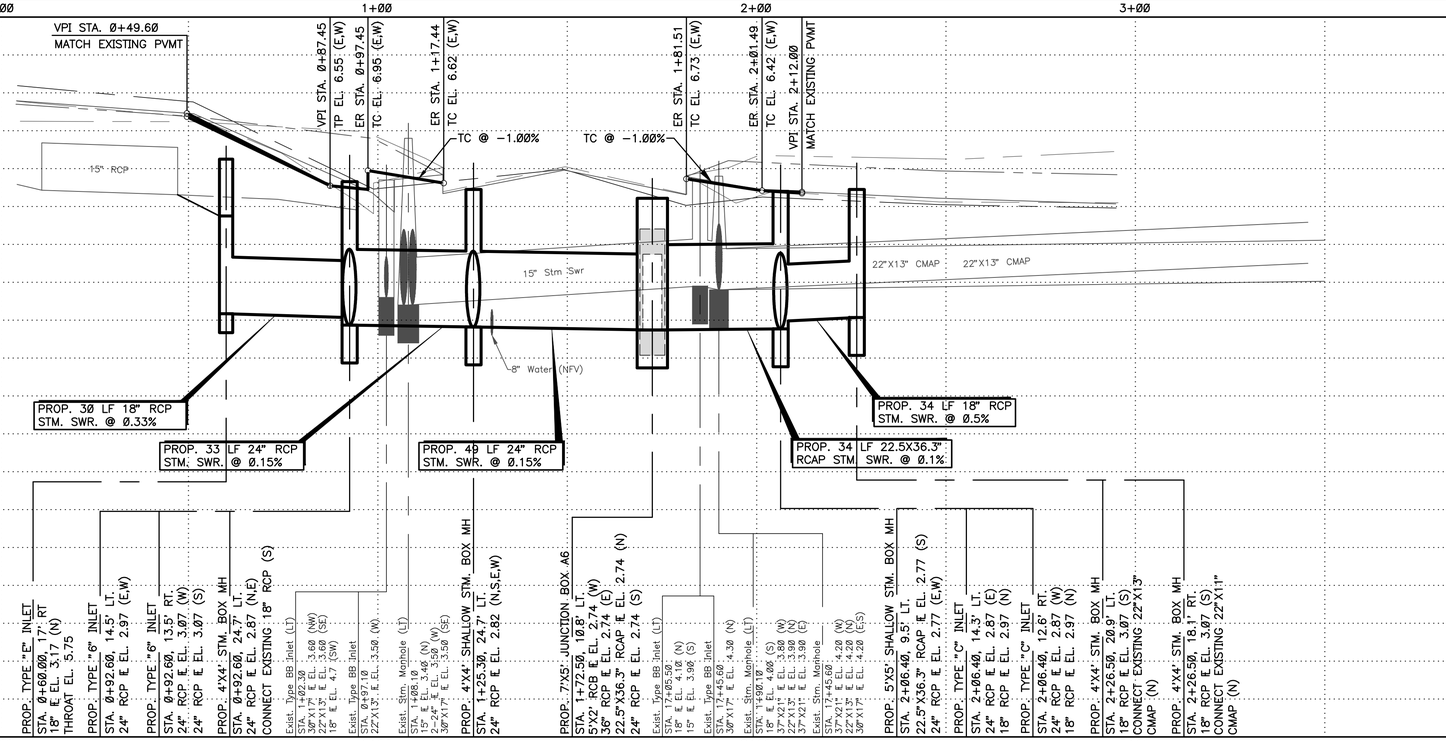
BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

PROP. CONCRETE DRIVEWAY
PROP. 4" CONCRETE SIDEWALK
PROP. 4" CONCRETE PAVEMENT
PROP. ASPHALT PAVEMENT
PROP. REMOVE PAVEMENT
PROP. LIMITS OF HIGH EARLY CONCRETE



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

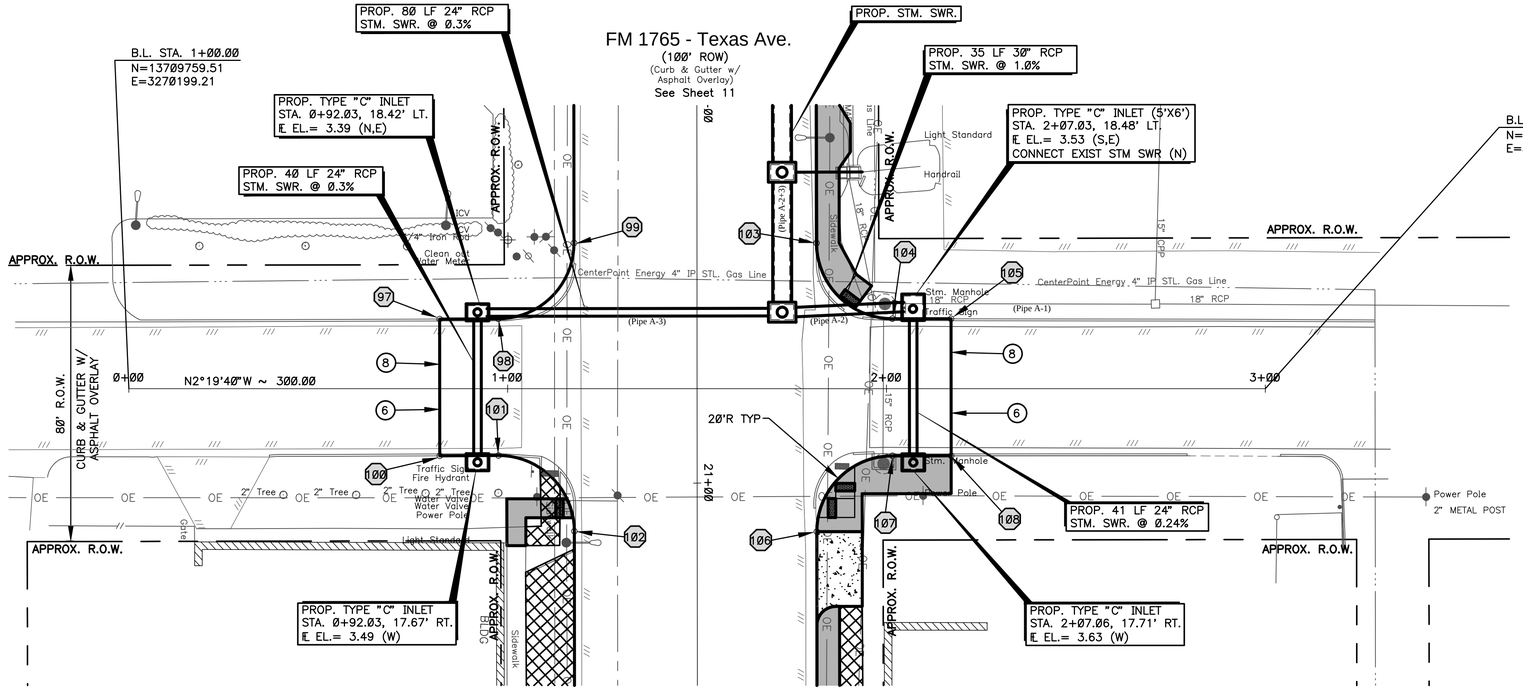
Texas Avenue Reconstrution

11th Street
Sta. 0+00 to End

Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ: 1" = 20'
VERT: 1" = 2'

SHEET 18 OF 52



#	STATION	OFFSET
97	PT 0+82.00	18.40' LT.
98	PT 0+97.50	18.40' LT.
99	PT 1+17.50	38.40' LT.
100	PT 0+82.00	17.70' RT.
101	PT 0+97.50	17.60' RT.
102	PT 1+17.50	37.60' RT.
103	PT 1+81.50	38.50' LT.
104	PT 2+01.50	18.50' LT.
105	PT 2+17.00	18.40' LT.
106	PT 1+81.60	37.70' RT.
107	PT 2+01.50	17.70' RT.
108	PT 2+17.00	17.70' RT.

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 3	13709937.43	3270194.81	6.11	MAG NAIL

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

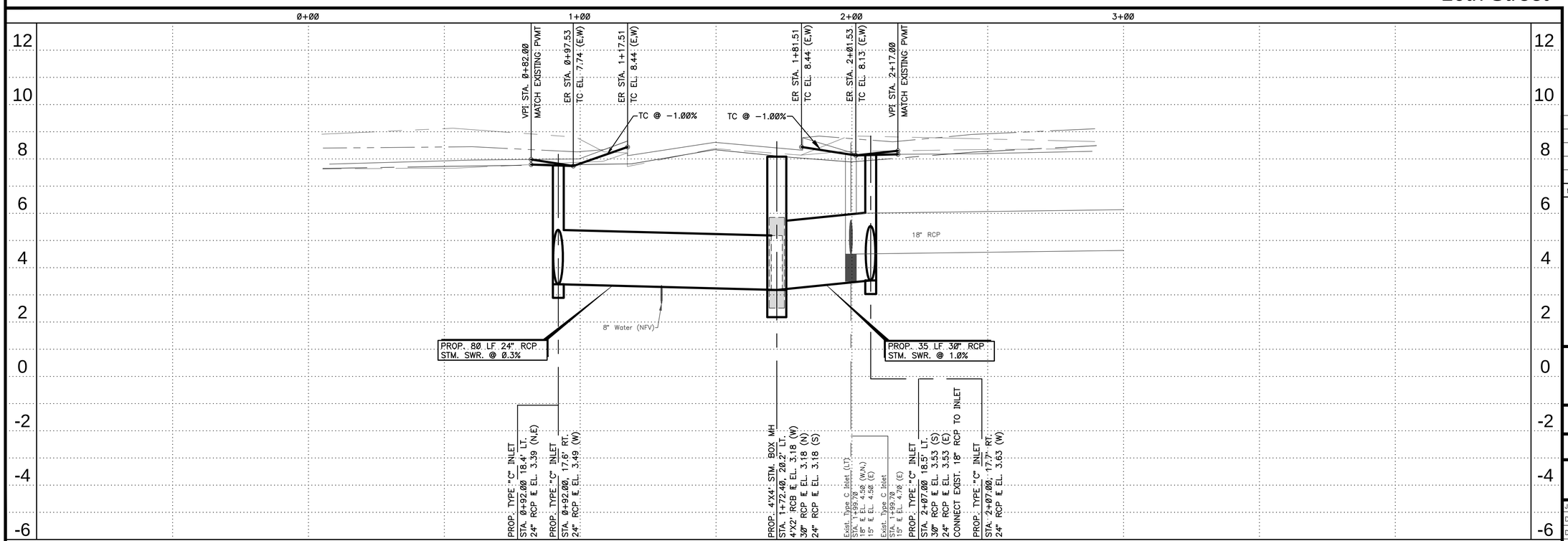
SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

10th Street



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

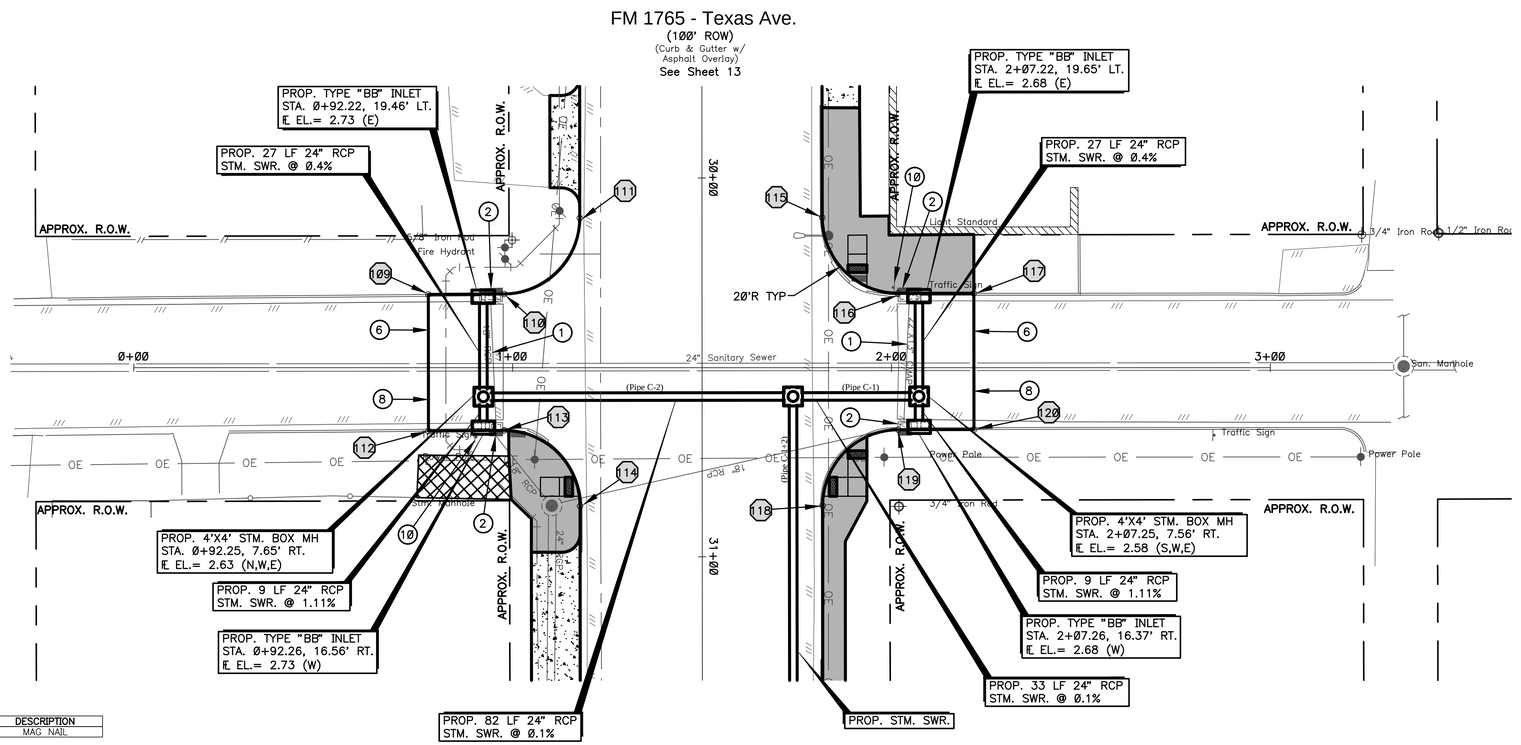
Texas Avenue Reconstrution

10th Street
Sta. 0+00 to End

Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ: 1" = 20'
VERT: 1" = 2'

SHEET 19 OF 52



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 3	13709937.43	3270194.81	6.11	MAG NAIL

SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

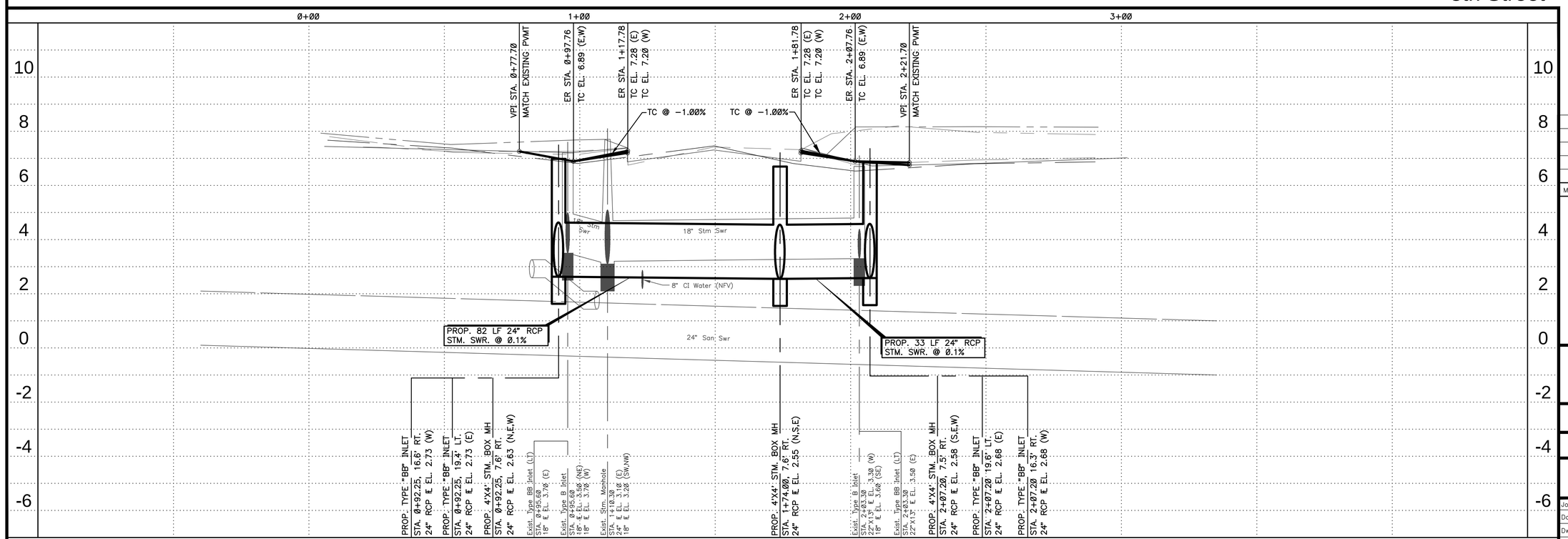
1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

#	STATION	OFFSET
109	PT Ø+77.7Ø	19.3Ø' LT.
110	PT Ø+97.7Ø	19.5Ø' LT.
111	PT 1+17.7Ø	39.5Ø' LT.
112	PT Ø+77.7Ø	16.7Ø' RT.
113	PT Ø+97.7Ø	16.5Ø' RT.
114	PT 1+17.8Ø	36.5Ø' RT.
115	PT 1+81.7Ø	39.6Ø' LT.
116	PT 2+Ø1.7Ø	19.6Ø' LT.
117	PT 2+21.7Ø	19.6Ø' LT.
118	PT 1+81.8Ø	36.4Ø' RT.
119	PT 2+Ø1.7Ø	16.4Ø' RT.
120	PT 2+21.7Ø	16.3Ø' RT.

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

8th Street



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

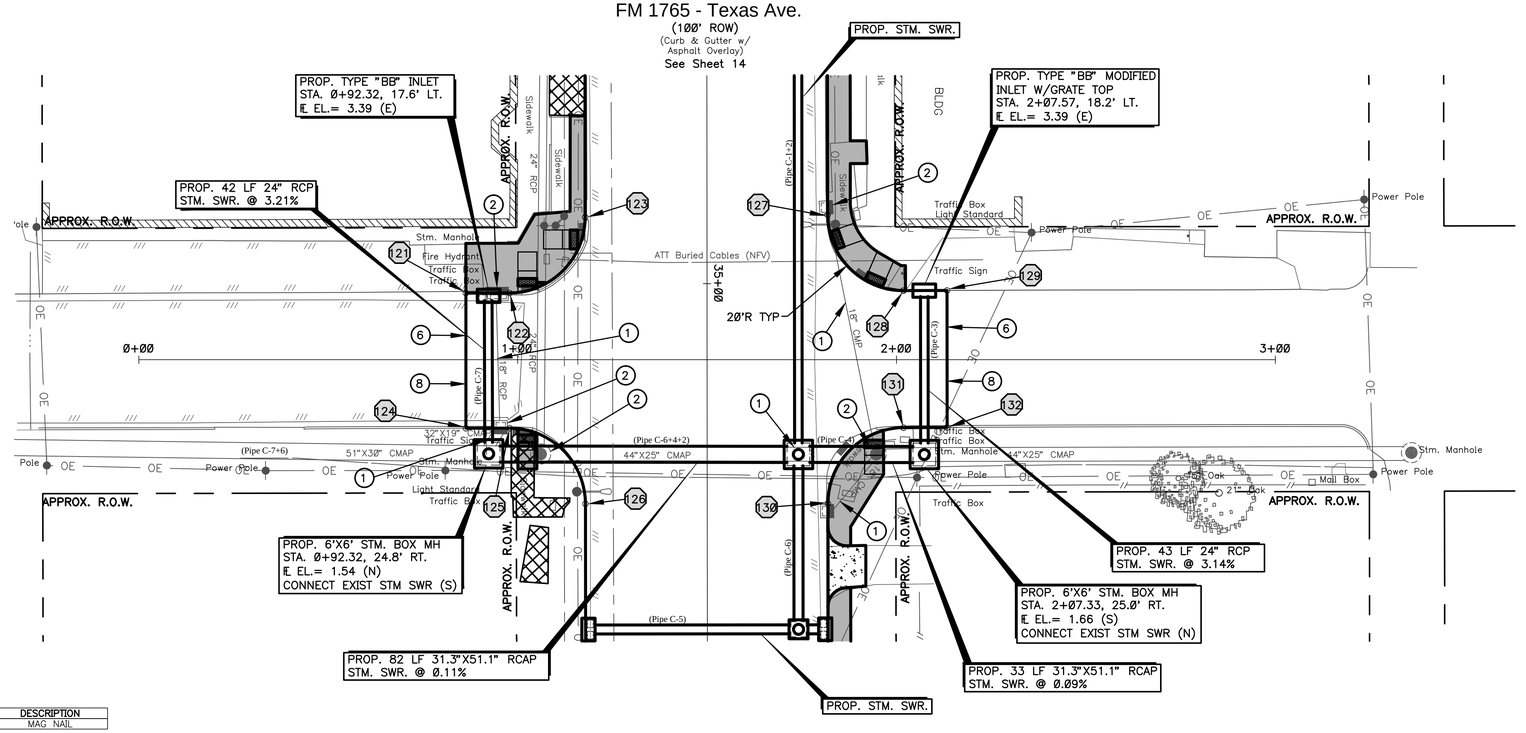
Texas Avenue Reconstrution

8th Street
Sta. 0+00 to End

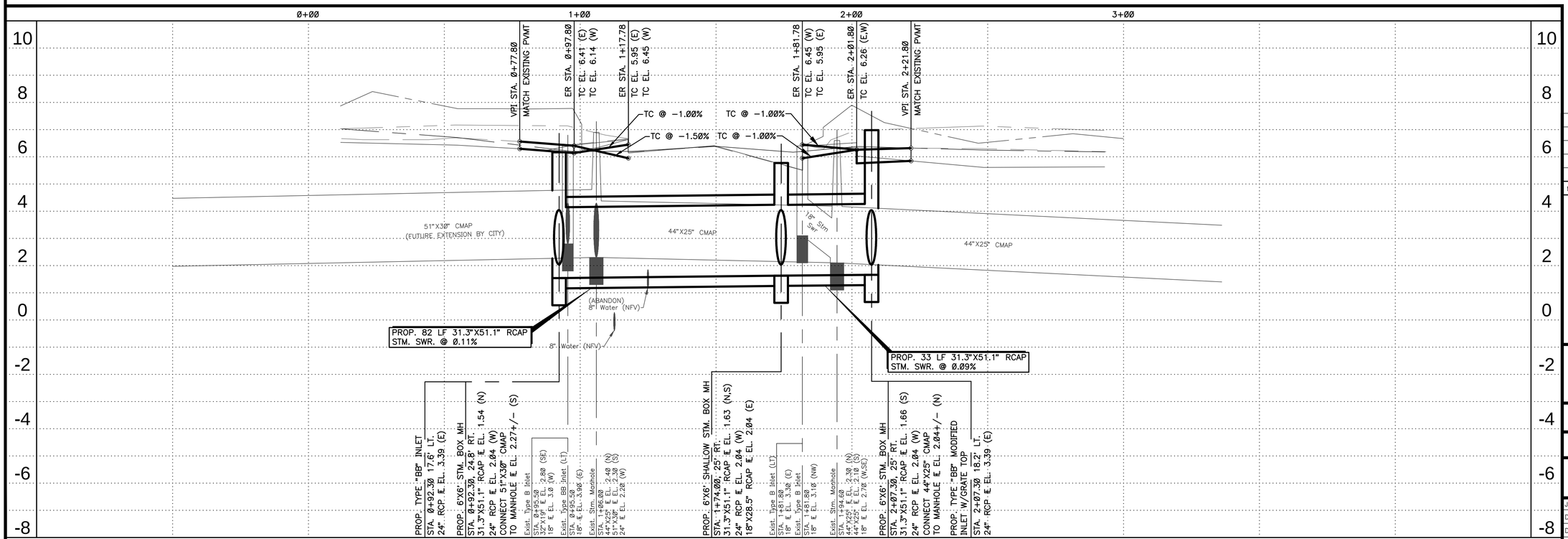
Job No.: 18-015	Scale: HORZ: 1" = 20' VERT: 1" = 2'	SHEET 20 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

FM 1765 - Texas Ave.

(100' ROW)
(Curb & Gutter w/ Asphalt Overlay)
See Sheet 14



PT. NO	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP 3	13709937.43	3270194.81	6.11	MAG NAIL



#	STATION	OFFSET
121	PT 0+86.30	17.60' LT.
122	PT 0+97.80	17.60' LT.
123	PT 1+17.80	37.60' LT.
124	PT 0+86.30	18.10' RT.
125	PT 0+97.80	18.00' RT.
126	PT 1+17.80	38.00' RT.
127	PT 1+81.80	38.20' LT.
128	PT 2+01.80	18.20' LT.
129	PT 2+13.30	18.20' LT.
130	PT 1+81.80	37.90' RT.
131	PT 2+01.80	17.90' RT.
132	PT 2+13.30	17.90' RT.

NOTE:
LOCATION OF FIRE HYDRANTS AND WATER VALVES SHOWN ARE APPROXIMATE. ADJUSTMENT TO PROPOSED SIDEWALK & DRIVEWAYS DUE TO LOCATION OF FIRE HYDRANTS & VALVES MAY BE REQUIRED.

7th Street

0 20 40
SCALE 1" = 20' (H)
SCALE 1" = 2' (V)

BENCHMARK:

SEE SURVEY/BASELINE CONTROL MAPS FOR BENCHMARK REFERENCES/ BASELINE DATA. (SHEET 5)

PAVING & DRAINAGE LEGEND:

1. REMOVE EXIST. STM. SWR./CULVERT
2. REMOVE EXIST. INLET/MANHOLE
3. REMOVE AND DISPOSE OF EXISTING ASPH./CONC. PAVEMENT AND BASE COURSE.
4. PROP. 8" THICK CONCRETE PAVEMENT AND 8" SUBGRADE (SUBGRADE TO EXTEND 2' OUTSIDE CURB)
5. PROP. REMOVE AND REPLACE WITH 6" CONCRETE DRIVEWAY
5A. PROP. REMOVE AND REPLACE WITH 8" CONCRETE DRIVEWAY
6. PROP. CONCRETE PAVING HEADER AT EXIST. CONCRETE ROAD
7. PROP. CONCRETE PAVING HEADER AT ASPHALT ROAD
8. PROP. SAW CUT. (NO SEPARATE PAY)
9. ADJUST MANHOLES COVERS TO GRADE
9A. ADJUST FIRE HYDRANT & VALVE BOXES TO GRADE
10. REMOVE/RELOCATE EXISTING SIGN (NO SEPARATE PAY)
11. PROP. 4" THICK CONCRETE PAVEMENT
12. PROTECT & BRACE LIGHT/POWER POLES AS NECESSARY (NO SEPARATE PAY)
13. PROP. 6' – 4" THICK CONCRETE SIDEWALK
14. PROP. CURB RAMP PER ADA REQUIREMENTS
15. REMOVE TRAFFIC SIGNAL BOX

- PROP. CONCRETE DRIVEWAY
- PROP. 4" CONCRETE SIDEWALK
- PROP. 4" CONCRETE PAVEMENT
- PROP. ASPHALT PAVEMENT
- PROP. REMOVE PAVEMENT
- PROP. LIMITS OF HIGH EARLY CONCRETE

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

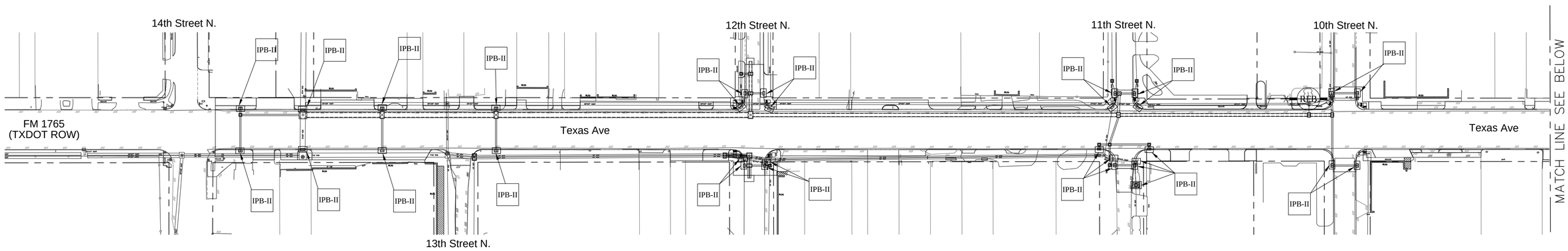
Texas Avenue Reconstrution

7th Street
Sta. 0+00 to End

Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ: 1" = 20'
VERT: 1" = 2'

SHEET 21 OF 52



LEGEND

- EXISTING STORM SEWER
- EXISTING MANHOLE
- EXISTING "A" INLET
- EXISTING "BB" INLET
- PROP. INLETS
- IPB-II — INLET PROTECTION BARRIER
- X — RFB — X — REINFORCED FILTER FABRIC BARRIER
- R.O.W IN PROJECT AREA

EROSION & SEDIMENTATION CONTROL NOTES:

1. PRIOR TO START OF CONSTRUCTION, CONTRACTOR SHALL INSTALL EROSION AND SEDIMENTATION CONTROLS AT LOCATION SHOWN ON PLANS.
2. CONTRACTOR SHALL MAINTAIN, REPAIR AND/OR REPLACE DAMAGED EROSION AND SEDIMENTATION CONTROL SYSTEM THROUGHOUT THE DURATION OF THE CONTRACT. (NO SEPARATE PAY).
3. CONTRACTOR SHALL PROVIDE PROTECTED STORAGE AREAS FOR CHEMICALS, PAINTS, SOLVENTS, FERTILIZERS, AND OTHER POTENTIALLY TOXIC MATERIALS.
4. CONTRACTOR SHALL LOCATE FUEL/MATERIAL STORAGE AREAS AWAY FROM STORM WATER CONVEYANCE SYSTEMS. CONTRACTOR SHALL USE BERMS AROUND FUEL STORAGE AREAS. (NO SEPARATE PAY).
5. CONTRACTOR SHALL ADVISE OWNER IMMEDIATELY, VERBALLY, AND IN WRITING, OF ANY FUEL OR TOXIC MATERIAL SPILLS ONTO THE PROJECT AREA AND THE ACTION TAKEN TO REMEDY THE PROBLEM.
6. CONTRACTOR IS RESPONSIBLE FOR DISPOSING OF HIS FUELS, MATERIALS, AND CONTAMINATED EXCAVATIONS IN A LEGALLY APPROVED MANNER. (NO SEPARATE PAY). NO DISPOSAL SHALL BE PERMITTED ON PROJECT SITE.
7. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL APPLICABLE ENVIRONMENTAL LAWS.
8. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADEQUATELY MAINTAINED SANITARY FACILITIES.
9. AT COMPLETION OF THE CONTRACT, OWNER AND/OR OWNER'S REPRESENTATIVE WITH THE CONTRACTOR SHALL EXAMINE EROSION AND SEDIMENTATION CONTROL SYSTEM BEFORE RELIEVING CONTRACTOR OF HIS MAINTENANCE RESPONSIBILITIES.
10. CONTRACTOR SHALL BE RESPONSIBLE FOR STREET CLEANING, ON A DAILY BASIS, OF ALL MUD AND DIRT DEPOSITED ON THE EXISTING PAVEMENT DUE TO HIS CONSTRUCTION ACTIVITY.
11. INLETS AND MANHOLES THAT ARE NOT COMPLETE AND/OR ARE SUBJECT TO CONVEYING STORM WATER FLOWS ARE TO BE PROTECTED TO PREVENT SEDIMENT FROM ENTERING THE PROPOSED OR EXISTING STORM SEWER SYSTEM.
12. IF PAVING CONTRACTOR REMOVES OR PUNCTURES TIMBER GRATE TO ESTABLISH DRAINAGE, INLET MUST BE SURROUNDED BY INLET FILTER FABRIC AS SHOWN IN DETAILS.
13. FILTER FABRIC TO BE CLEANED OR REPLACED WHEN IT CEASES TO FUNCTION PROPERLY OR AS DIRECTED BY THE ENGINEER.
14. LOCATION OF CONSTRUCTION ACCESS IS APPROXIMATE. EXACT LOCATION SHALL BE BASED ON THE ACTUAL SEQUENCING OF WORK AND LOCATIONS FOR EGRESS OF THE SITE BY THE CONTRACTOR.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

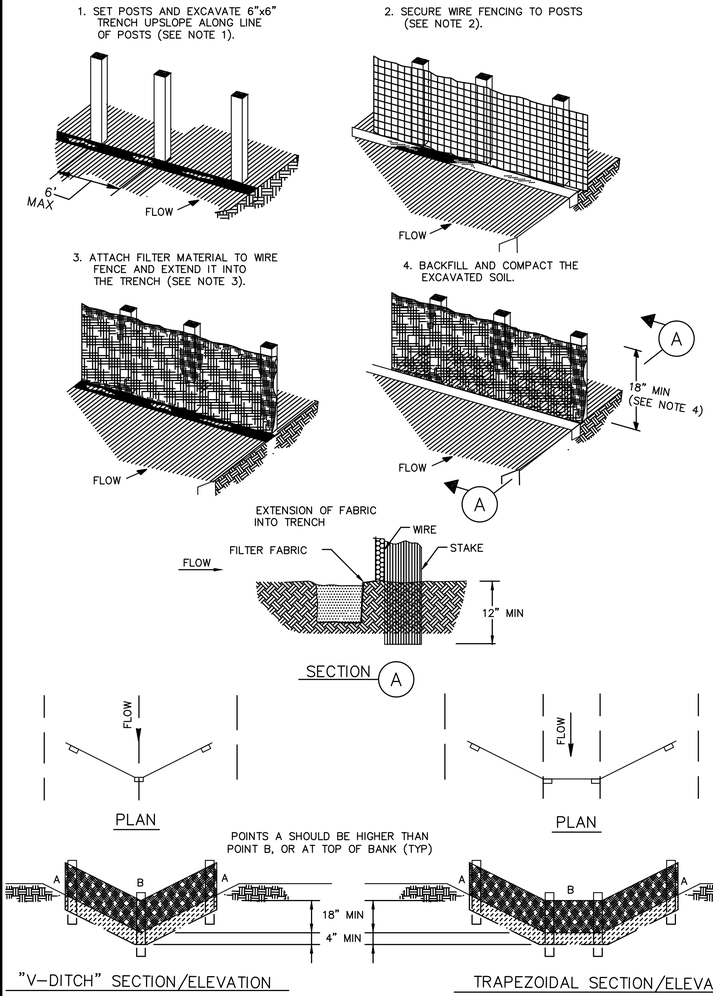
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Stormwater Pollution Prevention Plan

Job No.: 18-015	Scale: HORZ: 1" = 80' VERT:	SHEET 22 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

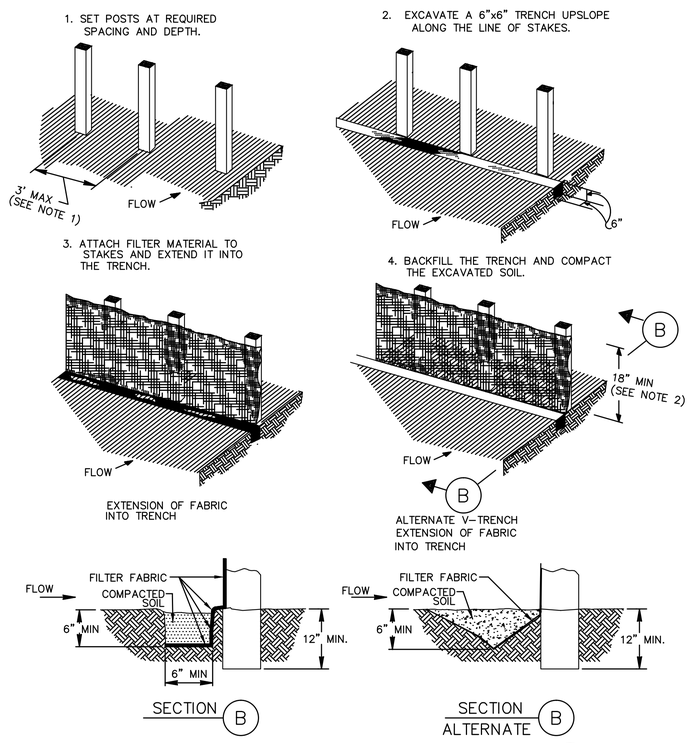


CONSTRUCTION NOTES:

1. SET 2 INCH BY 2 INCH WOODEN STAKES SPACED A MAX OF 6 FEET APART AND EMBEDDED A MIN OF 12 INCHES.
2. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH STAPLES.
3. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE, WITH TIES SPACED EVERY 24 INCHES AT TOP AND MIDSECTION.
4. MINIMUM HEIGHT OF FILTER SHOULD BE 18 INCHES AND A MAXIMUM OF 36 INCHES ABOVE NATURAL GROUND.
5. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
6. SEE SPECIFICATION FOR FILTER FABRIC BARRIER.

X — RFB — X
SYMBOL

REINFORCED FILTER FABRIC BARRIER

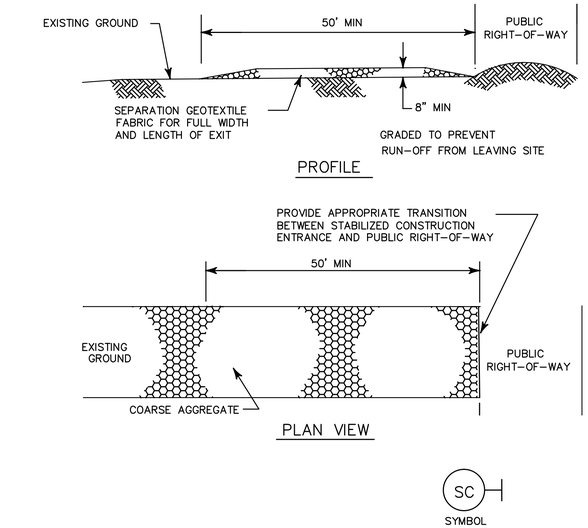


X — FF — X
SYMBOL

CONSTRUCTION NOTES:

1. 2 INCH THICK BY 2 INCH WOODEN STAKES TO BE SET AT MAX SPACING OF 3 FEET AND EMBEDDED A MIN OF 12 INCHES. IF PREASSEMBLED FENCE WITH SUPPORT NETTING IS USED, SPACING OF POST MAY BE INCREASED TO 6 FEET MAX.
2. ATTACH FILTER FABRIC TO WOODEN STAKES. FILTER FABRIC FENCE SHALL HAVE A MIN HEIGHT OF 18 INCHES AND MAX HEIGHT OF 36 INCHES ABOVE NATURAL GROUND.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHOULD BE OVERLAPPED 6 INCHES AT THE POSTS, AND FOLDED.
4. SEE SPECIFICATION FOR FILTER FABRIC FENCE.

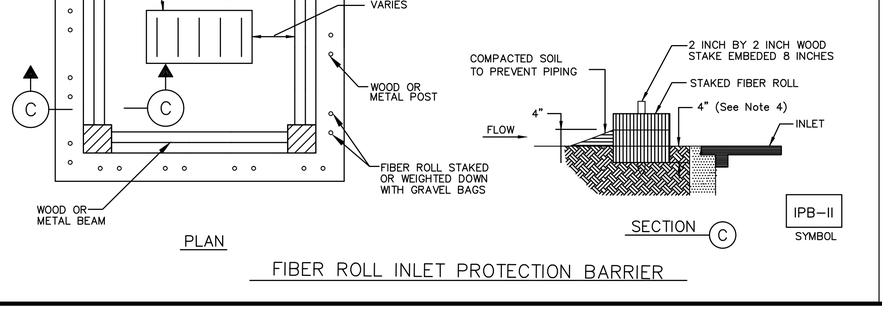
FILTER FABRIC FENCE



CONSTRUCTION NOTES:

1. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN 50 FEET.
2. THICKNESS SHALL BE NOT LESS THAN 8 INCHES.
3. WIDTH SHALL BE NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
4. STABILIZATION FOR OTHER AREAS SHALL HAVE THE SAME AGGREGATE THICKNESS AND WIDTH REQUIREMENTS AS THE STABILIZED CONSTRUCTION EXIT, UNLESS OTHERWISE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. STABILIZED AREA MAY BE WIDENED OR LENGTHENED TO ACCOMMODATE A TRUCK WASHING AREA. AN OUTLET SEDIMENT TRAP MUST BE PROVIDED FOR THE TRUCK WASHING AREA.
6. SEE SPECIFICATION FOR STABILIZED CONSTRUCTION EXIT.
7. STABILIZED CONSTRUCTION EXIT SHALL BE MAINTAINED FREE OF SEDIMENT FOR THE DURATION OF THE PROJECT.

STABILIZED CONSTRUCTION EXIT



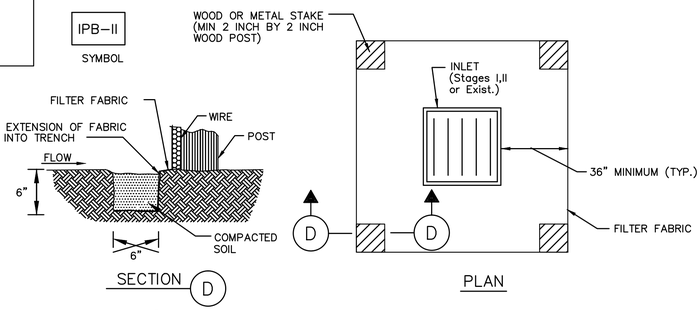
IPB—II
SYMBOL

1. MAX POST SPACING SHALL BE 4 FEET. ADDITIONAL POSTS MAY BE ADDED. POSTS SHALL BE PLACED ON EACH CORNER, AS A MINIMUM, AS SHOWN.
2. PLACEMENT OF FIBER ROLL FROM INLET SHALL VARY ACCORDING TO SITE CONDITIONS. TYPICAL PLACEMENT SHALL BE 24" FROM INLET.
3. FIBER ROLLS SHALL BE UTILIZED ONLY WHEN SITE CONDITIONS DO NOT PERMIT THE USE OF FILTER FABRIC BARRIER.
4. IF UNDERLYING MATERIAL IS BASE OR OTHER HARD-PACKED MATERIAL, THEN RIGER ROLLS MAY BE PLACED ON HARD-PACKED SURFACE AND WEIGHTED DOWN WITH GRAVEL BAGS

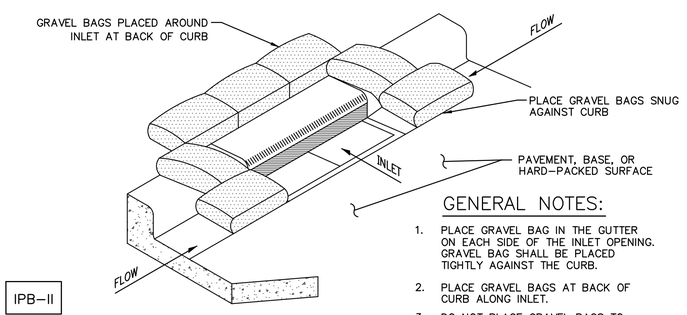
FIBER ROLL INLET PROTECTION BARRIER

CONSTRUCTION NOTE:

1. MAX. POST SPACING SHALL BE 4 FEET. ADDITIONAL POSTS MAY BE ADDED. POSTS SHALL BE PLACED ON EACH CORNER, AS A MINIMUM, AS SHOWN.
2. PLACEMENT OF FILTER FABRIC BARRIER FROM INLET SHALL VARY ACCORDING TO SITE CONDITIONS. TYPICAL PLACEMENT SHALL BE 36" MINIMUM FROM INLET EDGE.



SILT FENCE INLET PROTECTION BARRIER



GENERAL NOTES:

1. PLACE GRAVEL BAG IN THE GUTTER ON EACH SIDE OF THE INLET OPENING. GRAVEL BAG SHALL BE PLACED TIGHTLY AGAINST THE CURB.
2. PLACE GRAVEL BAGS AT BACK OF CURB ALONG INLET.
3. DO NOT PLACE GRAVEL BAGS TO BLOCK THROAT OF INLET, UNLESS DIRECTED BY ENGINEER.

INLET PROTECTION BARRIER
(FOR EXISTING & PROPOSED STAGE II INLETS)

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

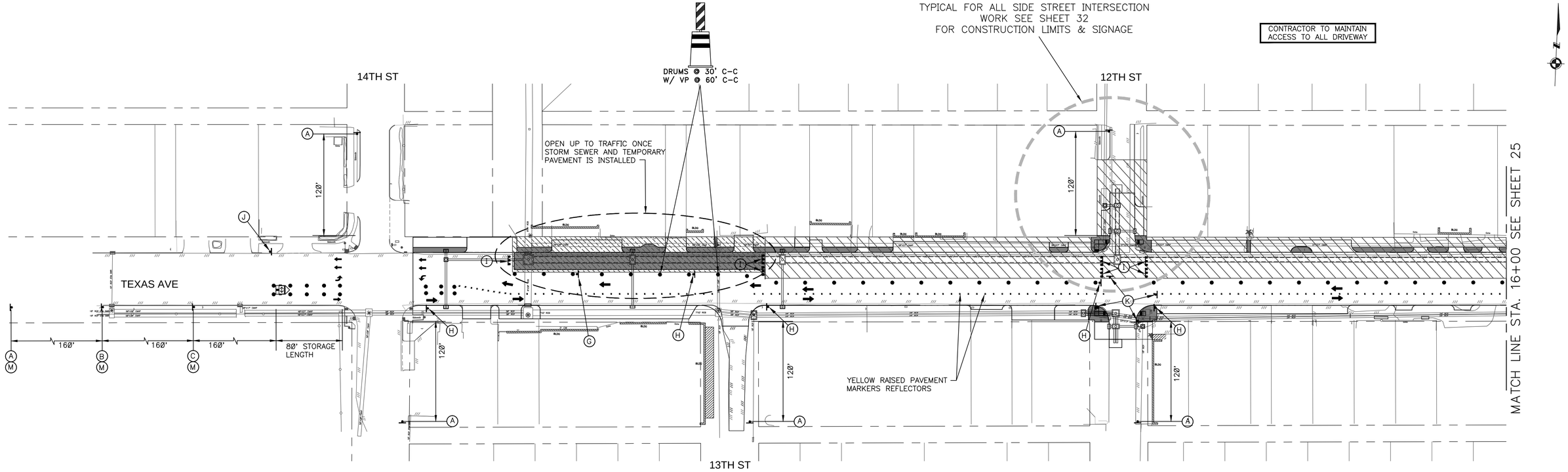
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

SWPPP Details

Job No.: 18-015	Scale:		SHEET
Date: September, 2019	HORZ:	N/A	23
Dwn By: D. Fattig	VERT:	N/A	OF 52
Chkd By: J Rudloff			

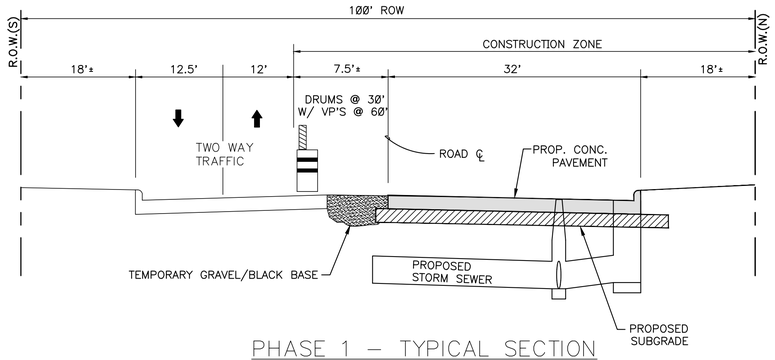


LEGEND

- PHASE 1 PVMT CONSTRUCTION
- PHASE 1A STORM SEWER CONSTRUCTION ONLY (TEMPORARY BLACK BASE REPAIR)
- PHASE 2 PVMT CONSTRUCTION
- PHASE 3 PVMT CONSTRUCTION
- PHASE 4 PVMT CONSTRUCTION
- TEMPORARY BLACK BASE REPAIR
- COMPLETED CONCRETE PAVEMENT
- TRAFFIC FLOW
- DRUMS
- TRAFFIC SIGNS
- RAISED PAVEMENT MARKERS REFLECTORS
- TRAILER MOUNTED FLASHING ARROW BOARD

PHASE 1/1A PAVEMENT NOTES:

1. CLOSE WESTBOUND LANES FROM 6th STREET TO 13th STREET PLACE TRAFFIC CONTROL SIGNAGE, DETOUR SIGNS, DEVICES AND DRUMS.
2. ONCE INSTALLATION OF STORM SEWER AND TEMPORARY PAVEMENT IN PHASE 1A AREA IS COMPLETE. CONTRACTOR IS TO OPEN UP THIS AREA (PHASE 1A) TO TRAFFIC FLOW WESTBOUND.
3. PLACE TWO-WAY TRAFFIC ON EASTBOUND LANES TO PROVIDE TEMPORARY LOCAL ACCESS.
4. INSTALL STORM SEWER ALONG THE ROADWAY AS INDICATED ON PLANS.
5. BACKFILL STORM SEWER IMMEDIATELY TO MAINTAIN ACCESS TO DRIVEWAYS AND SIDE STREETS. (NO SEPARATE PAY)
6. FOLLOW UP WITH PAVING ON WESTBOUND LANES FROM 13th STREET TO 6th STREET.
7. CONTINUE TO MAINTAIN ACCESS TO DRIVEWAYS. (NO SEPARATE PAY)
8. NO TWO CONSECUTIVE INTERSECTION CAN BE CLOSE AT THE SAME TIME.



PHASE 1 - TYPICAL SECTION

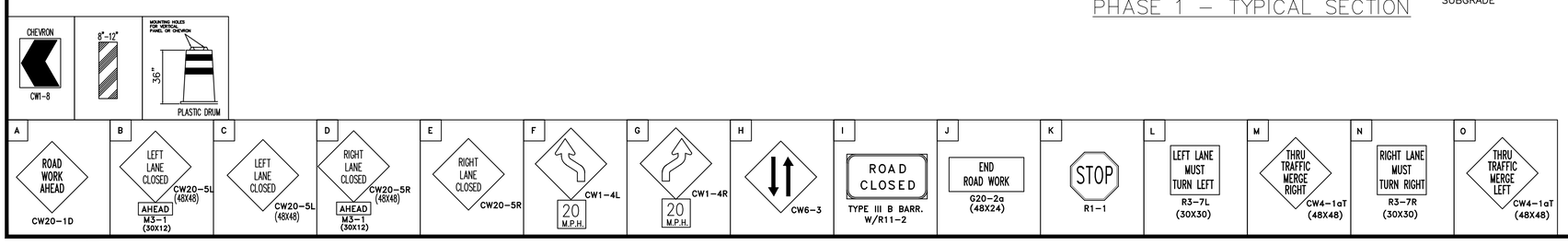
TEXAS AVE SPEED LIMIT
WEST OF 14th STREET - 35 MPH
EAST OF 14th STREET - 30 MPH

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55	L=WS	550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL TRAFFIC CONTROL DEVISES AS PER THE LATEST REVISION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD).
2. THE TRAFFIC CONTROL PLAN AND DETAILS INCLUDED IN THE PLAN DRAWINGS ARE PROVIDED AS A GUIDE TO THE CONTRACTOR AND ARE THE MINIMUM REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR PREPARATION AND SUBMITTAL OF A REVISED TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL IF IMPLEMENTED DIFFERENTLY FROM WHAT IS SHOWN ON THE PLAN DRAWINGS.
3. THIS IS A GENERAL LAYOUT. IT IS NOT THE INTENT OF HAVING THE ENTIRE HALF OF ROADWAY REMOVE FROM END TO END AT ONE TIME. THE WORK SHALL BE LIMITED TO TWO BLOCKS AT A TIME.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS TO ALL BUSINESS DURING CONSTRUCTION. THIS MAY REQUIRE LEAVING SEGMENTS OF EXISTING PAVEMENT AVAILABLE FOR ACCESS WHILE ADJACENT PAVEMENT IS POURED AND CURED.
5. ANY ADJUSTMENTS TO THE TRAFFIC CONTROL PLAN, INCLUDING PROVISION OF ADDITIONAL TRAFFIC CONTROL DEVICES AND SIGNAGE, AS NEEDED TO FACILITATE SMOOTH FLOW OF TRAFFIC AND TO ACCOMMODATE FIELD CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE TRAFFIC CONTROL AND REGULATION BID ITEM.
6. CONTRACTOR SHALL MAINTAIN ALL WEATHER ACCESS TO RESIDENTIAL AND COMMERCIAL PROPERTIES ADJACENT TO AND IN THE WORK AREAS AT ALL TIMES.
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSTAL SERVICE AND TRASH PICKUP SERVICE TO RESIDENTS DURING THE DURATION OF CONSTRUCTION OPERATIONS.



SEE SHEET 32 FOR TYPICAL DETOUR LAYOUT FOR CONSTRUCTION OF SIDE STREETS

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

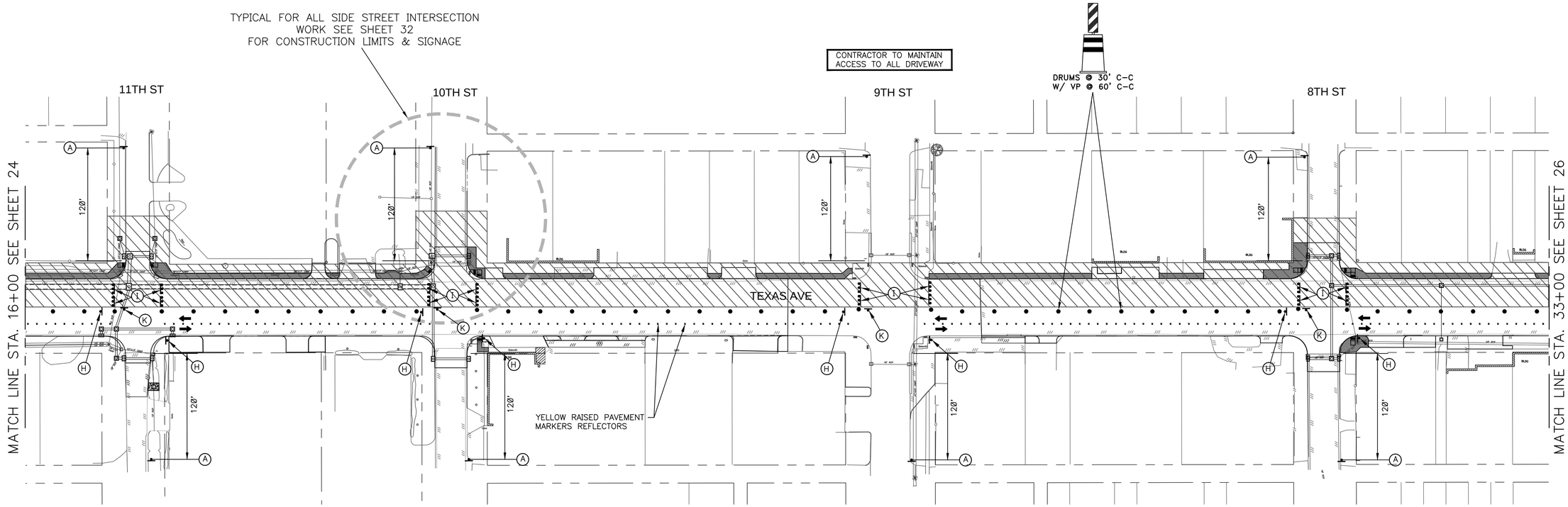
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Phase 1 Traffic Layout - 1 of 3

Job No.: 18-015	Scale: HORZ: 1"=40' VERT:	SHEET 24 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

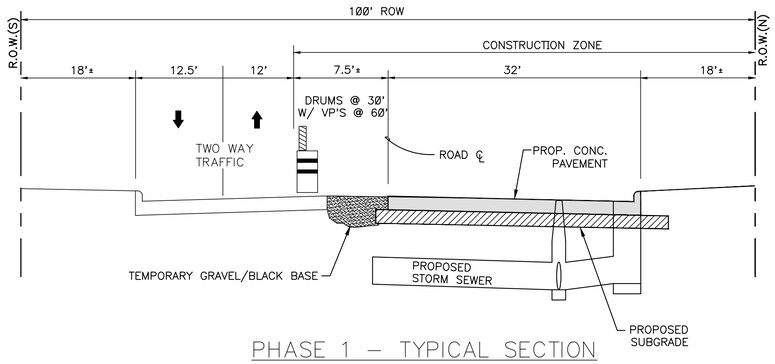


LEGEND

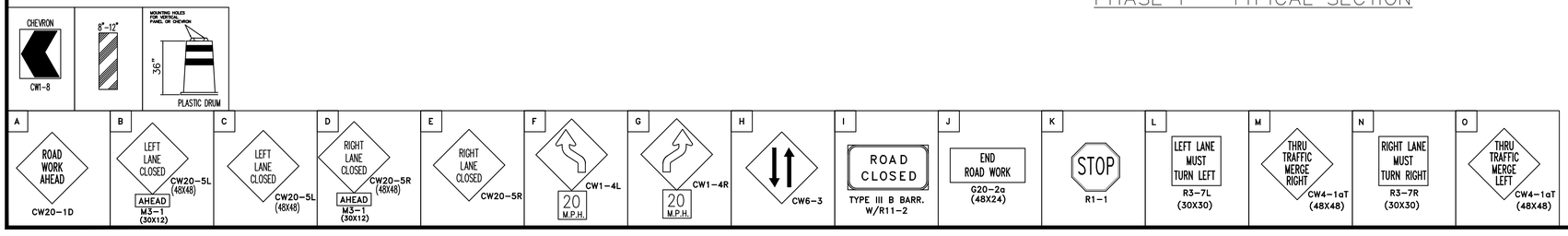
- PHASE 1 PVMT CONSTRUCTION
- PHASE 1A STORM SEWER CONSTRUCTION ONLY (TEMPORARY BLACK BASE REPAIR)
- PHASE 2 PVMT CONSTRUCTION
- PHASE 3 PVMT CONSTRUCTION
- PHASE 4 PVMT CONSTRUCTION
- TEMPORARY BLACK BASE REPAIR
- COMPLETED CONCRETE PAVEMENT
- TRAFFIC FLOW
- DRUMS
- TRAFFIC SIGNS
- RAISED PAVEMENT MARKERS REFLECTORS
- TRAILER MOUNTED FLASHING ARROW BOARD

PHASE 1 PAVEMENT NOTES:

1. CLOSE WESTBOUND LANES FROM 6th STREET TO 13th STREET PLACE TRAFFIC CONTROL SIGNAGE, DETOUR SIGNS, DEVICES AND DRUMS.
2. PLACE TWO-WAY TRAFFIC ON EASTBOUND LANES TO PROVIDE TEMPORARY LOCAL ACCESS.
3. INSTALL STORM SEWER ALONG THE ROADWAY AS INDICATED ON PLANS.
4. BACKFILL STORM SEWER IMMEDIATELY TO MAINTAIN ACCESS TO DRIVEWAYS AND SIDE STREETS. (NO SEPARATE PAY)
5. FOLLOW UP WITH PAVING ON WESTBOUND LANES FROM 13th STREET TO 6th STREET.
6. CONTINUE TO MAINTAIN ACCESS TO DRIVEWAYS. (NO SEPARATE PAY)
7. NO TWO CONSECUTIVE INTERSECTION CAN BE CLOSE AT THE SAME TIME.



PHASE 1 - TYPICAL SECTION



TEXAS AVE SPEED LIMIT
WEST OF 14th STREET - 35 MPH
EAST OF 14th STREET - 30 MPH

Posted Speed *	Formula	Minimum Desirable Taper Lengths * * 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L=WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL TRAFFIC CONTROL DEVISES AS PER THE LATEST REVISION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD).
2. THE TRAFFIC CONTROL PLAN AND DETAILS INCLUDED IN THE PLAN DRAWINGS ARE PROVIDED AS A GUIDE TO THE CONTRACTOR AND ARE THE MINIMUM REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR PREPARATION AND SUBMITTAL OF A REVISED TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL IF IMPLEMENTED DIFFERENTLY FROM WHAT IS SHOWN ON THE PLAN DRAWINGS.
3. THIS IS A GENERAL LAYOUT. IT IS NOT THE INTENT OF HAVING THE ENTIRE HALF OF ROADWAY REMOVE FROM END TO END AT ONE TIME. THE WORK SHALL BE LIMITED TO TWO BLOCKS AT A TIME.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS TO ALL BUSINESS DURING CONSTRUCTION. THIS MAY REQUIRE LEAVING SEGMENTS OF EXISTING PAVEMENT AVAILABLE FOR ACCESS WHILE ADJACENT PAVEMENT IS POURED AND CURED.
5. ANY ADJUSTMENTS TO THE TRAFFIC CONTROL PLAN, INCLUDING PROVISION OF ADDITIONAL TRAFFIC CONTROL DEVICES AND SIGNAGE, AS NEEDED TO FACILITATE SMOOTH FLOW OF TRAFFIC AND TO ACCOMMODATE FIELD CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE TRAFFIC CONTROL AND REGULATION BID ITEM.
6. CONTRACTOR SHALL MAINTAIN ALL WEATHER ACCESS TO RESIDENTIAL AND COMMERCIAL PROPERTIES ADJACENT TO AND IN THE WORK AREAS AT ALL TIMES.
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSTAL SERVICE AND TRASH PICKUP SERVICE TO RESIDENTS DURING THE DURATION OF CONSTRUCTION OPERATIONS.

SEE SHEET 32 FOR TYPICAL DETOUR LAYOUT FOR CONSTRUCTION OF SIDE STREETS

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

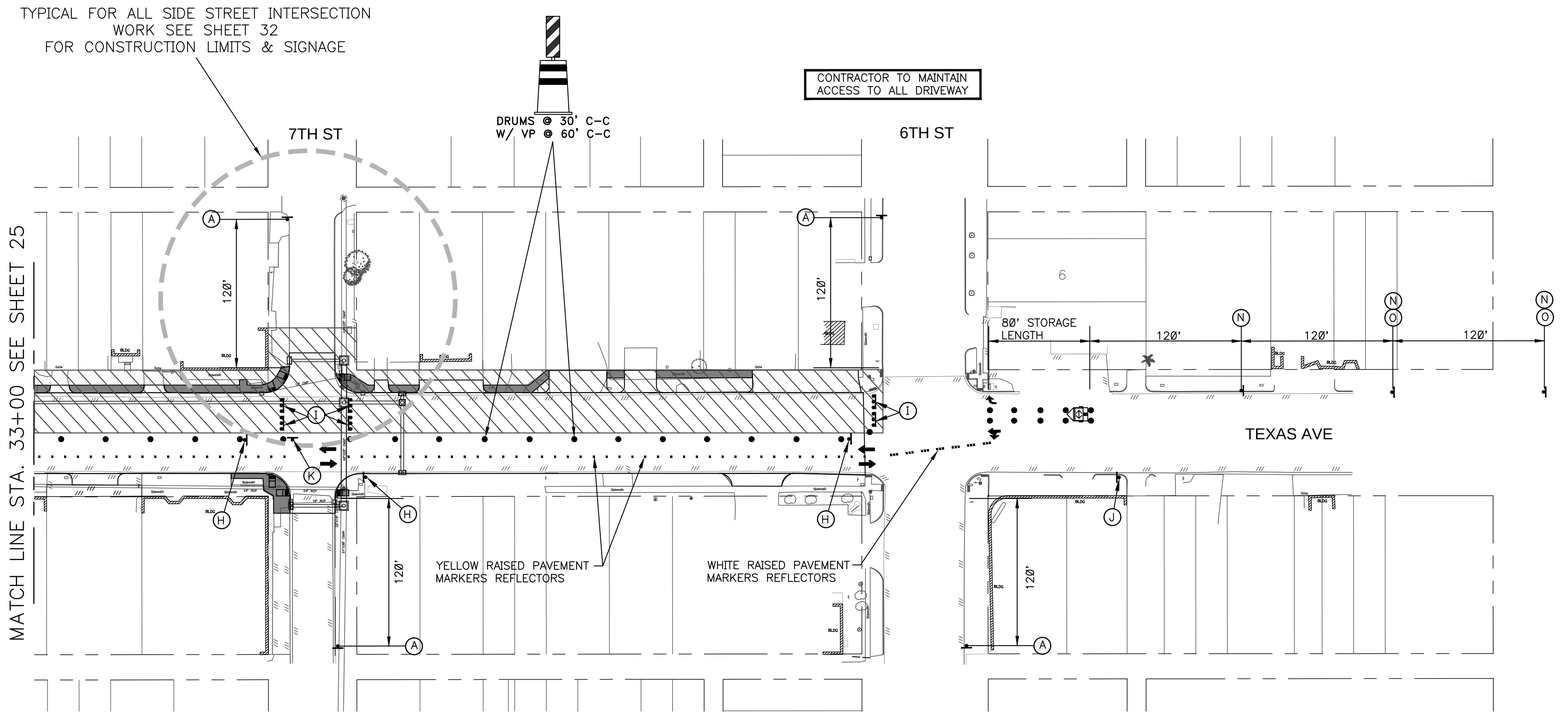
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Phase 1 Traffic Layout - 2 of 3

Job No.: 18-015	Scale: HORZ: 1"=40' VERT:	SHEET 25 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

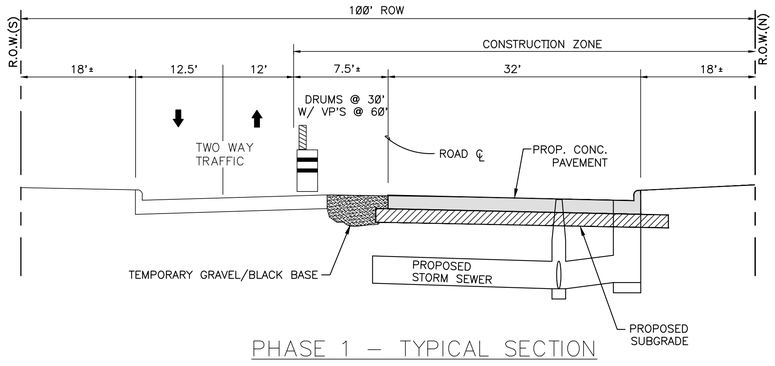


LEGEND

- PHASE 1 PVMT CONSTRUCTION
- PHASE 1A STORM SEWER CONSTRUCTION ONLY (TEMPORARY BLACK BASE REPAIR)
- PHASE 2 PVMT CONSTRUCTION
- PHASE 3 PVMT CONSTRUCTION
- PHASE 4 PVMT CONSTRUCTION
- TEMPORARY BLACK BASE REPAIR
- COMPLETED CONCRETE PAVEMENT
- TRAFFIC FLOW
- DRUMS
- TRAFFIC SIGNS
- RAISED PAVEMENT MARKERS REFLECTORS
- TRAILER MOUNTED FLASHING ARROW BOARD

PHASE 1 PAVEMENT NOTES:

1. CLOSE WESTBOUND LANES FROM 6th STREET TO 13th STREET PLACE TRAFFIC CONTROL SIGNAGE, DETOUR SIGNS, DEVICES AND DRUMS.
2. PLACE TWO-WAY TRAFFIC ON EASTBOUND LANES TO PROVIDE TEMPORARY LOCAL ACCESS.
3. INSTALL STORM SEWER ALONG THE ROADWAY AS INDICATED ON PLANS.
4. BACKFILL STORM SEWER IMMEDIATELY TO MAINTAIN ACCESS TO DRIVEWAYS AND SIDE STREETS. (NO SEPARATE PAY)
5. FOLLOW UP WITH PAVING ON WESTBOUND LANES FROM 13th STREET TO 6th STREET.
6. CONTINUE TO MAINTAIN ACCESS TO DRIVEWAYS. (NO SEPARATE PAY)
7. NO TWO CONSECUTIVE INTERSECTION CAN BE CLOSE AT THE SAME TIME.



PHASE 1 - TYPICAL SECTION

TEXAS AVE SPEED LIMIT
WEST OF 14th STREET - 35 MPH
EAST OF 14th STREET - 3Ø MPH

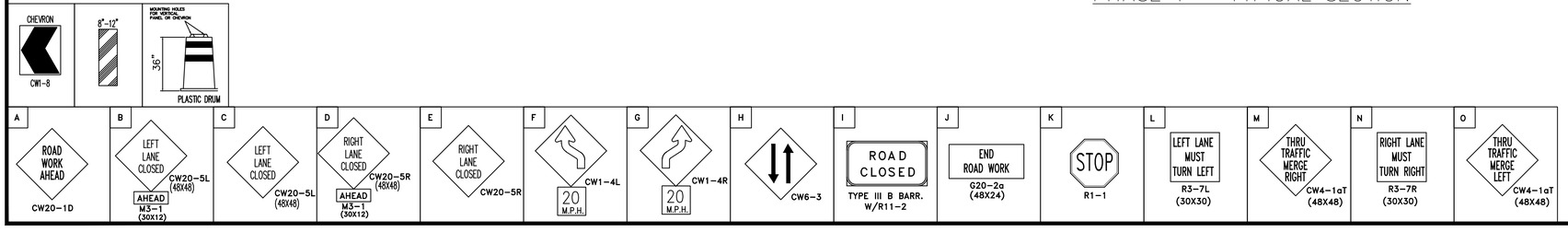
Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "Bf"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

SEE SHEET 32 FOR TYPICAL DETOUR LAYOUT FOR CONSTRUCTION OF SIDE STREETS

GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL TRAFFIC CONTROL DEVISES AS PER THE LATEST REVISION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD).
2. THE TRAFFIC CONTROL PLAN AND DETAILS INCLUDED IN THE PLAN DRAWINGS ARE PROVIDED AS A GUIDE TO THE CONTRACTOR AND ARE THE MINIMUM REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR PREPARATION AND SUBMITTAL OF A REVISED TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL IF IMPLEMENTED DIFFERENTLY FROM WHAT IS SHOWN ON THE PLAN DRAWINGS.
3. THIS IS A GENERAL LAYOUT. IT IS NOT THE INTENT OF HAVING THE ENTIRE HALF OF ROADWAY REMOVE FROM END TO END AT ONE TIME. THE WORK SHALL BE LIMITED TO TWO BLOCKS AT A TIME.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS TO ALL BUSINESS DURING CONSTRUCTION. THIS MAY REQUIRE LEAVING SEGMENTS OF EXISTING PAVEMENT AVAILABLE FOR ACCESS WHILE ADJACENT PAVEMENT IS POURED AND CURED.
5. ANY ADJUSTMENTS TO THE TRAFFIC CONTROL PLAN, INCLUDING PROVISION OF ADDITIONAL TRAFFIC CONTROL DEVICES AND SIGNAGE, AS NEEDED TO FACILITATE SMOOTH FLOW OF TRAFFIC AND TO ACCOMMODATE FIELD CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE TRAFFIC CONTROL AND REGULATION BID ITEM.
6. CONTRACTOR SHALL MAINTAIN ALL WEATHER ACCESS TO RESIDENTIAL AND COMMERCIAL PROPERTIES ADJACENT TO AND IN THE WORK AREAS AT ALL TIMES.
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSTAL SERVICE AND TRASH PICKUP SERVICE TO RESIDENTS DURING THE DURATION OF CONSTRUCTION OPERATIONS.



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

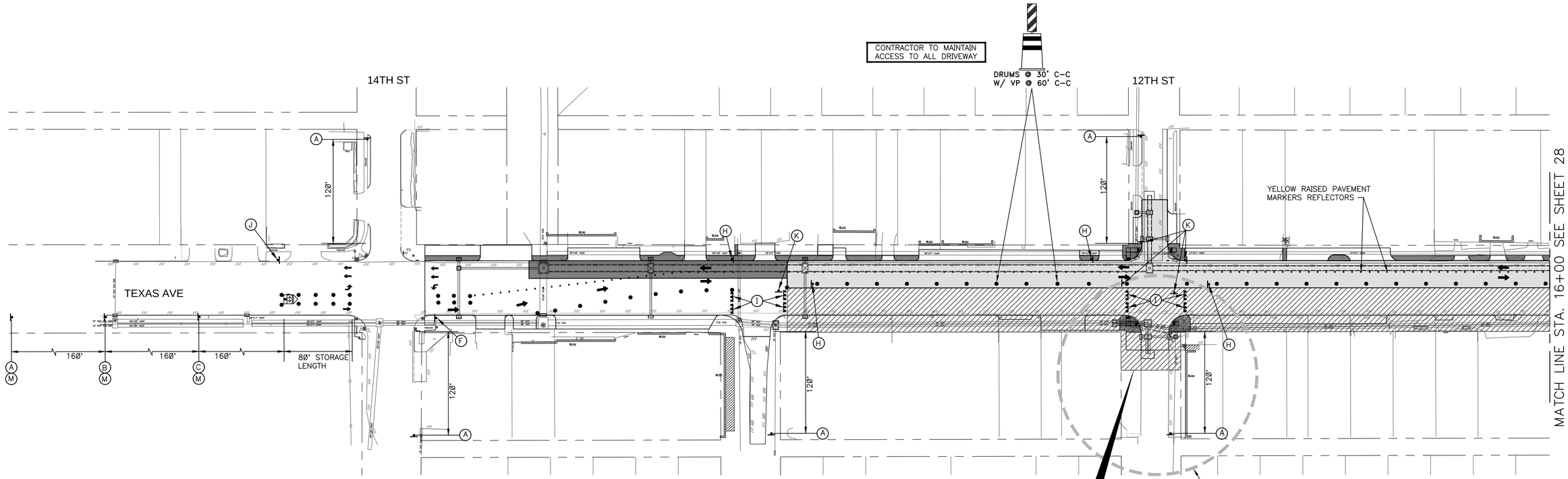
Galveston County.Texas

Texas Avenue Reconstrution

Phase 1 Traffic Layout - 3 of 3

Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff
Scale: HORZ: 1"=40' VERT:

SHEET 26 OF 52

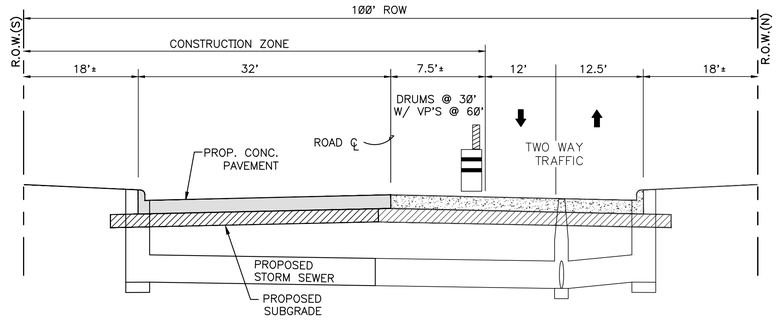


LEGEND

- PHASE 1 PVMT CONSTRUCTION
- PHASE 1A STORM SEWER CONSTRUCTION ONLY (TEMPORARY BLACK BASE REPAIR)
- PHASE 2 PVMT CONSTRUCTION
- PHASE 3 PVMT CONSTRUCTION
- PHASE 4 PVMT CONSTRUCTION
- TEMPORARY BLACK BASE REPAIR
- COMPLETED CONCRETE PAVEMENT
- TRAFFIC FLOW
- DRUMS
- TRAFFIC SIGNS
- RAISED PAVEMENT MARKERS REFLECTORS
- TRAILER MOUNTED FLASHING ARROW BOARD

PHASE 2 PAVEMENT NOTES:

1. CLOSE EASTBOUND LANES FROM 6th STREET TO 13th STREET AND PLACE TRAFFIC CONTROL SIGNAGE, DETOUR SIGNS, DEVICES AND DRUMS.
2. PLACE TWO-WAY TRAFFIC ALONG WESTBOUND LANES TO PROVIDE TEMPORARY LOCAL ACCESS.
3. INSTALL STORM SEWER LATERALS AND INLETS ALONG THE SIDE OF THE ROADWAY AS INDICATED ON PLANS.
4. BACKFILL STORM SEWER IMMEDIATELY TO MAINTAIN ACCESS TO DRIVEWAYS AND SIDE STREETS. (NO SEPARATE PAY)
5. FOLLOW UP WITH PAVING ON EASTBOUND LANES FROM 13th STREET TO 6th STREET
6. CONTINUE TO MAINTAIN ACCESS TO DRIVEWAYS. (NO SEPARATE PAY
7. NO TWO CONSECUTIVE INTERSECTION CAN BE CLOSE AT THE SAME TIME.



PHASE 2 – TYPICAL SECTION

TEXAS AVE SPEED LIMIT
WEST OF 14th STREET – 35 MPH
EAST OF 14th STREET – 30 MPH

Posted Speed *	Formula	Minimum Desirable Taper Lengths * * 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL TRAFFIC CONTROL DEVISES AS PER THE LATEST REVISION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD).
2. THE TRAFFIC CONTROL PLAN AND DETAILS INCLUDED IN THE PLAN DRAWINGS ARE PROVIDED AS A GUIDE TO THE CONTRACTOR AND ARE THE MINIMUM REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR PREPARATION AND SUBMITTAL OF A REVISED TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL IF IMPLEMENTED DIFFERENTLY FROM WHAT IS SHOWN ON THE PLAN DRAWINGS.
3. THIS IS A GENERAL LAYOUT. IT IS NOT THE INTENT OF HAVING THE ENTIRE HALF OF ROADWAY REMOVE FROM END TO END AT ONE TIME. THE WORK SHALL BE LIMITED TO TWO BLOCKS AT A TIME.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS TO ALL BUSINESS DURING CONSTRUCTION. THIS MAY REQUIRE LEAVING SEGMENTS OF EXISTING PAVEMENT AVAILABLE FOR ACCESS WHILE ADJACENT PAVEMENT IS POURED AND CURED.
5. ANY ADJUSTMENTS TO THE TRAFFIC CONTROL PLAN, INCLUDING PROVISION OF ADDITIONAL TRAFFIC CONTROL DEVICES AND SIGNAGE, AS NEEDED TO FACILITATE SMOOTH FLOW OF TRAFFIC AND TO ACCOMMODATE FIELD CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE TRAFFIC CONTROL AND REGULATION BID ITEM.
6. CONTRACTOR SHALL MAINTAIN ALL WEATHER ACCESS TO RESIDENTIAL AND COMMERCIAL PROPERTIES ADJACENT TO AND IN THE WORK AREAS AT ALL TIMES.
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSTAL SERVICE AND TRASH PICKUP SERVICE TO RESIDENTS DURING THE DURATION OF CONSTRUCTION OPERATIONS.

SEE SHEET 32 FOR TYPICAL DETOUR LAYOUT FOR CONSTRUCTION OF SIDE STREETS

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

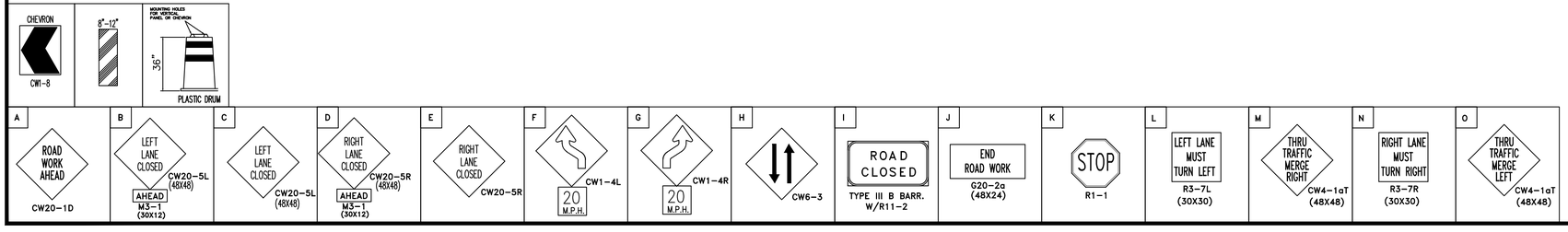
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

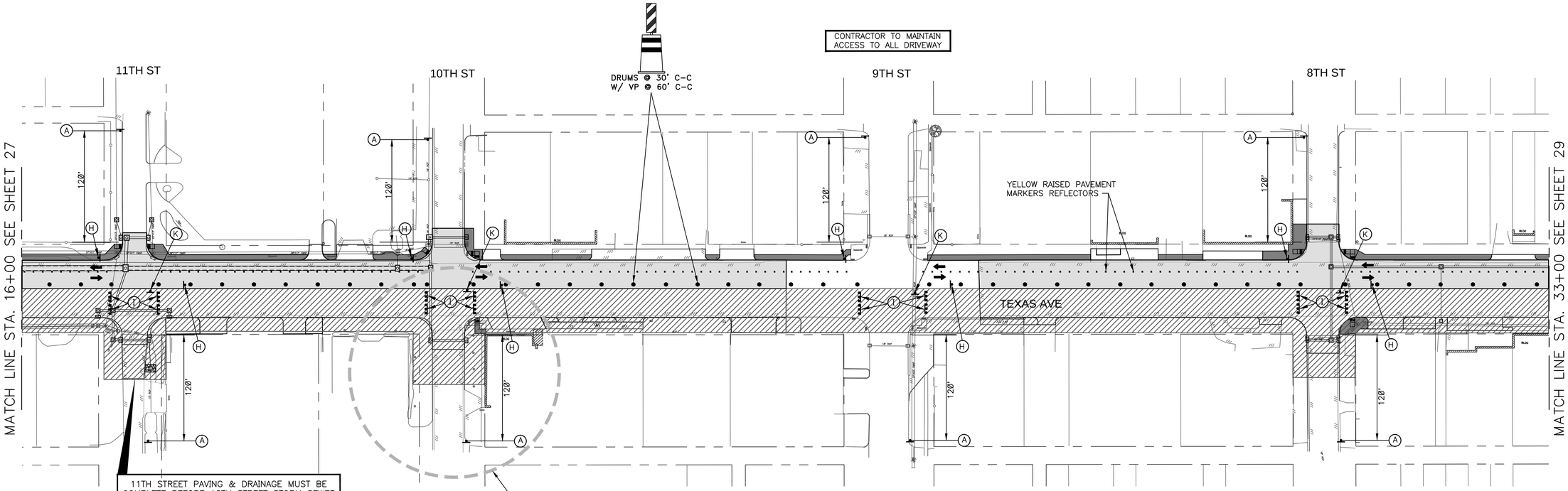
Galveston County.Texas

Texas Avenue Reconstrution

Phase 2 Traffic Layout - 1 of 3

Job No.: 18-015	Scale: HORZ: 1"=40' VERT:	SHEET 27 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



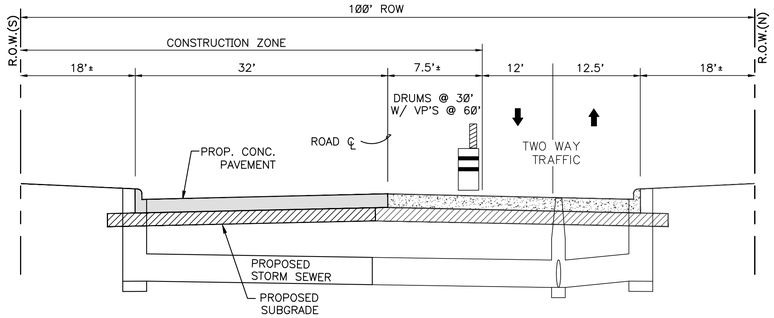


LEGEND

- PHASE 1 PVMT CONSTRUCTION
- PHASE 1A STORM SEWER CONSTRUCTION ONLY (TEMPORARY BLACK BASE REPAIR)
- PHASE 2 PVMT CONSTRUCTION
- PHASE 3 PVMT CONSTRUCTION
- PHASE 4 PVMT CONSTRUCTION
- TEMPORARY BLACK BASE REPAIR
- COMPLETED CONCRETE PAVEMENT
- TRAFFIC FLOW
- DRUMS
- TRAFFIC SIGNS
- RAISED PAVEMENT MARKERS REFLECTORS
- TRAILER MOUNTED FLASHING ARROW BOARD

PHASE 2 PAVEMENT NOTES:

1. CLOSE EASTBOUND LANES FROM 6th STREET TO 13th STREET AND PLACE TRAFFIC CONTROL SIGNAGE, DETOUR SIGNS, DEVICES AND DRUMS.
2. PLACE TWO-WAY TRAFFIC ALONG WESTBOUND LANES TO PROVIDE TEMPORARY LOCAL ACCESS.
3. INSTALL STORM SEWER LATERALS AND INLETS ALONG THE SIDE OF THE ROADWAY AS INDICATED ON PLANS.
4. BACKFILL STORM SEWER IMMEDIATELY TO MAINTAIN ACCESS TO DRIVEWAYS AND SIDE STREETS. (NO SEPARATE PAY)
5. FOLLOW UP WITH PAVING ON EASTBOUND LANES FROM 13th STREET TO 6th STREET
6. CONTINUE TO MAINTAIN ACCESS TO DRIVEWAYS. (NO SEPARATE PAY
7. NO TWO CONSECUTIVE INTERSECTION CAN BE CLOSE AT THE SAME TIME.



PHASE 2 – TYPICAL SECTION

TEXAS AVE SPEED LIMIT
WEST OF 14th STREET – 35 MPH
EAST OF 14th STREET – 30 MPH

Posted Speed *	Formula	Minimum Desirable Taper Lengths * * 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	L= WS²/60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L=WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL TRAFFIC CONTROL DEVISES AS PER THE LATEST REVISION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD).
2. THE TRAFFIC CONTROL PLAN AND DETAILS INCLUDED IN THE PLAN DRAWINGS ARE PROVIDED AS A GUIDE TO THE CONTRACTOR AND ARE THE MINIMUM REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR PREPARATION AND SUBMITTAL OF A REVISED TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL IF IMPLEMENTED DIFFERENTLY FROM WHAT IS SHOWN ON THE PLAN DRAWINGS.
3. THIS IS A GENERAL LAYOUT. IT IS NOT THE INTENT OF HAVING THE ENTIRE HALF OF ROADWAY REMOVE FROM END TO END AT ONE TIME. THE WORK SHALL BE LIMITED TO TWO BLOCKS AT A TIME.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS TO ALL BUSINESS DURING CONSTRUCTION. THIS MAY REQUIRE LEAVING SEGMENTS OF EXISTING PAVEMENT AVAILABLE FOR ACCESS WHILE ADJACENT PAVEMENT IS POURED AND CURED.
5. ANY ADJUSTMENTS TO THE TRAFFIC CONTROL PLAN, INCLUDING PROVISION OF ADDITIONAL TRAFFIC CONTROL DEVICES AND SIGNAGE, AS NEEDED TO FACILITATE SMOOTH FLOW OF TRAFFIC AND TO ACCOMMODATE FIELD CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE TRAFFIC CONTROL AND REGULATION BID ITEM.
6. CONTRACTOR SHALL MAINTAIN ALL WEATHER ACCESS TO RESIDENTIAL AND COMMERCIAL PROPERTIES ADJACENT TO AND IN THE WORK AREAS AT ALL TIMES.
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSTAL SERVICE AND TRASH PICKUP SERVICE TO RESIDENTS DURING THE DURATION OF CONSTRUCTION OPERATIONS.

SEE SHEET 32 FOR TYPICAL
DETOUR LAYOUT FOR
CONSTRUCTION OF SIDE STREETS

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

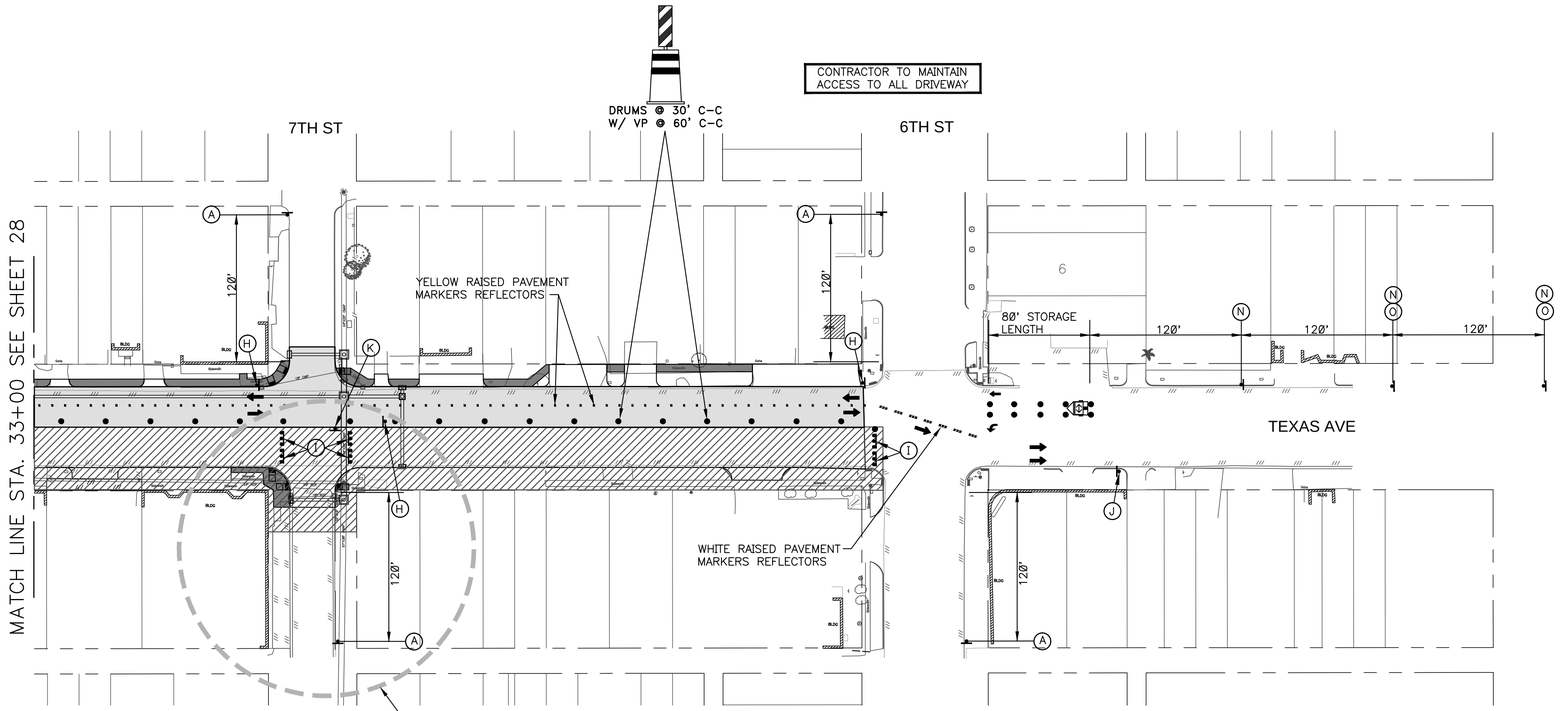
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstruction

Phase 2 Traffic Layout - 2 of 3

Job No.: 18-015	Scale: HORZ: 1"=40' VERT:	SHEET 28 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



LEGEND

- PHASE 1 PVMT CONSTRUCTION
- PHASE 1A STORM SEWER CONSTRUCTION ONLY (TEMPORARY BLACK BASE REPAIR)
- PHASE 2 PVMT CONSTRUCTION
- PHASE 3 PVMT CONSTRUCTION
- PHASE 4 PVMT CONSTRUCTION
- TEMPORARY BLACK BASE REPAIR
- COMPLETED CONCRETE PAVEMENT
- TRAFFIC FLOW
- DRUMS
- TRAFFIC SIGNS
- RAISED PAVEMENT MARKERS REFLECTORS
- TRAILER MOUNTED FLASHING ARROW BOARD

PHASE 2 PAVEMENT NOTES:

1. CLOSE EASTBOUND LANES FROM 6th STREET TO 13th STREET AND PLACE TRAFFIC CONTROL SIGNAGE, DETOUR SIGNS, DEVICES AND DRUMS.
2. PLACE TWO-WAY TRAFFIC ALONG WESTBOUND LANES TO PROVIDE TEMPORARY LOCAL ACCESS.
3. INSTALL STORM SEWER LATERALS AND INLETS ALONG THE SIDE OF THE ROADWAY AS INDICATED ON PLANS.
4. BACKFILL STORM SEWER IMMEDIATELY TO MAINTAIN ACCESS TO DRIVEWAYS AND SIDE STREETS. (NO SEPARATE PAY)
5. FOLLOW UP WITH PAVING ON EASTBOUND LANES FROM 13th STREET TO 6th STREET
6. CONTINUE TO MAINTAIN ACCESS TO DRIVEWAYS. (NO SEPARATE PAY
7. NO TWO CONSECUTIVE INTERSECTION CAN BE CLOSE AT THE SAME TIME.

PHASE 2 – TYPICAL SECTION

TEXAS AVE SPEED LIMIT
WEST OF 14th STREET – 35 MPH
EAST OF 14th STREET – 3Ø MPH

Posted Speed *	Formula	Minimum Desirable Taper Lengths * * 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	L= WS²/60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL TRAFFIC CONTROL DEVISES AS PER THE LATEST REVISION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD).
2. THE TRAFFIC CONTROL PLAN AND DETAILS INCLUDED IN THE PLAN DRAWINGS ARE PROVIDED AS A GUIDE TO THE CONTRACTOR AND ARE THE MINIMUM REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR PREPARATION AND SUBMITTAL OF A REVISED TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL IF IMPLEMENTED DIFFERENTLY FROM WHAT IS SHOWN ON THE PLAN DRAWINGS.
3. THIS IS A GENERAL LAYOUT. IT IS NOT THE INTENT OF HAVING THE ENTIRE HALF OF ROADWAY REMOVE FROM END TO END AT ONE TIME. THE WORK SHALL BE LIMITED TO TWO BLOCKS AT A TIME.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS TO ALL BUSINESS DURING CONSTRUCTION. THIS MAY REQUIRE LEAVING SEGMENTS OF EXISTING PAVEMENT AVAILABLE FOR ACCESS WHILE ADJACENT PAVEMENT IS POURED AND CURED.
5. ANY ADJUSTMENTS TO THE TRAFFIC CONTROL PLAN, INCLUDING PROVISION OF ADDITIONAL TRAFFIC CONTROL DEVICES AND SIGNAGE, AS NEEDED TO FACILITATE SMOOTH FLOW OF TRAFFIC AND TO ACCOMMODATE FIELD CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE TRAFFIC CONTROL AND REGULATION BID ITEM.
6. CONTRACTOR SHALL MAINTAIN ALL WEATHER ACCESS TO RESIDENTIAL AND COMMERCIAL PROPERTIES ADJACENT TO AND IN THE WORK AREAS AT ALL TIMES.
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSTAL SERVICE AND TRASH PICKUP SERVICE TO RESIDENTS DURING THE DURATION OF CONSTRUCTION OPERATIONS.

SEE SHEET 32 FOR TYPICAL DETOUR LAYOUT FOR CONSTRUCTION OF SIDE STREETS

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

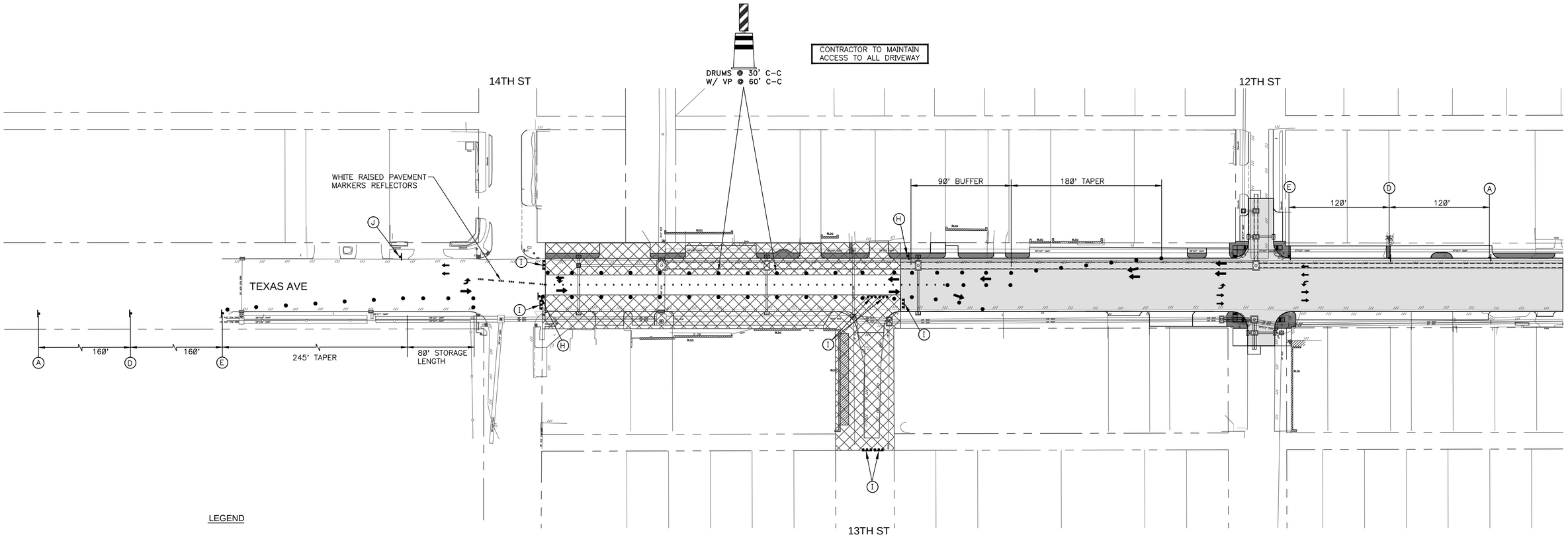
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Phase 2 Traffic Layout - 3 of 3

Job No.: 18-015	Scale: HORZ: 1"=40' VERT:	SHEET 29 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

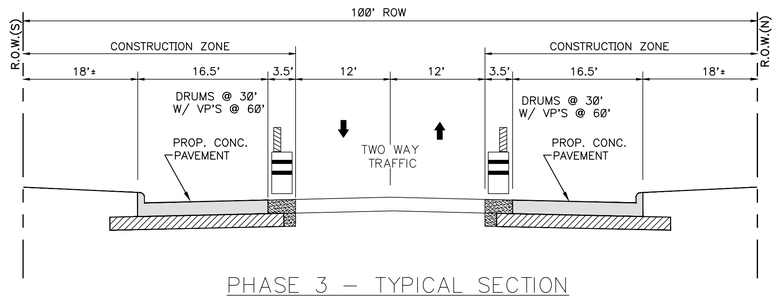


LEGEND

- PHASE 1 PVMT CONSTRUCTION
- PHASE 1A STORM SEWER CONSTRUCTION ONLY (TEMPORARY BLACK BASE REPAIR)
- PHASE 2 PVMT CONSTRUCTION
- PHASE 3 PVMT CONSTRUCTION
- PHASE 4 PVMT CONSTRUCTION
- TEMPORARY BLACK BASE REPAIR
- COMPLETED CONCRETE PAVEMENT
- TRAFFIC FLOW
- DRUMS
- TRAFFIC SIGNS
- RAISED PAVEMENT MARKERS REFLECTORS
- TRAILER MOUNTED FLASHING ARROW BOARD

PHASE 3 PAVEMENT NOTES:

1. CLOSE EASTBOUND LANES FROM 14th STREET TO 13th STREET AND PLACE TRAFFIC CONTROL SIGNAGE, DETOUR SIGNS, DEVICES AND DRUMS.
2. PLACE TWO-WAY TRAFFIC AND PROVIDE TEMPORARY LOCAL ACCESS.
3. FOLLOW UP WITH PAVING ON LANES FROM 14th STREET TO 13th STREET
4. CONTINUE TO MAINTAIN ACCESS TO DRIVEWAYS. (NO SEPARATE PAY)



PHASE 3 - TYPICAL SECTION

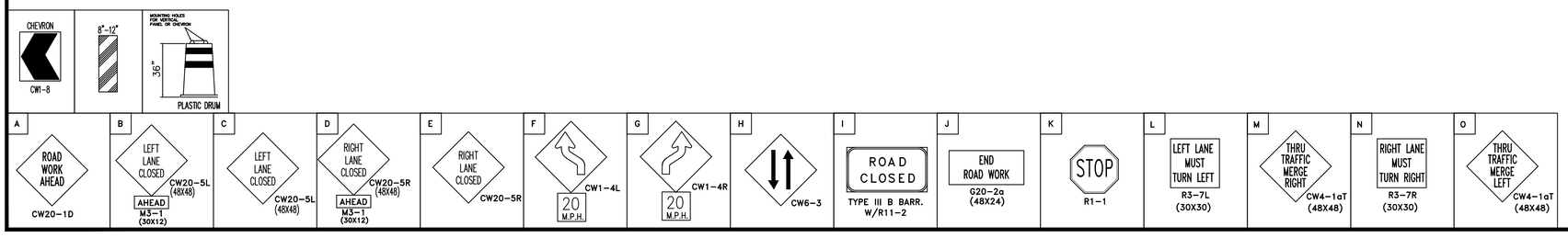
TEXAS AVE SPEED LIMIT
WEST OF 14th STREET - 35 MPH
EAST OF 14th STREET - 30 MPH

Posted Speed *	Formula	Minimum Desirable Taper Lengths * * 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	L= WS²/60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L=WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
* * Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL TRAFFIC CONTROL DEVISES AS PER THE LATEST REVISION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD).
2. THE TRAFFIC CONTROL PLAN AND DETAILS INCLUDED IN THE PLAN DRAWINGS ARE PROVIDED AS A GUIDE TO THE CONTRACTOR AND ARE THE MINIMUM REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR PREPARATION AND SUBMITTAL OF A REVISED TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL IF IMPLEMENTED DIFFERENTLY FROM WHAT IS SHOWN ON THE PLAN DRAWINGS.
3. THIS IS A GENERAL LAYOUT. IT IS NOT THE INTENT OF HAVING THE ENTIRE HALF OF ROADWAY REMOVE FROM END TO END AT ONE TIME. THE WORK SHALL BE LIMITED TO TWO BLOCKS AT A TIME.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS TO ALL BUSINESS DURING CONSTRUCTION. THIS MAY REQUIRE LEAVING SEGMENTS OF EXISTING PAVEMENT AVAILABLE FOR ACCESS WHILE ADJACENT PAVEMENT IS POURED AND CURED.
5. ANY ADJUSTMENTS TO THE TRAFFIC CONTROL PLAN, INCLUDING PROVISION OF ADDITIONAL TRAFFIC CONTROL DEVICES AND SIGNAGE, AS NEEDED TO FACILITATE SMOOTH FLOW OF TRAFFIC AND TO ACCOMMODATE FIELD CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE TRAFFIC CONTROL AND REGULATION BID ITEM.
6. CONTRACTOR SHALL MAINTAIN ALL WEATHER ACCESS TO RESIDENTIAL AND COMMERCIAL PROPERTIES ADJACENT TO AND IN THE WORK AREAS AT ALL TIMES.
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSTAL SERVICE AND TRASH PICKUP SERVICE TO RESIDENTS DURING THE DURATION OF CONSTRUCTION OPERATIONS.



SEE SHEET 32 FOR TYPICAL DETOUR LAYOUT FOR CONSTRUCTION OF SIDE STREETS

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

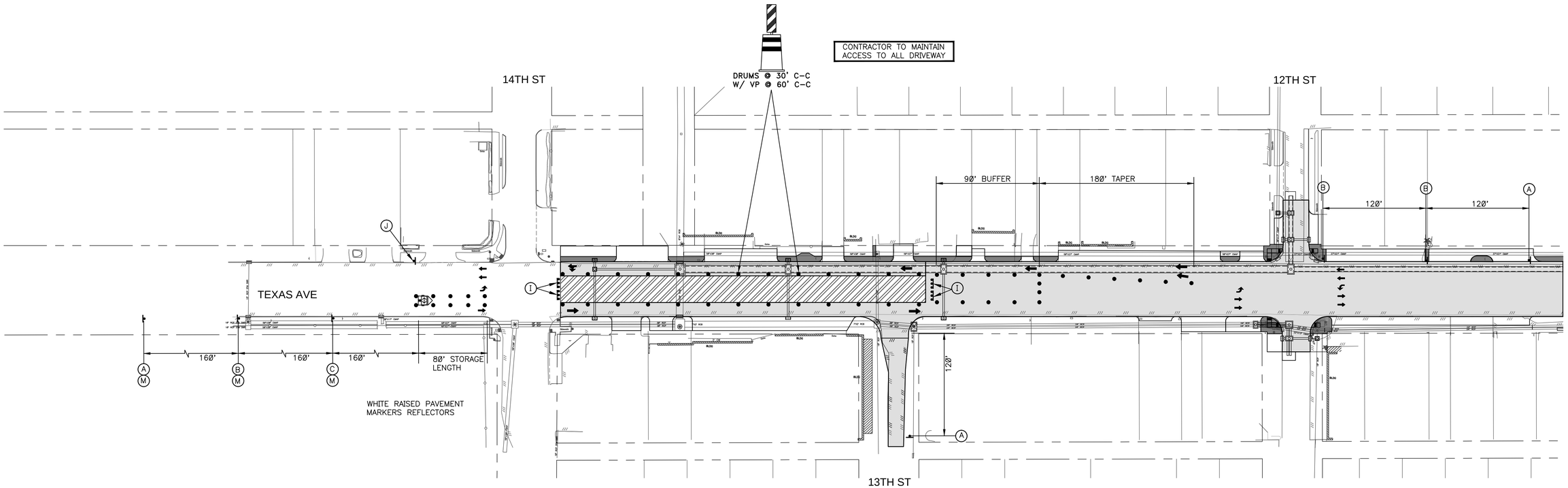
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Phase 3 Traffic Layout

Job No.: 18-015	Scale: HORZ: 1"=40' VERT:	SHEET 30 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

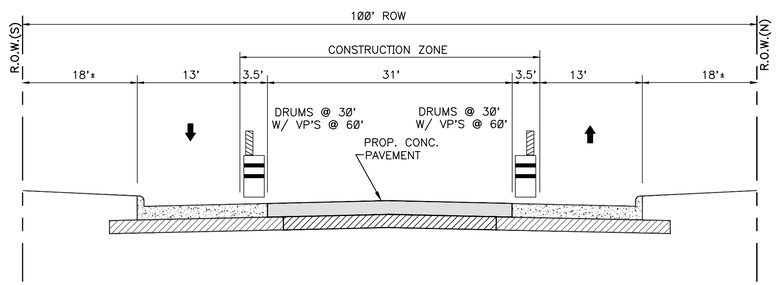


LEGEND

- PHASE 1 PVMT CONSTRUCTION
- PHASE 1A STORM SEWER CONSTRUCTION ONLY (TEMPORARY BLACK BASE REPAIR)
- PHASE 2 PVMT CONSTRUCTION
- PHASE 3 PVMT CONSTRUCTION
- PHASE 4 PVMT CONSTRUCTION
- TEMPORARY BLACK BASE REPAIR
- COMPLETED CONCRETE PAVEMENT
- TRAFFIC FLOW
- DRUMS
- TRAFFIC SIGNS
- RAISED PAVEMENT MARKERS REFLECTORS
- TRAILER MOUNTED FLASHING ARROW BOARD

PHASE 4 PAVEMENT NOTES:

1. CLOSE WESTBOUND LANES FROM 14th STREET TO 13th STREET PLACE TRAFFIC CONTROL SIGNAGE, DETOUR SIGNS, DEVICES AND DRUMS.
2. PLACE TWO-WAY TRAFFIC AND PROVIDE TEMPORARY LOCAL ACCESS.
3. FOLLOW UP WITH PAVING ON LANES FROM 14th STREET TO 13th STREET.
4. CONTINUE TO MAINTAIN ACCESS TO DRIVEWAYS. (NO SEPARATE PAY)



PHASE 4 – TYPICAL SECTION

TEXAS AVE SPEED LIMIT
WEST OF 14th STREET – 35 MPH
EAST OF 14th STREET – 30 MPH

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE AND INSTALL ALL TRAFFIC CONTROL DEVISES AS PER THE LATEST REVISION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD).
2. THE TRAFFIC CONTROL PLAN AND DETAILS INCLUDED IN THE PLAN DRAWINGS ARE PROVIDED AS A GUIDE TO THE CONTRACTOR AND ARE THE MINIMUM REQUIREMENTS. CONTRACTOR IS RESPONSIBLE FOR PREPARATION AND SUBMITTAL OF A REVISED TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL IF IMPLEMENTED DIFFERENTLY FROM WHAT IS SHOWN ON THE PLAN DRAWINGS.
3. THIS IS A GENERAL LAYOUT. IT IS NOT THE INTENT OF HAVING THE ENTIRE HALF OF ROADWAY REMOVE FROM END TO END AT ONE TIME. THE WORK SHALL BE LIMITED TO TWO BLOCKS AT A TIME.
4. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS TO ALL BUSINESS DURING CONSTRUCTION. THIS MAY REQUIRE LEAVING SEGMENTS OF EXISTING PAVEMENT AVAILABLE FOR ACCESS WHILE ADJACENT PAVEMENT IS POURED AND CURED.
5. ANY ADJUSTMENTS TO THE TRAFFIC CONTROL PLAN, INCLUDING PROVISION OF ADDITIONAL TRAFFIC CONTROL DEVICES AND SIGNAGE, AS NEEDED TO FACILITATE SMOOTH FLOW OF TRAFFIC AND TO ACCOMMODATE FIELD CONDITIONS SHALL BE CONSIDERED INCIDENTAL TO THE TRAFFIC CONTROL AND REGULATION BID ITEM.
6. CONTRACTOR SHALL MAINTAIN ALL WEATHER ACCESS TO RESIDENTIAL AND COMMERCIAL PROPERTIES ADJACENT TO AND IN THE WORK AREAS AT ALL TIMES.
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING POSTAL SERVICE AND TRASH PICKUP SERVICE TO RESIDENTS DURING THE DURATION OF CONSTRUCTION OPERATIONS.

SEE SHEET 32 FOR TYPICAL DETOUR LAYOUT FOR CONSTRUCTION OF SIDE STREETS

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

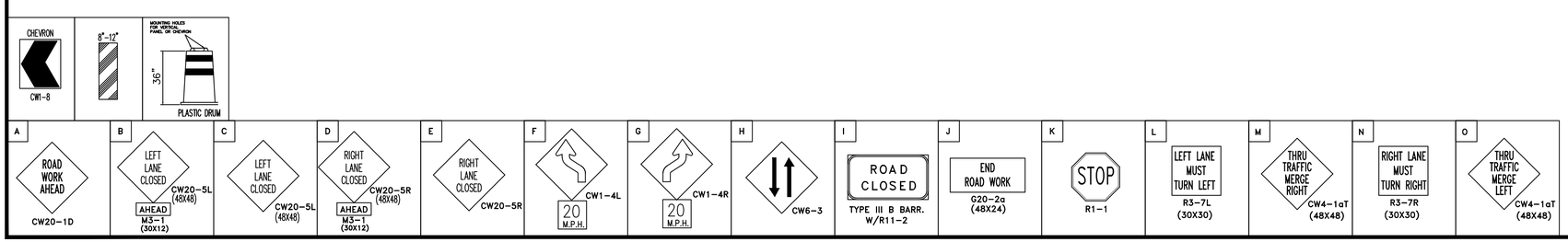
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

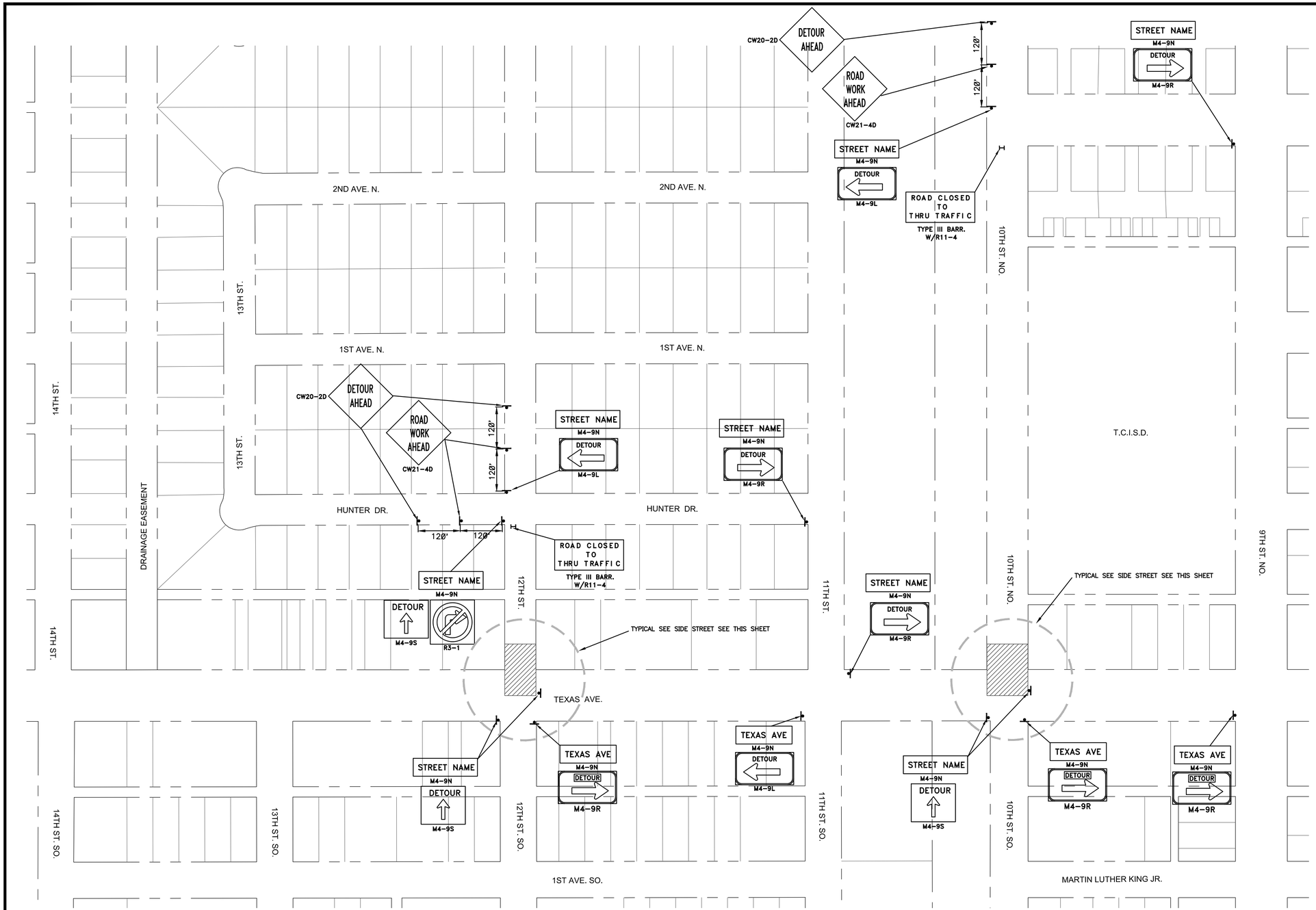
Galveston County.Texas

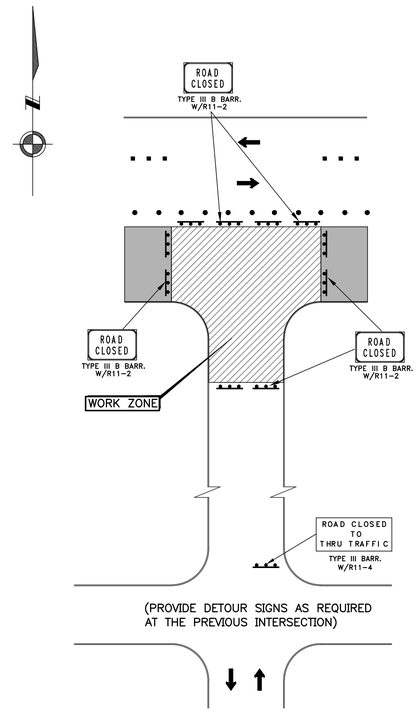
Texas Avenue Reconstrution

Phase 4 Traffic Layout

Job No.: 18-015	Scale: HORZ: 1"=40' VERT:	SHEET 31 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		







(PROVIDE DETOUR SIGNS AS REQUIRED AT THE PREVIOUS INTERSECTION)

SIDE STREET DETAIL

LEGEND:

NEW PAVEMENT COMPLETED

PROP. PAVEMENT

TYPICAL SIDE STREET PAVEMENT NOTES:

1. THIS IS A TYPICAL GENERAL LAYOUT FOR ALL INTERSECTION WORK (NORTH OR SOUTH SIDE). ADDITIONAL SIGNAGE & DETOUR SIGNS WILL BE REQUIRED FOR TO DETOUR TRAFFIC. CONTRACTOR TO PLACE ALL APPROPRIATE SIGNAGE TO DETOUR TRAFFIC AROUND CLOSED INTERSECTION.
2. CLOSE INTERSECTION AND PLACE TRAFFIC CONTROL SIGNAGE, DEVICES AND DRUMS AND APPROPRIATE DETOUR SIGNAGE AS REQUIRED.
3. NO TWO CONSECUTIVE INTERSECTION CAN BE CLOSE AT THE SAME TIME.
4. FOLLOW UP WITH PAVING.
5. CONTINUE TO MAINTAIN ACCESS TO DRIVEWAYS. (NO SEPARATE PAY)
6. CONTRACTOR TO REMOVE ALL SIGNAGE & DETOUR SIGNS UPON COMPLETION OF CONSTRUCTION AT INTERSECTING. THEN MOVE AND SET UP SIGNAGE AND DETOUR SIGNS FOR THE NEXT INTERSECTION.

SEE SHEET 24-31 FOR CONSTRUCTION PHASES LAYOUTS & SIGNAGE

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

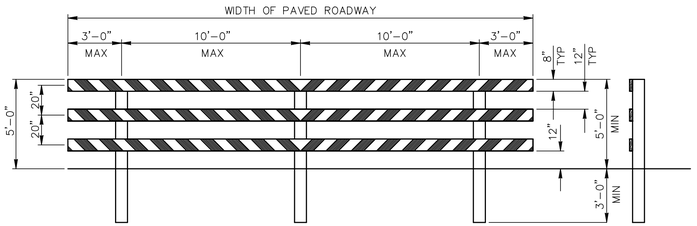
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

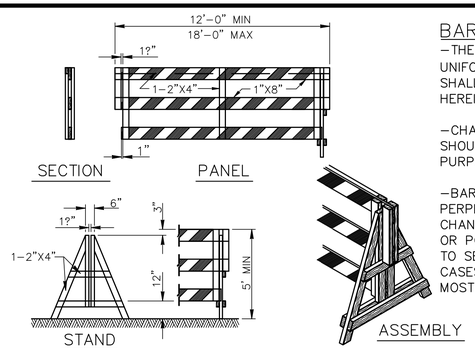
TYPICAL CONSTRUCTION PHASE LAYOUT FOR SIDE STREET DETAILS

Job No.: 18-015	Scale: HORZ: NTS VERT: NA	SHEET 32 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



TYPE III BARRICADE
FOR END OF ROAD

FOR TYPE III BARRICADE FOR END OF ROAD, THE THREE (3) RAILS SHALL BE REFLECTIVE RED AND RELFLECTIVE WHITE STRIPES ON SIDE FACING TRAFFIC



DEMOUNTABLE TYPE III BARRICADE

BARRICADE NOTES

-THE MOST RECENT EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, AND IT'S REVISIONS, SHALL GOVERN THE CONSTRUCTION AND USE OF ALL ITEMS HEREIN DESCRIBED.

-CHANNELIZATION DEVICES OTHER THAN BARRICADES SHOULD NORMALLY BE USED FOR CHANNELIZATION PURPOSES.

-BARRICADES SHOULD NORMALLY BE PLACED PERPENDICULAR TO THE TRAFFIC FLOW. OTHER CHANNELIZING DEVICES, SUCH AS DRUMS, VERTICAL PANELS OR PORTABLE BARRIERS, SHOULD BE USED WHERE NEEDED TO SEPARATE TRAFFIC FROM THE WORK AREA. IN ALL CASES, THE BARRICADES SHOULD BE SO LOCATED AS TO MOST ADVANTAGEOUSLY WARN AND DIRECT TRAFFIC.

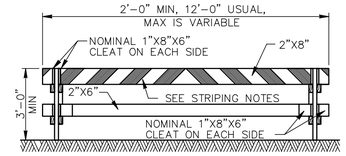
-BARRICADES MAY BE DESIGNED AND CONSTRUCTED FROM WOOD OR ANY OTHER SUITABLE MATERIAL IN A MANNER APPROVED BY THE DEPARTMENT OF TRAFFIC AND TRANSPORTATION. THE CONSTRUCTION DETAILS SHOWN HEREON ARE TYPICAL AND ARE SUGGESTED DETAILS FOR WOOD SUPPORT SYSTEMS FOR BARRICADES. THE DETAILS OF RAIL WIDTH AND STRIPING, NUMBER AND SPACING OF RAILS, MINIMUM LENGTH AND HEIGHT (ABOVE PAVEMENT) OF RAILS MUST BE ADHERED TO WHEN ALTERNATE DESIGNS ARE USED.

-BARRICADES ARE TO BE CONSTRUCTED OF CLEAN SOUND MATERIAL. ALL SURFACES ABOVE GROUND, WHICH ARE NOT STRIPED, SHALL BE WHITE EXCEPT THE UNPAINTED GALVANIZED METAL OR ALUMINUM COMPONENTS MAY BE USED. COMPONENTS MADE OF LUMBER SHALL BE PAINTED WITH A MINIMUM OF TWO COATS OF AN APPROVED BRAND OF WHITE PAINT TO SECURE THOROUGH COVERAGE AND A UNIFORM WHITE COLOR.

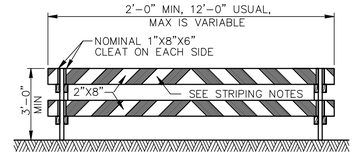
-THE REFLECTORIZED WHITE AND REFLECTORIZED ORANGE (REFLECTORIZED RED) STRIPES FOR BARRICADES, DRUMS AND VERTICAL PANELS SHALL BE CONSTRUCTED OF "HIGH INTENSITY" SHEETING AND SHALL BE MAINTAINED TO MEET THE APPEARANCE, COLOR AND REFLECTIVITY REQUIREMENTS SET BY DOT.

-THE CONTRACTOR SHALL MAINTAIN EACH BARRICADE IN A CLEAN AND GOOD CONDITION.

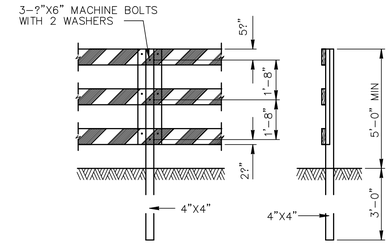
-BARRICADES SHALL BE REMOVED UPON COMPLETION OF THE WORK AND/OR THE ELIMINATION OF THE HAZARD ON ANY SECTION.



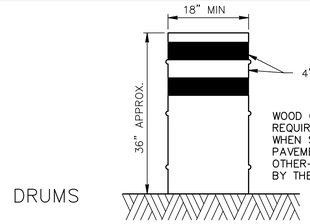
TYPE I



TYPE II



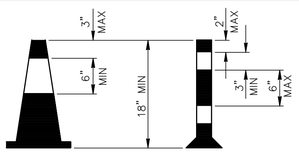
POST FOR
TYPE III BARRICADE



DRUMS

-DRUMS, SET ON END, AND USED FOR TRAFFIC WARNING OR CHANNELIZATION SHALL BE APPROX 36" IN HEIGHT AND A MIN OF 18" IN DIAMETER. THE CONTRACTOR, AT HIS OPTION, MAY USE DRUMS MADE FROM STEEL BARRELS OR BLACK POLYETHYLENE PLASTIC DRUM LINERS WEIGHING APPROX EIGHT POUNDS EACH. THE MARKINGS ON DRUMS SHALL BE HORIZONTAL, CIRCUMFERENTIAL, REFLECTORIZED ORANGE AND REFLECTORIZED WHITE STRIPES, 4 TO 8 INCHES WIDE. THE FIRST REFLECTORIZED STRIPE SHOULD START WITHIN TWO (2) INCHES OF THE TOP OF THE DRUM. THERE SHALL BE AT LEAST TWO ORANGE AND TWO WHITE STRIPES ON EACH DRUM. IF THERE ARE NON- REFLECTORIZED SPACES BETWEEN THE HORIZONTAL ORANGE AND WHITE STRIPES, THEY SHALL BE NO MORE THAN 2 INCHES WIDE. METAL DRUMS SHALL BE PAINTED BLACK OR ORANGE BEFORE REFLECTORIZED STRIPES ARE ADDED. ALL DRUMS ON PROJECT WILL BE THE SAME COLOR. WHEN DRUMS ARE PLACED IN THE ROADWAY, APPROPRIATE WARNING SIGNS SHOULD BE USED. DURING HOURS OF DARKNESS, A FLASHING WARNING LIGHT SHOULD BE PLACED ON DRUMS USED SINGLY AS A WARNING DEVICE. STEADY BURN ELECTRIC LIGHTS OR DELINEATORS SHOULD BE PLACED ON DRUMS USED IN SERIES FOR TRAFFIC CHANNELIZATION. DRUMS SHALL BE WEIGHTED WITH SAND TO THE EXTENT INDICATED IN THE PLANS.

-CWI-8 CHEVRON SIGNS, CWI-6A ARROW SIGNS OR VP-I VERTICAL PANELS MOUNTED ABOVE DRUMS MAY BE USED AS SUPPLEMENTS TO DRUM DELINEATION.

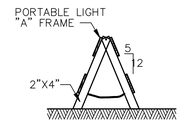


CONES

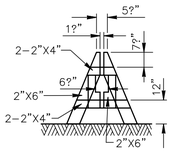
-TRAFFIC CONES AND TUBULAR MARKERS SHALL BE A MIN OF 18" INCHES IN HEIGHT WITH A BROADENED BASE AND MAY BE MADE OF VARIOUS MATERIALS TO WITHSTAND IMPACT WITHOUT DAMAGE TO THEMSELVES OR TO VEHICLES. LARGER SIZES SHOULD BE USED ON FREEWAYS AND OTHER ROADWAYS WHERE SPEED ARE RELATIVELY HIGH OR WHERE EVER MORE CONSPICUOUS GUIDANCE IS NEEDED. ORANGE SHALL BE THE PREDOMINANT COLOR ON CONES AND TUBULAR MARKERS. THEY SHOULD BE KEPT CLEAN AND BRIGHT FOR MAX TARGET VALUE. FOR NIGHTTIME USE THEY SHALL BE REFLECTORIZED OR EQUIPPED WITH LIGHTING DEVICES FOR MAX VISIBILITY. REFLECTORIZED MATERIAL SHALL HAVE A SMOOTH, SEALED OUTER SURFACE WHICH WILL DISPLAY THE SAME APPROX COLOR DAY AND NIGHT.

-REFLECTORIZATION OF TUBULAR MARKERS SHALL BE A MIN OF TWO THREE-INCH BANDS PLACED A MAX OF 2" FROM THE TOP WITH A MAX OF 6" BETWEEN THE BANDS. REFLECTORIZATION OF CONES SHALL BE PROVIDED BY A MIN 6" BAND PLACED A MAX OF 3" FROM THE TOP.

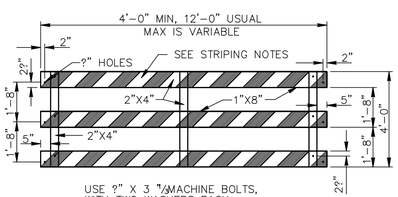
-CONES OR TUBULAR MARKERS ARE GENERALLY ONLY SUITABLE FOR TEMPORARY USAGE (UP TO 8 HOURS) WITH OTHER CHANNELIZATION DEVICES SUCH AS VERTICAL PANELS OR BARRICADES PREFERRED FOR LONGER TERM USAGE. CARE SHOULD BE TAKEN TO INSURE THAT THEY REMAIN IN THEIR PROPER LOCATION AND IN AN UPRIGHT POSITION.



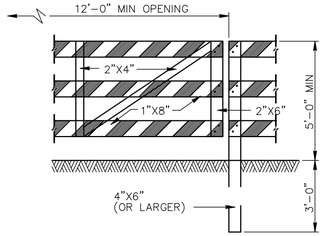
"A" FRAME



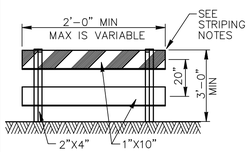
DEMOUNTABLE



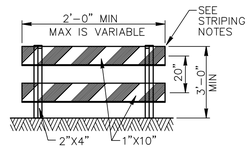
PANEL FOR
TYPE III BARRICADE



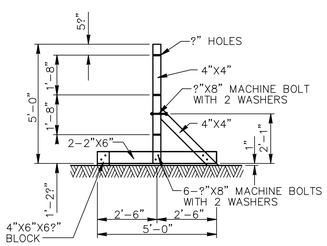
GATE FOR
TYPE III BARRICADE



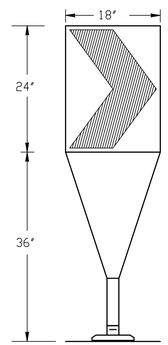
TYPE I



TYPE II



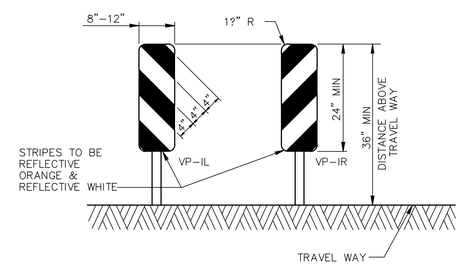
STAND FOR
TYPE III BARRICADE



Fixed Base w/ Approved
Adhesive (Driveable Base, or
Flexible Support can be used)

CHEVRONS

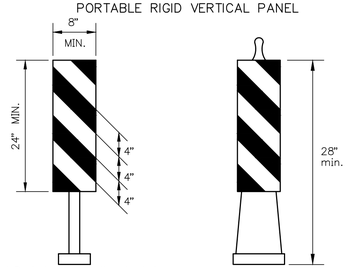
1. THE CHEVRON SHALL BE A VERTICAL RECTANGLE WITH A MINIMUM SIZE OF 12 BY 18 INCHES.
2. CHEVRONS ARE INTENDED TO GIVE NOTICE OF A SHARP CHANGE OF ALIGNMENT WITH THE DIRECTION OF TRAVEL AND PROVIDE ADDITIONAL EMPHASIS AND GUIDANCE FOR VEHICLE OPERATORS WITH REGARD TO CHANGES IN HORIZONTAL ALIGNMENT OF THE ROADWAY.
3. CHEVRONS, WHEN USED, SHALL BE ERECTED ON THE OUTSIDE OF A SHARP CURVE OR TURN, OR ON THE FAR SIDE OF AN INTERSECTION. THEY SHALL BE IN LINE WITH AND AT RIGHT ANGLES TO APPROACH-ING TRAFFIC. SPACING SHOULD BE SUCH THAT THE MOTORIST ALWAYS HAS THREE IN VIEW, UNTIL THE CHANGE IN ALIGNMENT ELIMINATES ITS NEED.
4. TO BE EFFECTIVE, THE CHEVRON SHOULD BE VISIBLE FOR AT LEAST 500 FEET.
5. CHEVRONS SHALL BE ORANGE WITH A BLACK NON-REFLECTIVE LEGEND. SHEETING FOR THE CHEVRON SHALL BE RETROREFLECTIVE TYPE E (FLUORESCENT PRISMATIC) CONFORMING TO DEPARTMENTAL MATERIAL SPECIFICATION DMS-8300, UNLESS NOTED OTHERWISE. THE LEGEND SHALL BE BLACK VINYL NON-REFLECTIVE DECAL SHEETING MEETING THE REQUIREMENTS OF DMS-8320.



VERTICAL PANELS (VP)

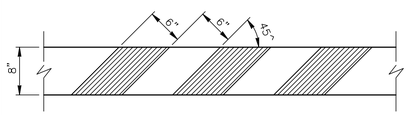
VERTICAL PANELS ARE NORMALLY USED AS CHANNELIZING DEVICES TO INDICATE TANGENT OR NEARLY TANGENT ROADWAY ALIGNMENT WHERE GOOD TARGET VALUE OF A DEVICE IS NEEDED IN DAYTIME AS WELL AS THE NIGHTTIME. IN ADDITION, VERTICAL PANELS SHOULD BE USED AT THE EDGE OF SHOULDER DROP-OFFS AND OTHER SUCH AREAS AS LANE TRANSITIONS WHERE POSITIVE DAY AND NIGHT DELINEATION MAY BE REQUIRED. VERTICAL PANELS SHOULD BE MOUNTED BACK TO BACK IF USED AT THE EDGE OF CUTS ADJACENT TO TWO-WAY TWO LANE ROADWAYS. STRIPES SHOULD ALWAYS SLOPE DOWNWARD TOWARD THE TRAVELED WAY.

PORTABLE RIGID VERTICAL PANEL



See Compliant Products List for alternate designs.

1. CHANNELIZING DEVICES ON SELF-RIGHTING SUPPORTS MAY BE A VERTICAL PANEL, OPPOSING LANE DIVIDER OR CHEVRON.
2. CHANNELIZING DEVICES ON SELF-RIGHTING SUPPORTS SHALL BE USED AT LOCATIONS DETAILED ELSEWHERE IN THE PLANS. THESE DEVICES SHALL CONFORM TO THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
3. THE CONTRACTOR SHALL MAINTAIN DEVICES IN A CLEAN CONDITION AND REPLACED DAMAGED, NON-REFLECTIVE, FADED, OR BROKEN DEVICES AND BASES AS NECESSARY.
4. PORTABLE BASES SHALL BE FABRICATED FROM VIRGIN AND/OR RECYCLED RUBBER. APPROXIMATE WEIGHT OF PORTABLE BASES SHALL BE 35 LBS.



STRIPING FOR BARRICADE

FOR ALL TYPES OF BARRICADES WITH RAILS LESS THAN 3'-0" LONG, STRIPES 4" WIDE SHALL BE USED. IDENTIFICATION MARKINGS MAY BE SHOWN ONLY ON BACK SIDE OF BAR-RICADE RAILS.

-STRIPING SHOULD COVER THE FULL WIDTH OF THE RAIL. STRIPING OF RAILS, PANELS, ETC, SHOULD SLOPE DOWNWARD AT AN ANGLE OF 45^ DEGREES IN DIRECTIONS TRAFFIC IS TO PASS.

-WHERE A BARRICADE EXTENDS ENTIRELY ACROSS A ROADWAY, IT IS DESIRABLE THAT THE STRIPES SLOPE DOWNWARD IN THE DIRECTION TOWARD WHICH TRAFFIC MUST TURN IN DETOURING. WHEN BOTH RIGHT AND LEFT TURNS ARE PROVIDED FOR, THE CHEVRON STRIPING SHOULD SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

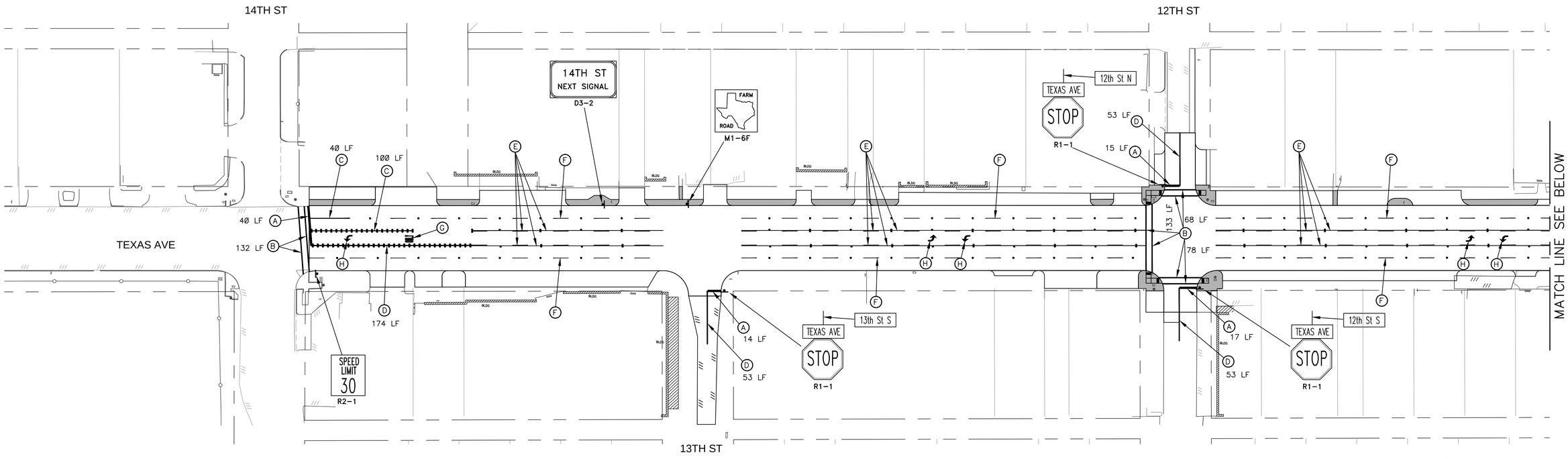
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

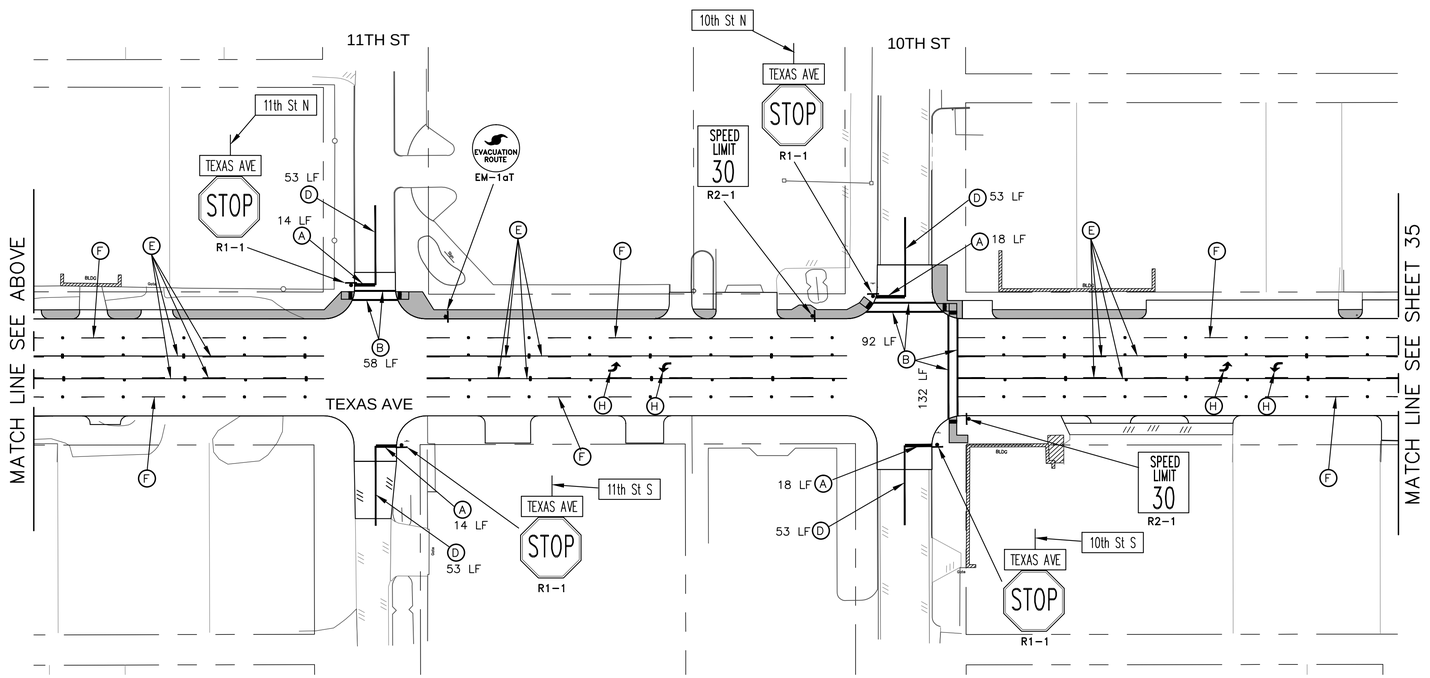
Galveston County.Texas

Texas Avenue Reconstrution

Traffic Control Details

Job No.: 18-015	Scale: HORZ: N/A VERT: N/A	SHEET 33 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		





NOTES:
1. ALL STRIPING & MARKERS SHALL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, LATEST EDITION.
2. EXISTING STRIPING & MARKERS NOT SHOWN TO BE REPLACED THAT ARE DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT NO ADDITIONAL COST TO THE PROJECT.
3. REMOVAL OF EXISTING STRIPING AND MARKERS SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.

LEGEND:

- (A) REFLECTIVE MARKING 24" SOLID (WHITE)
- (B) REFLECTIVE MARKING 12" SOLID (WHITE)
- (C) REFLECTIVE MARKING 8" SOLID (WHITE)
- (D) REFLECTIVE MARKING 4" SOLID DOUBLE (YELLOW) (LENGTH SHOWN IS THE TOTAL SINGLE)
- (E) REFLECTIVE MARKING 4" BROKEN/SOLID (YELLOW)
- (F) REFLECTIVE MARKING 4" BROKEN/SOLID (WHITE)
- (G) REFLECTIVE MARKING (WORD "ONLY") (WHITE)
- (H) REFLECTIVE MARKING (ARROW) (WHITE)
- (RR) REMOVE & REPLACE SIGN (NO SEPARATE PAY)
- (N) REMOVE OLD SIGN & REPLACE WITH NEW SIGN
- ■ RPM (RAISED PAVEMENT MARKERS/BUTTONS)

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

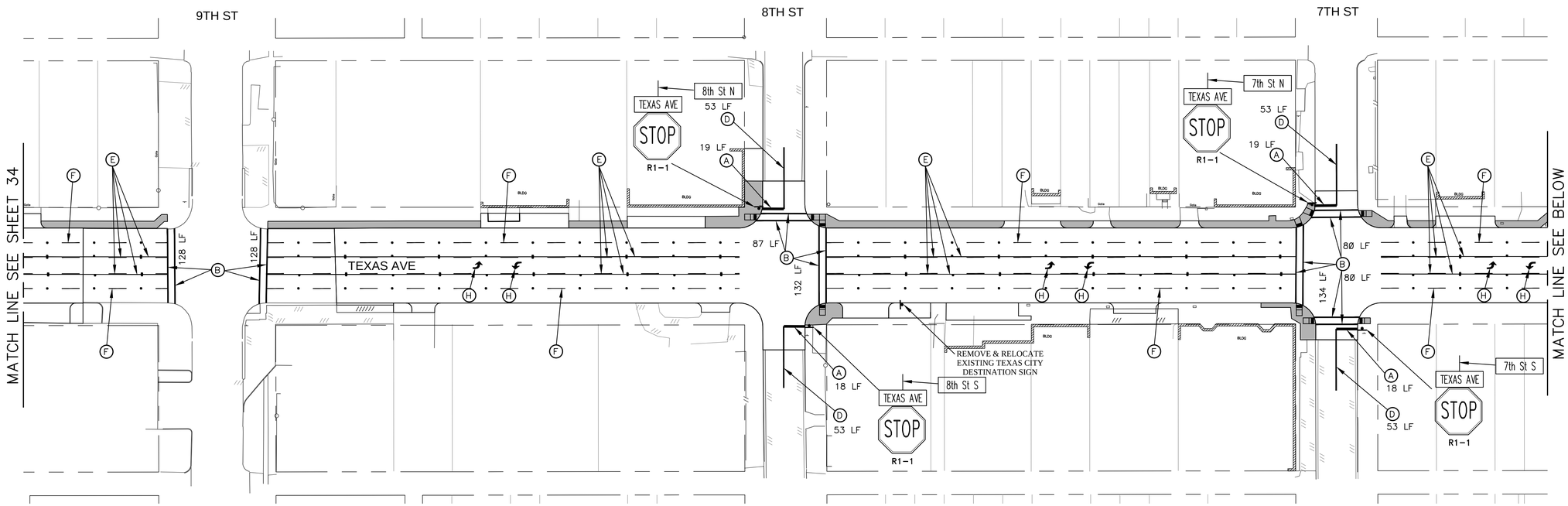
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

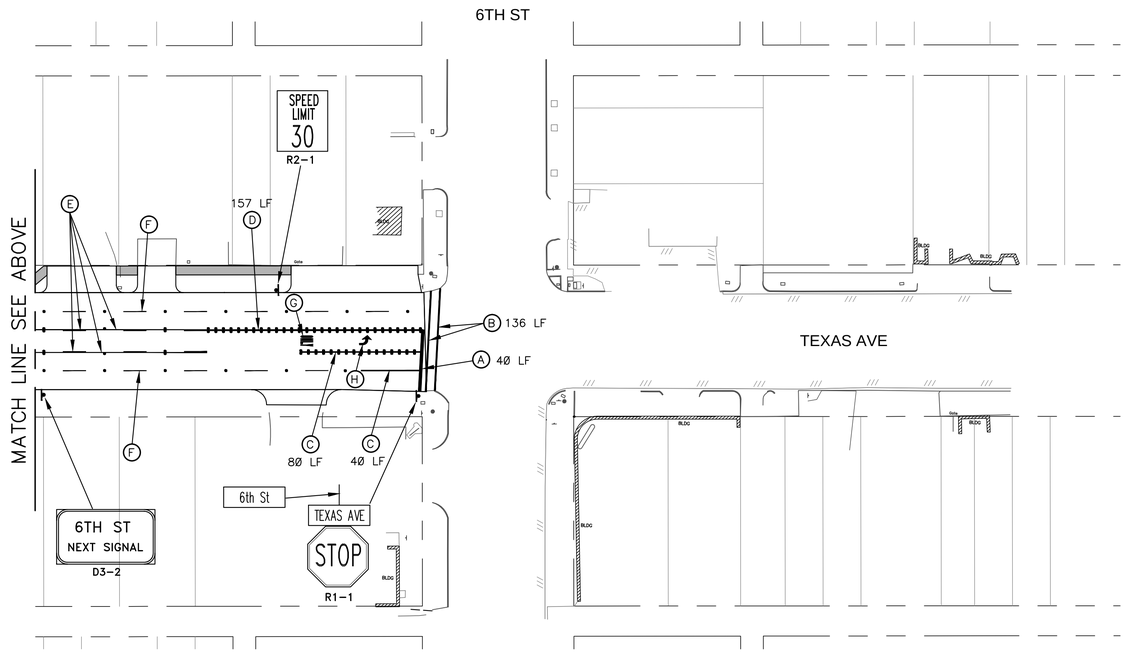
Galveston County.Texas

Texas Avenue Reconstrution

Striping Layout - I

Job No.: 18-015	Scale: HORZ: 1"=50' VERT:	SHEET 34 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		





NOTES:
1. ALL STRIPING & MARKERS SHALL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, LATEST EDITION.
2. EXISTING STRIPING & MARKERS NOT SHOWN TO BE REPLACED THAT ARE DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT NO ADDITIONAL COST TO THE PROJECT.
3. REMOVAL OF EXISTING STRIPING AND MARKERS SHALL BE CONSIDERED INCIDENTAL TO THE PROJECT.

LEGEND:

- (A) REFLECTIVE MARKING 24" SOLID (WHITE)
- (B) REFLECTIVE MARKING 12" SOLID (WHITE)
- (C) REFLECTIVE MARKING 8" SOLID (WHITE)
- (D) REFLECTIVE MARKING 4" SOLID DOUBLE (YELLOW) (LENGTH SHOWN IS THE TOTAL SINGLE)
- (E) REFLECTIVE MARKING 4" BROKEN/SOLID (YELLOW)
- (F) REFLECTIVE MARKING 4" BROKEN/SOLID (WHITE)
- (G) REFLECTIVE MARKING (WORD "ONLY") (WHITE)
- (H) REFLECTIVE MARKING (ARROW) (WHITE)
- (RR) REMOVE & REPLACE SIGN (NO SEPARATE PAY)
- (N) REMOVE OLD SIGN & REPLACE WITH NEW SIGN
- ■ RPM (RAISED PAVEMENT MARKERS/BUTTONS)

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

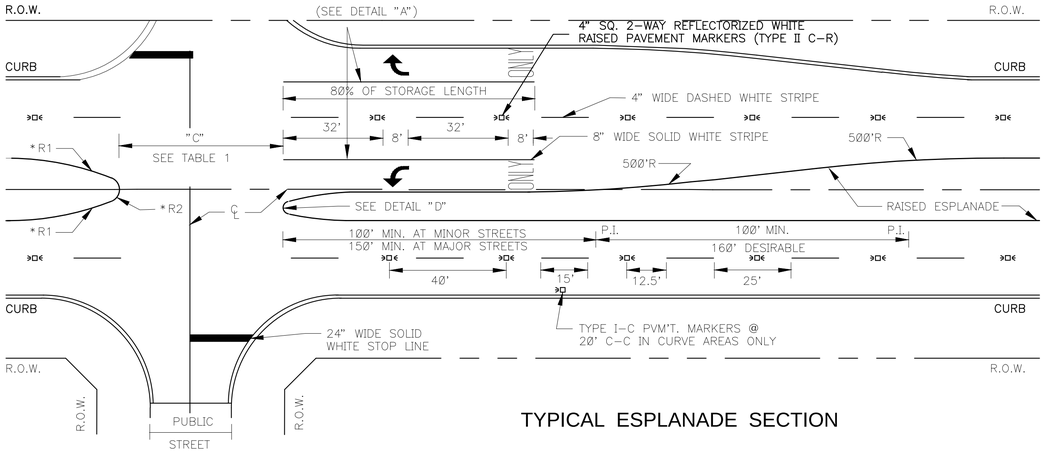
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Striping Layout - II

Job No.: 18-015	Scale: HORZ: 1"=50' VERT:	SHEET 35 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



TYPICAL ESPLANADE SECTION

DETAIL "A"

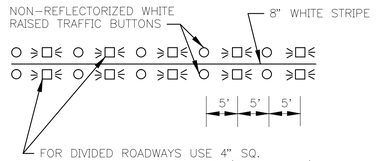


TABLE 1

TYPICAL LENGTH OF ESPLANADE OPENING "C" FOR PUBLIC STREET

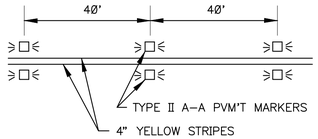
ESPLANADE INTERRUPTION	(1) NO LTB	(1) 1 LTB	(1) 2LTB
UNDIVIDED STREET < 40'	45'	52' (2)	60'
44'	50'	56' (2)	60'
DIVIDED STREET	D+10'	D+10'	D+10'

NOTES:
(1) LEFT TURN BAY
(2) DISTANCE FROM CENTERLINE OF OPENING TO ESPLANADE NOSE WITH LEFT TURN LANE MUST BE 30'

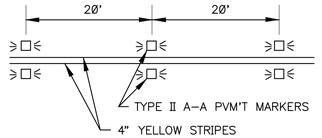
RADIUS DIMENSIONS

ESPLANADE	*R1	*R2
<8'	N/A	W/2
8'-38'	90'	W/5
>38'	N/A	15'

CENTER LINE DETAIL TANGENT SECTION



CENTER LINE DETAIL CURVE SECTION



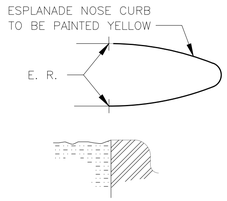
PAVEMENT MARKER LEGEND

SYMBOL	DESCRIPTION
⋗□⋖	TWO SIDED REFLECTORIZED RAISED PAVEMENT MARKER
□⋖	ONEE SIDED REFLECTORIZED PAVEMENT MARKER
○	NON-REFLECTIVE 4" DIA. RAISED TRAFFIC BUTTON

NOTES:

1. ALL STRIPING & MARKERS SHALL CONFORM WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS.
2. ALL TRAFFIC BUTTONS AND MARKERS SHALL BE INSTALLED ADJACENT TO STRIPES (APPROX. 2").
3. LEFT TURN STORAGE BAYS SHALL BE A MIN. OF 100' AT MINOR STREETS AND A MIN. OF 150' AT MAJOR STREETS.
4. REPEAT ARROWS AT APPROX. 1000' INTERVALS WITHIN TWO-WAY LEFT TURN SECTION.
5. WITHIN A TANGENT SECTION THE TYPE I-C PAVEMENT MARKERS CAN BE PLACED AT 40' C-C ON ROADWAYS WITHOUT CURB AND GUTTERS.

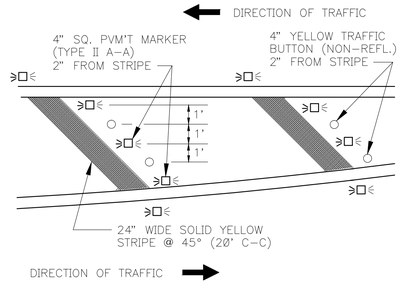
DETAIL "D"



TYPICAL CURB SECTION

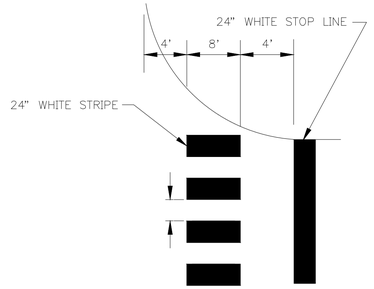
PAINT FROM THE BACK OF CURB TO THE GUTTER LINE

CROSSHATCHING DETAIL

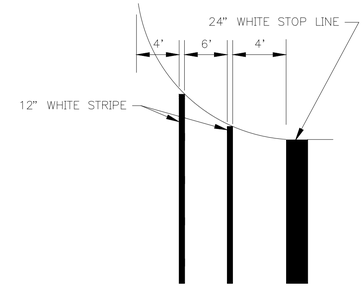


TYPICAL CROSSWALK PLACEMENT

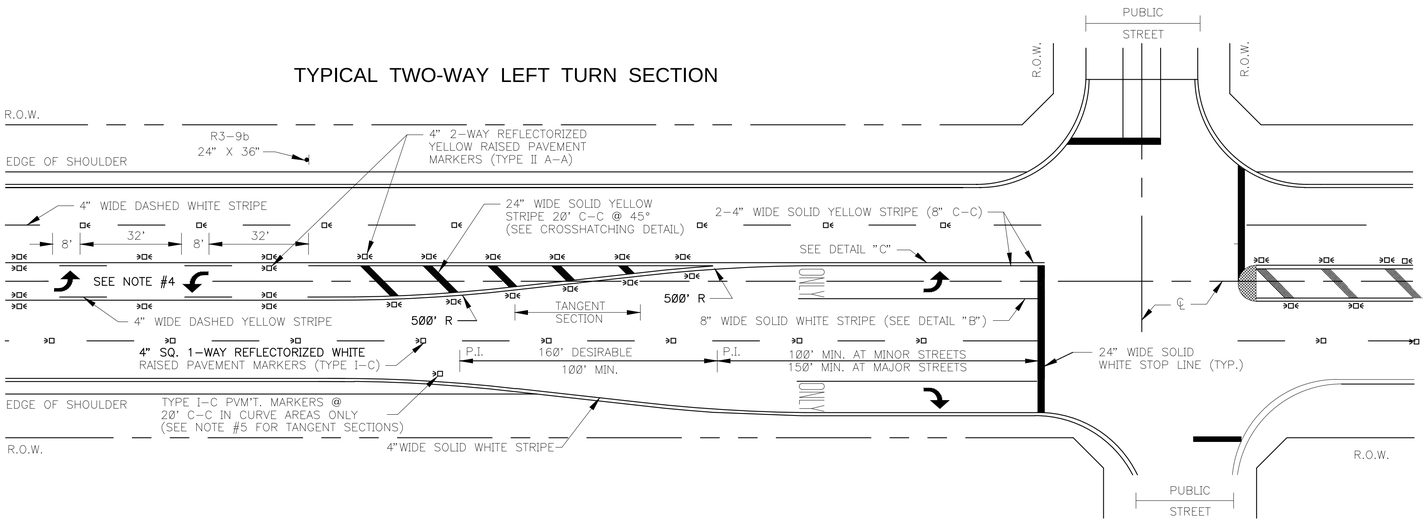
CONTINENTAL TYPE



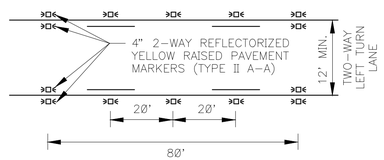
STANDARD TYPE



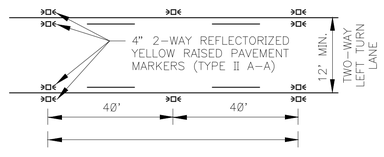
TYPICAL TWO-WAY LEFT TURN SECTION



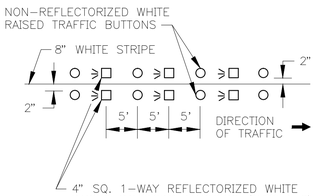
TWO-WAY LEFT TURN CURVE SECTION



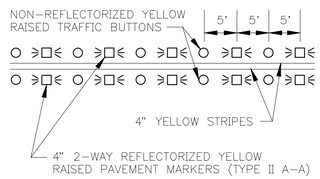
TWO-WAY LEFT TURN TANGENT SECTION



DETAIL "B"



DETAIL "C"



MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

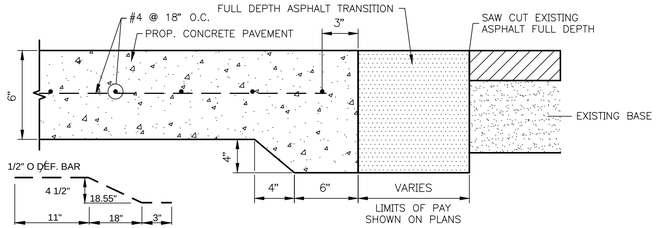
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstruction

Striping Details

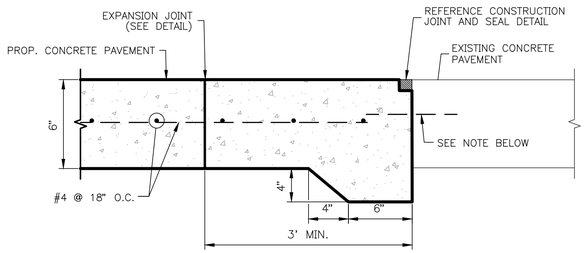
Job No.: 18-015	Scale:		SHEET
Date: September, 2019	HORZ:	N/A	36
Dwn By: D. Fattig	VERT:	N/A	OF 52
Chkd By: J Rudloff			



UNDERCUT BAR

CONCRETE PAVING HEADER AT ASPHALT PAVING

NOT TO SCALE

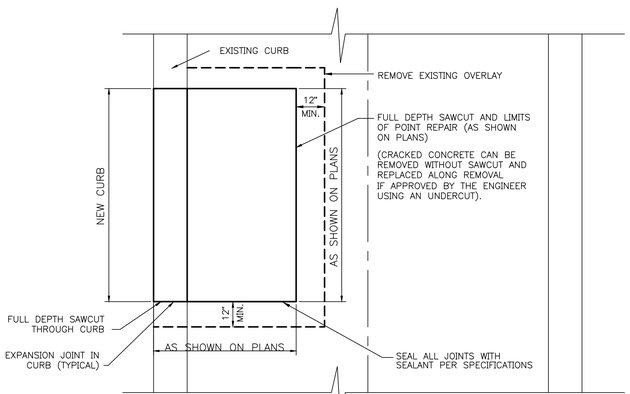


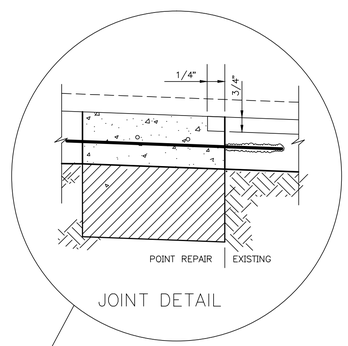
NOTES:

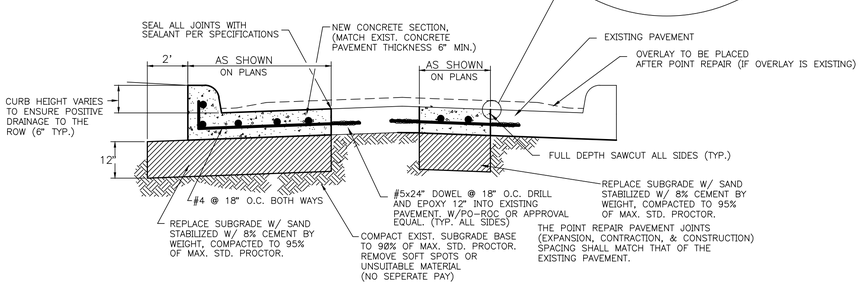
PROVIDE 3/4" DIAMETER SMOOTH STEEL BAR, 20" LONG ON 12" CENTERS. DRILL AND EPOXY DOWEL INTO EXISTING PAVEMENT WITH "PO ROC" OR EQUAL.

CONCRETE PAVING HEADER AT EXISTING CONCRETE PAVING

NOT TO SCALE



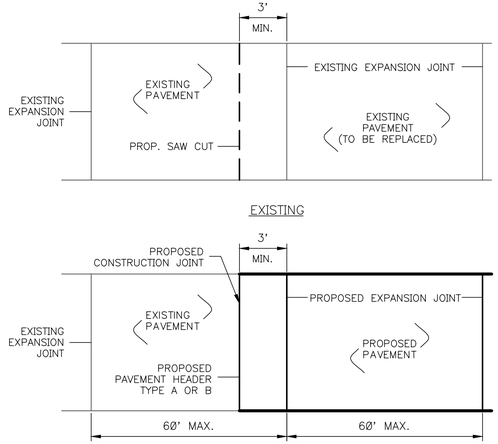




SECTION

TYPICAL POINT REPAIR DETAIL FOR CONCRETE STREETS ON CEMENT STABILIZED SAND SUBGRADE

NOT TO SCALE

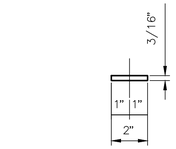


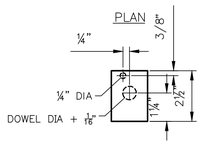
PAVEMENT JOINT LOCATION DETAIL WHERE PROPOSED PAVEMENT MEETS EXISTING

NOT TO SCALE

GENERAL NOTES:

1. ALL REINFORCING STEEL SHALL CONFORM TO A.S.T.M. DESIGNATION A-615, GRADE 60.
2. THE LOCATION OF EXPANSION JOINTS MAY BE REQUIRED TO SUIT THE PROPOSED METHODS OF THE CONTRACTOR. THE MAXIMUM WIDTH BETWEEN TRANSVERSE EXPANSION JOINTS SHALL NOT EXCEED 60'-0".
3. CONTROL JOINTS DEEP SHALL BE SAW CUT A DEPTH OF ONE QUARTER OF PAVEMENT THICKNESS PLUS 1/2 INCH AND FILLED WITH JOINT SEALANT @ 20' MAXIMUM SPACING BETWEEN CONTROL JOINTS.

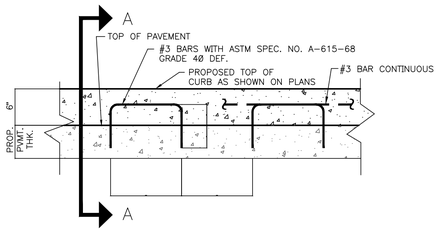




ELEVATION

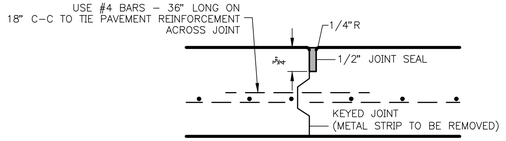
JOINT PLATE DETAIL

NOT TO SCALE



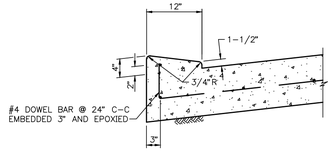
#3 BAR HOOP DETAIL

NOT TO SCALE



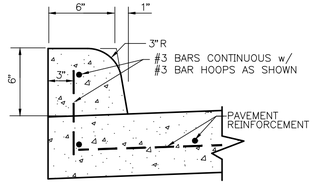
CONSTRUCTION JOINT AND SEAL DETAIL

NOT TO SCALE



4"x12" LAYDOWN CURB

NOT TO SCALE

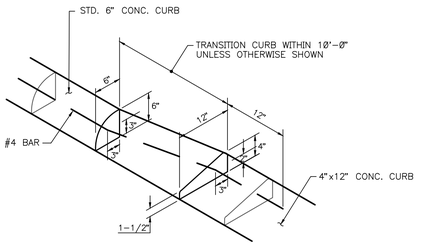


SECTION A-A

NOT TO SCALE

CONCRETE CURB NEW CONSTRUCTION

NOT TO SCALE

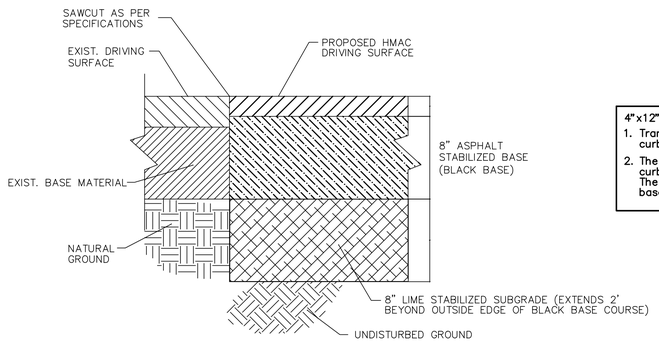


TYPICAL CURB TRANSITION

NOT TO SCALE

4"x12" LAYDOWN TRANSITION CURB NOTES:

1. Transitions from 6-inch concrete curb to 4-inch x 12-inch concrete curb to be accomplished within 10 feet, unless otherwise shown.
2. The gutter elevation is calculated from the proposed top of curb line elevation shown in profile minus 6-inch concrete curb. The gutter elevation for laydown will also be calculated based on 6-inch concrete curb.

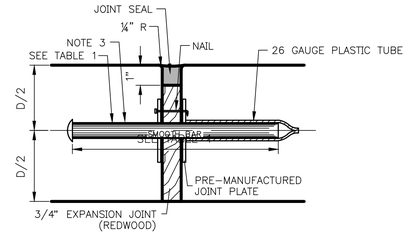


FULL DEPTH ASPHALT TRANSITION DETAIL

NOT TO SCALE

NOTES:

1. STEEL TO MEET ASTM STANDARD SPECIFICATIONS FOR CONCRETE REINFORCING BARS. UNITS TO BE SPACED ON 12" CENTERS.
2. EXPANSION JOINT TO BE PLACED AT THE END OF EACH CURB RADIUS AND SPACED AT A MAXIMUM DISTANCE OF 60 FEET.
3. CENTER DOWEL HORIZONTALLY ON JOINT.
4. CENTER DOWEL VERTICALLY IN CONCRETE BASE. EXTEND THICKENED CONCRETE AS NEEDED TO MAINTAIN 3" MIN. COVER.



SECTION
DOWEL TYPE EXPANSION JOINT

TABLE 1

PAVEMENT THICKNESS (IN)	DOWEL SIZES AND SPACINGS		
	DIAMETER (IN)	LENGTH (IN)	SPACING (IN)
6	3/4"	18	12
7	1	18	12
8	1¼	18	12

EXPANSION AND CONSTRUCTION JOINT DETAILS

NOT TO SCALE

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS — JOHN D. RUDLOFF — 83386 — LICENSED PROFESSIONAL ENGINEER

9-13-19

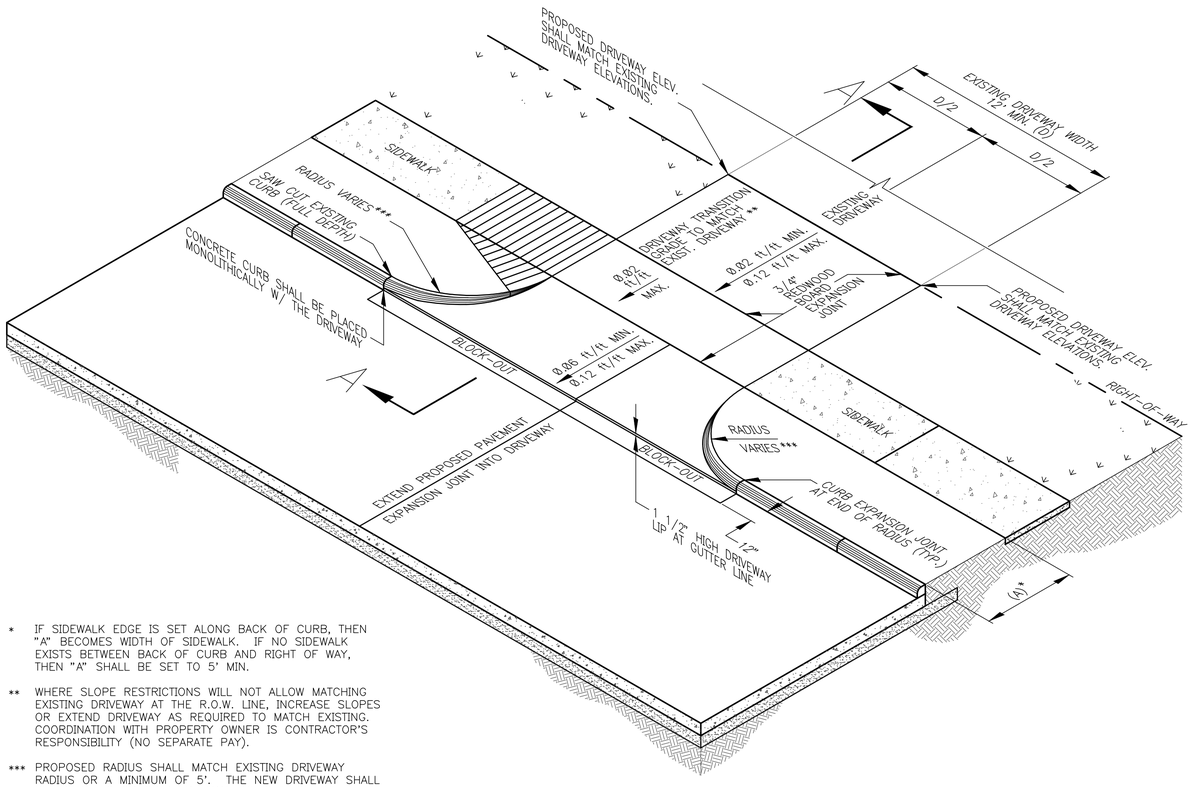
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Pavement Details I

Job No.: 18-015	Scale: HORZ: VERT: N/A	SHEET 37 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



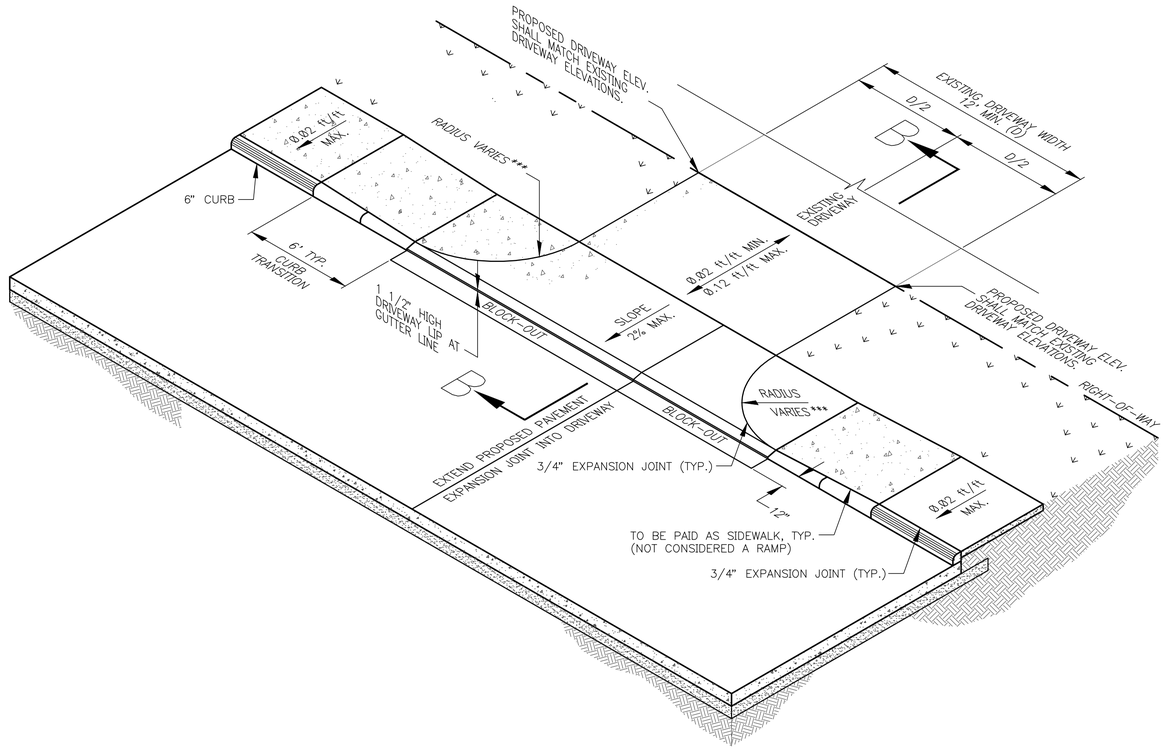
* IF SIDEWALK EDGE IS SET ALONG BACK OF CURB, THEN "A" BECOMES WIDTH OF SIDEWALK. IF NO SIDEWALK EXISTS BETWEEN BACK OF CURB AND RIGHT OF WAY, THEN "A" SHALL BE SET TO 5' MIN.

** WHERE SLOPE RESTRICTIONS WILL NOT ALLOW MATCHING EXISTING DRIVEWAY AT THE R.O.W. LINE, INCREASE SLOPES OR EXTEND DRIVEWAY AS REQUIRED TO MATCH EXISTING. COORDINATION WITH PROPERTY OWNER IS CONTRACTOR'S RESPONSIBILITY (NO SEPARATE PAY).

*** PROPOSED RADIUS SHALL MATCH EXISTING DRIVEWAY RADIUS OR A MINIMUM OF 5'. THE NEW DRIVEWAY SHALL BE EQUAL TO OR GREATER THAN THE SIZE OF THE EXISTING DRIVEWAY (MIN. 12' WIDTH).

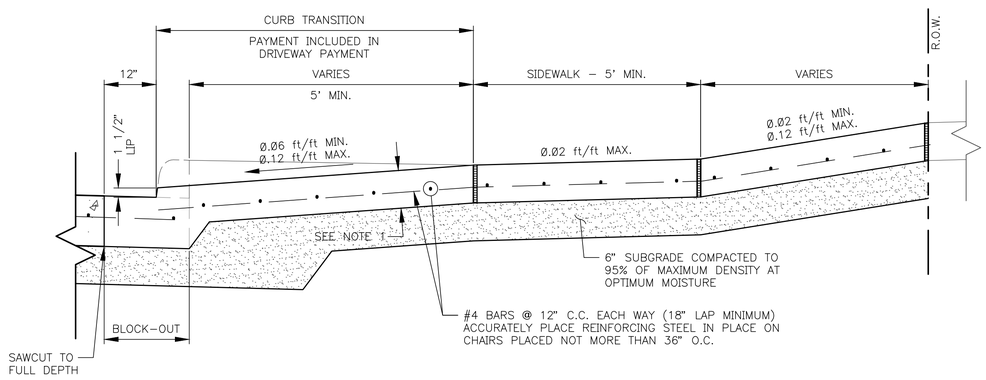
DRIVEWAY DETAIL

NOT TO SCALE

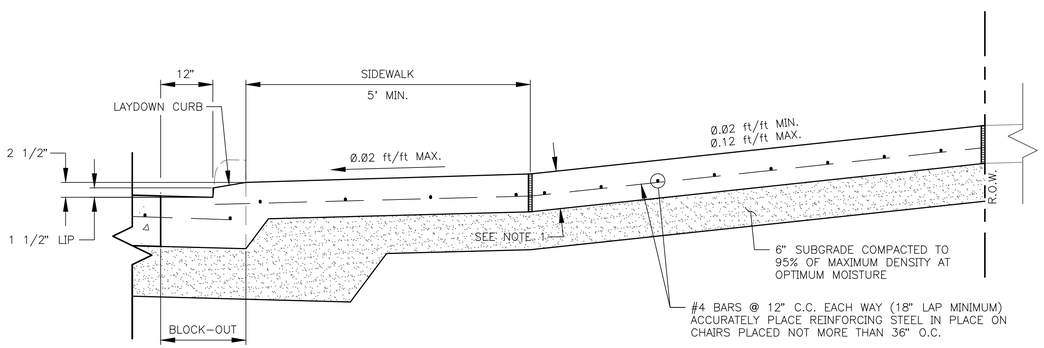


DRIVEWAY DETAIL W/ SIDEWALK ADJACENT TO CURB

NOT TO SCALE



SECTION A-A



SECTION B-B

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED PROFESSIONAL ENGINEER

9-13-19

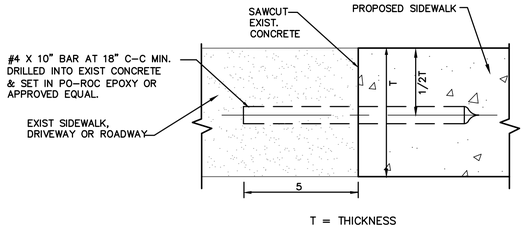
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Paving Details II

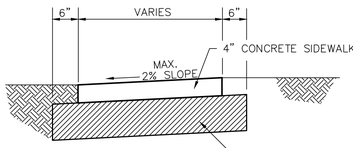
Job No.: 18-015	Scale:	SHEET
Date: September, 2019	HORZ:	38
Dwn By: D. Fattig	VERT: N/A	OF 52
Chkd By: J Rudloff		



T = THICKNESS

PROPOSED SIDEWALK AT EXISTING CONCRETE DETAIL

NOT TO SCALE



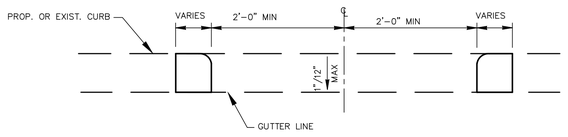
SECTION

NOTES:

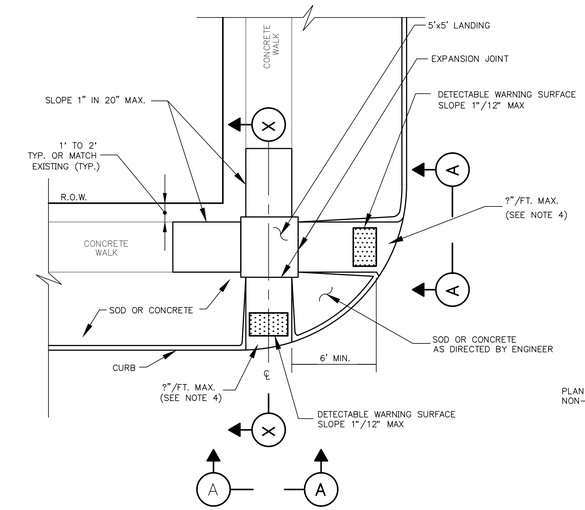
1. ALL EDGES SHALL BE ROUNDED WITH 1/4" RADIUS.
2. CONTRACTION JOINTS SHALL BE SPACED AT 4'-0" INTERVALS.
3. CONTRACTION JOINTS SHALL BE 1" DEEP AND EDGED WITH 1/4" RADIUS.
4. EXPANSION JOINTS SHALL BE SPACED AT 20 FT. INTERVALS. (MAXIMUM)
5. WHERE NEW SIDEWALK IS PLACED AGAINST EXISTING SIDEWALK, SAWCUT EXISTING SIDEWALK TO AN EVEN STRAIGHT LINE PRIOR TO INSTALLATION OF THE NEW SIDEWALK.

CONCRETE SIDEWALK DETAILS

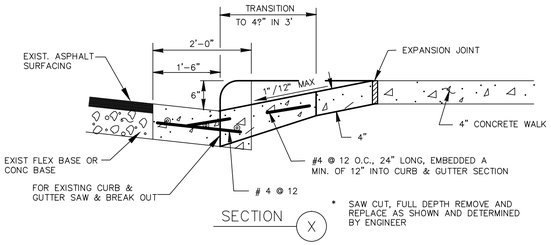
NOT TO SCALE



SECTION A
N.T.S.



CURB RAMP

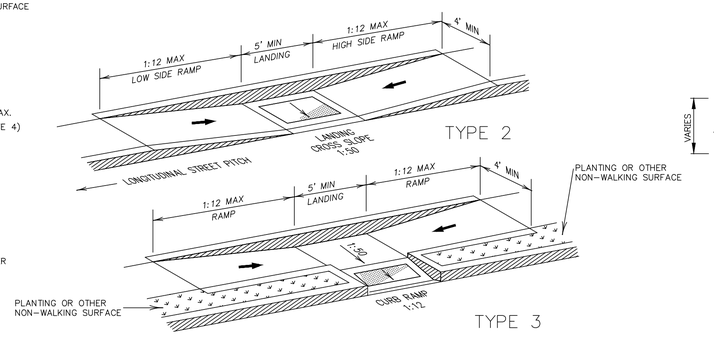


SECTION X

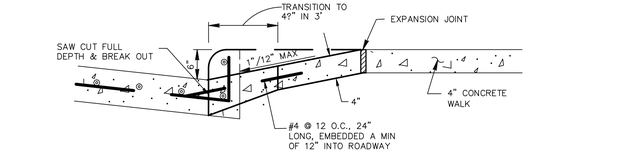
* SAW CUT, FULL DEPTH REMOVE AND REPLACE AS SHOWN AND DETERMINED BY ENGINEER

EXISTING CURB & GUTTER CONSTRUCTION

NOT TO SCALE



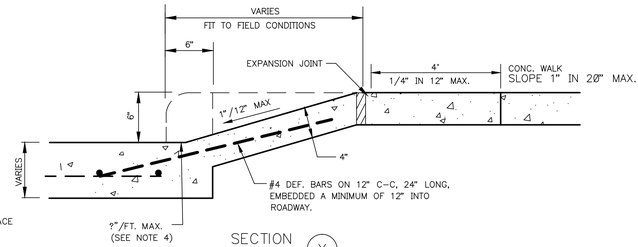
PARALLEL CURB RAMPS



SECTION X

EXISTING CONCRETE PAVEMENT CONSTRUCTION

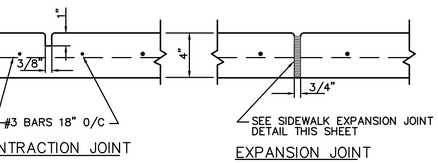
NOT TO SCALE



SECTION X

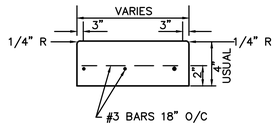
TYPICAL

NOT TO SCALE

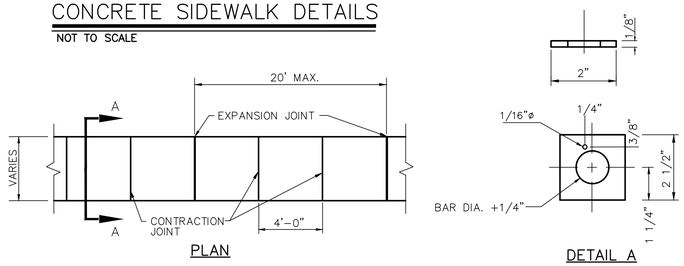


CONTRACTION JOINT

EXPANSION JOINT

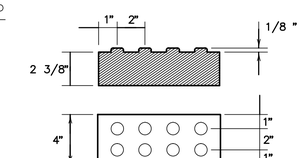


SECTION A-A

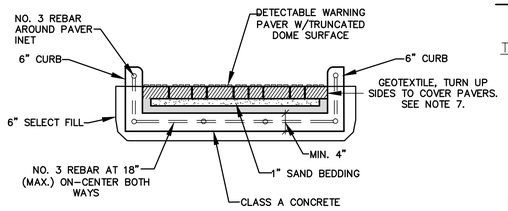


PLAN

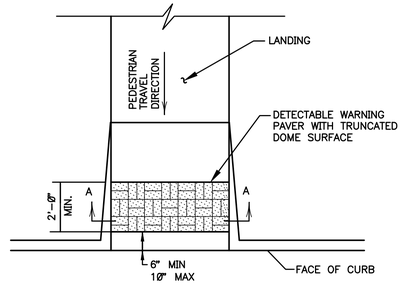
DETAIL A



DETECTABLE WARNING PAVER



SECTION A-A



TRUNCATED DOME PATTERN CURB RAMP

GENERAL NOTES (PAVERS):
FURNISH DETECTABLE WARNING PAVER UNITS MEETING ALL REQUIREMENTS OF ASTM C-936, C-33. LAY IN A TWO BY TWO UNIT BASKET WEAVE PATTERN OR AS DIRECTED.

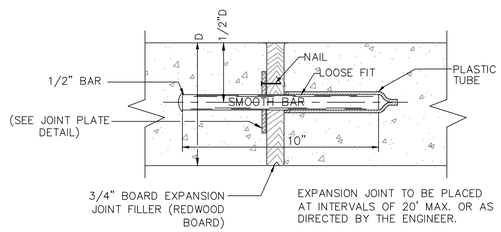
LAY FULL-SIZE UNITS FIRST FOLLOWED BY CLOSURE UNITS CONSISTING OF AT LEAST 25 PERCENT OF A FULL UNIT. CUT DETECTABLE WARNING PAVER UNITS USING A POWER MASONRY SAW AND SHALL BE CUT FULL DEPTH.

DETECTABLE WARNING PAVER

NOT TO SCALE

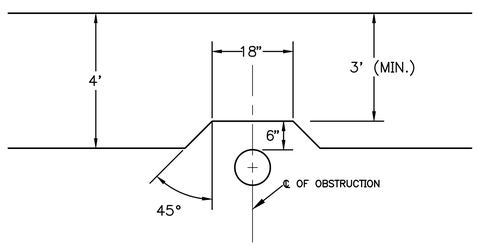
NOTES FOR DETECTABLE WARNINGS:

1. CURB RAMPS MUST CONTAIN A DETECTABLE WARNING SURFACE THAT CONSISTS OF RAISED TRUNCATED DOMES COMPLYING WITH SECTION 4.29 OF THE TEXAS ACCESSIBILITY STANDARDS (TAS). THE SURFACE MUST CONTRAST VISUALLY WITH ADJOINING SURFACES. THE CONTRACTOR SHALL COORDINATE WITH THE CITY TO OBTAIN APPROVAL OF THE COLOR PRIOR TO INSTALLING THE TRUNCATED DOME.
2. DETECTABLE WARNING SURFACES MUST BE SLIP RESISTANT AND NOT ALLOW WATER TO ACCUMULATE.
3. ALIGN TRUNCATED DOMES IN THE DIRECTION OF PEDESTRIAN TRAVEL WHEN ENTERING THE STREET.
4. SHADED AREAS ON THE CURB RAMP DETAILS INDICATE THE APPROXIMATE LOCATION FOR THE DETECTABLE WARNING SURFACE FOR THE CURB RAMP.
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 RAMP OR LANDING WHERE THE PEDESTRIAN ACCESS ROUTE ENTERS THE STREET.
6. DETECTABLE WARNING SURFACE SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS A MINIMUM 6" AND A MAXIMUM 10" FROM THE EXTENSION OF THE FACE OF CURB. DETECTABLE WARNING SURFACES MAY BE CURVED ALONG THE CORNER RADIUS.
7. GEOTEXTILE SHALL BE INSTALLED AND CUT FLUSH WITH TOP OF PAVEMENT. ANY RAGGED EDGE EXPOSED AFTER PAVERS ARE IN PLACE, SHALL BE REMOVED BY HEAT.



SIDEWALK EXPANSION JOINT DETAIL

NOT TO SCALE



SIDEWALK AROUND OBSTRUCTION

NOT TO SCALE

WHEEL CHAIR RAMP NOTES:

1. THE LOCATION OF A WHEELCHAIR RAMP MAY BE SHIFTED FROM THE PROPOSED LOCATION OF THE PLANS, BECAUSE OF UNFORESEEN EXISTING CONDITIONS AT THE TIME OF CONSTRUCTION. A CHANGE IN LOCATION WILL BE AS DIRECTED BY THE CITY OR ENGINEER.
2. ALL REINFORCING STEEL SHALL BE NEW BILLET STEEL AND MEET THE REQUIREMENTS OF ASTM DESIGNATION A-615. GRADE 60 DEFORMED BARS, FOR CONCRETE REINFORCEMENT.
3. MINIMUM CLEAR WIDTH OF WHEELCHAIR RAMP IS 3-0".
4. IN AREAS WHERE CURB RAMP CONNECTS TO ROADWAY GUTTER WITHIN LIMITS OF A CURB ARC, A FLATTENED AREA (¼"/FT. MAX.) SHALL BE PROVIDED SUCH THAT THE APPROACH TO RAMP IS 90° TO THE RAMP TRAVEL DIRECTION. FLATTENED AREA SHALL BE SLOPED TOWARD GUTTER TO PROVIDE POSITIVE DRAINAGE.
5. CONTRACTOR SHALL ENSURE CONNECTION OF PROPOSED SIDEWALK TO EXISTING SIDEWALK IS EVEN. ANY CHANGE IN ELEVATION IN EXCESS OF ¼" WILL REQUIRE REMOVAL AND REPLACEMENT OF PROPOSED SIDEWALK.
6. IN THE EVENT FIELD CONDITIONS PREVENT THE SIDEWALK TRANSITIONS FROM BEING CONSTRUCTED @ A 1:20 SLOPE OR LESS, CONTRACTOR SHALL INSTALL ADDITIONAL WHEELCHAIR RAMP. CONTRACTOR SHALL COORDINATE THE ADDITIONAL WHEELCHAIR RAMP LENGTH IN THE FIELD WITH THE OWNER'S REPRESENTATIVE.
7. ADDITIONAL INFORMATION ON WHEELCHAIR RAMP LOCATION, DESIGN VISIBILITY AND TEXTURE MAY BE FOUND IN THE CURRENT EDITION OF THE TEXAS ACCESSIBILITY STANDARDS (TAS) PREPARED AND ADMINISTERED BY THE TEXAS DEPARTMENT OF LICENSING AND REGULATION (TDLR).

WHEELCHAIR RAMP DETAIL

NOT TO SCALE

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83380
LICENSED
PROFESSIONAL ENGINEER

9-13-19

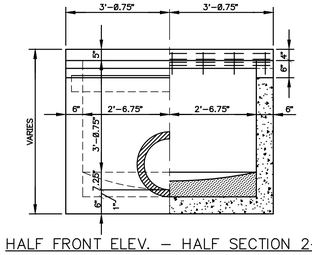
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

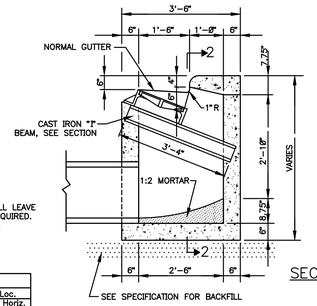
Paving Construction Details III

Job No.: 18-015	Scale: HORZ: N/A VERT:	SHEET 39 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

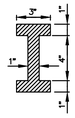


HALF FRONT ELEV. – HALF SECTION 2-2

NOTES:
USE CAST IRON FRAME AND PLATE (PER SPECIFICATIONS). LEAD SHALL LEAVE INLET AT LOCATION AND GRADE REQUIRED. BRICK INLETS ARE NOT PERMITTED.

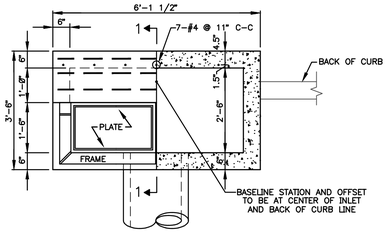


SECTION 1-1

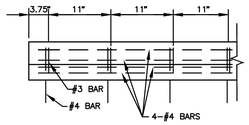


SECTION THRU "I" BEAM

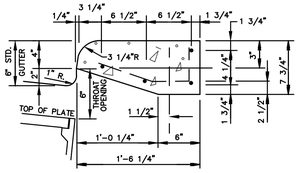
BAR LIST				
No.	Size	Length	Shp.	Loc.
4	#4	5'-10"	St.	Horiz.
7	#4	8'-10"	St.	Vert.
7	#3	1'-6"	Bt.	



HALF PLAN – HALF HORIZ. SECTION



HALF FRONT ELEVATION

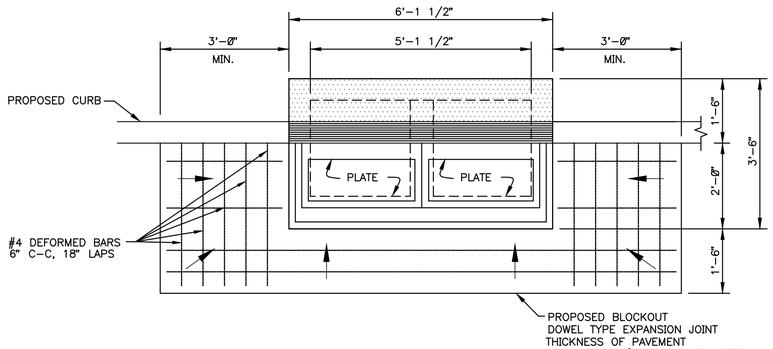


TRANS SECTION

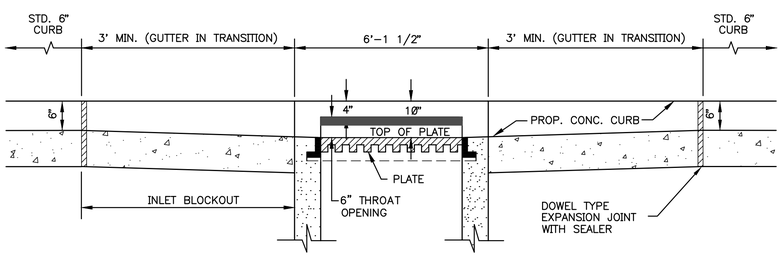
PRECAST CURB BEAM

TYPE B-B' INLET

NOT TO SCALE

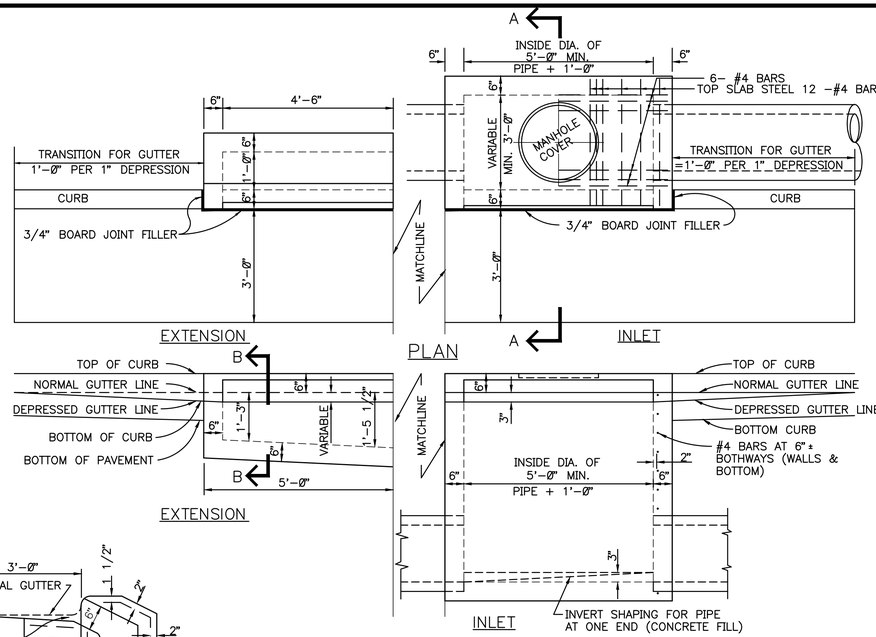


PLAN (TYPE B-B SHOWN)

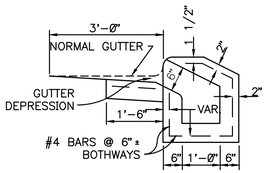


GUTTER DEPRESSIONS FOR INLETS

NOT TO SCALE



ELEVATION-WITH GUTTER DEPRESSION



SECTION B-B

GENERAL NOTES:

All concrete shall be Class A. All exposed corners shall be chamfered 3/4". Pipes shall enter inlets as shown elsewhere on plans. Slope top of inlets as directed to match graded section.

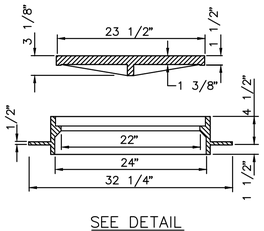
All materials used in casting manhole covers and ladder rung shall conform to A.S.T.M. Specifications. Payment of curb inlets and extensions thereto as shown on the plans will be made at the unit prices bid for the "Inlets" and "Inlet Extensions".

A permissible construction joint may be placed in the inlet wall with the approval of the Engineer. Where shown elsewhere on plans a 6"x24" opening shall be placed in the backwall of the inlet as directed by the Engineer.

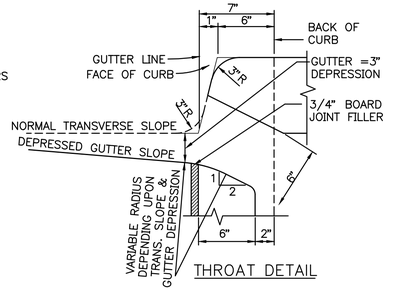
Manhole ring and cover shall be 23" unless otherwise specified in the plans. Precasting of Stage I Construction will be permitted with the approval of the Engineer. Connection of pipes to precast units shall be mortared as directed by the Engineer.

* But not less than six inches over highest pipe.

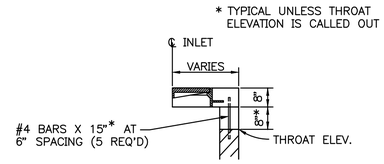
Control points for horizontal layout of "c" inlets, all types, is the lateral center of the inlet, without regard for extensions, at the back of curb line.



SEE DETAIL

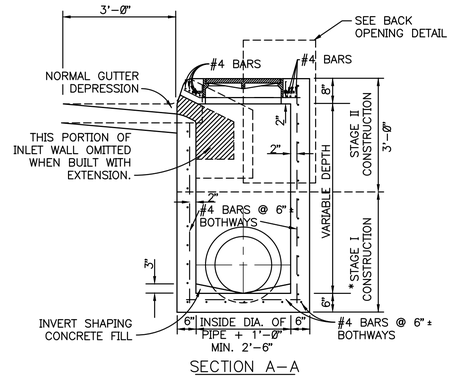


THROAT DETAIL



3' BACK OPENING

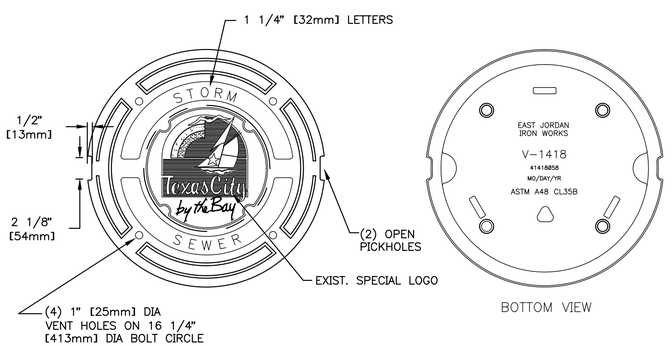
Note: This is to be used only where specified in plans.



SECTION A-A

TYPE "C" INLET DETAILS

NOT TO SCALE



TYPE "C"/"C-1"/"C-2"/"C-2A" INLET MANHOLE COVER DETAIL

NOT TO SCALE

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

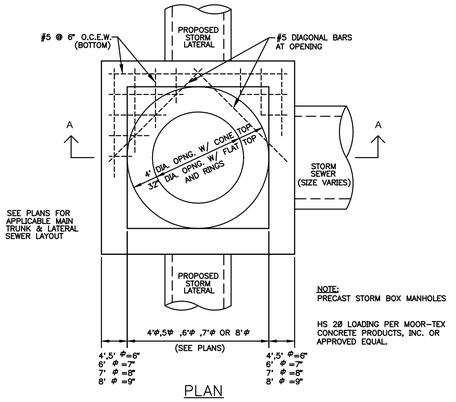
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

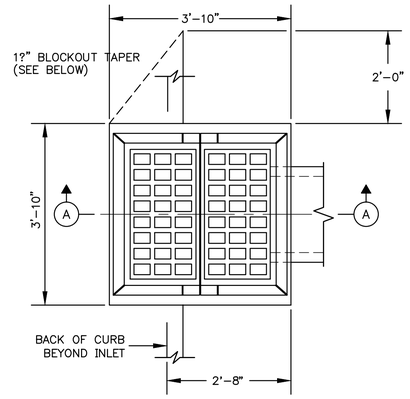
Texas Avenue Reconstrution

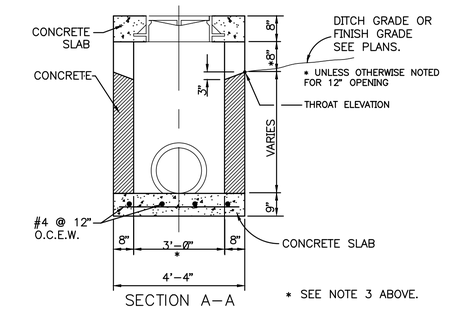
Drainage Details I

Job No.: 18-015	Scale:	SHEET
Date: September, 2019	HORZ:	40
Dwn By: D. Fattig	VERT: N/A	OF 52
Chkd By: J Rudloff		



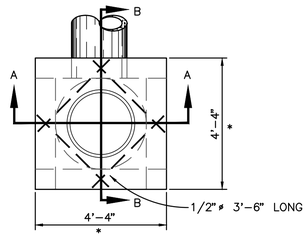
PLAN



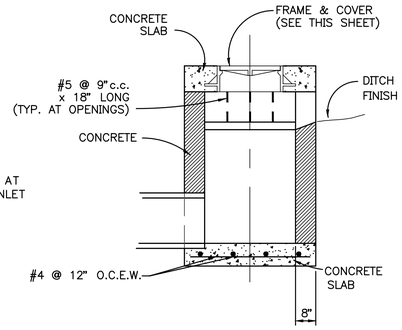


SECTION A–A

* SEE NOTE 3 ABOVE.



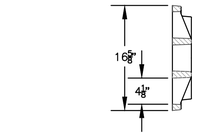
PLAN



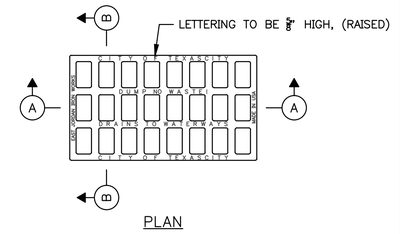
SECTION B–B

NOTE:

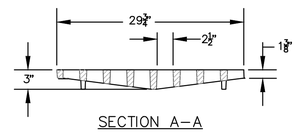
1. IF PRECAST INLETS ARE NOT USED, INSTALL #4 REINFORCING BARS AT 6" O.C.E.W. IN WALLS.
2. WHERE SIZE OF PIPES PASSING THROUGH INLET EXCEEDS 30", INCREASE INSIDE WIDTH TO DIAMETER OF PIPE PLUS 1'-0" (O.D. + 1'-0")
3. WHERE INLETS ARE LOCATED ON BOX CULVERTS OR OTHER FLAT TOP STRUCTURES, MOUNT THEM PER MANWAY DETAIL WITH APPROXIMATELY SIZED SQUARE OPENING.



SECTION B–B



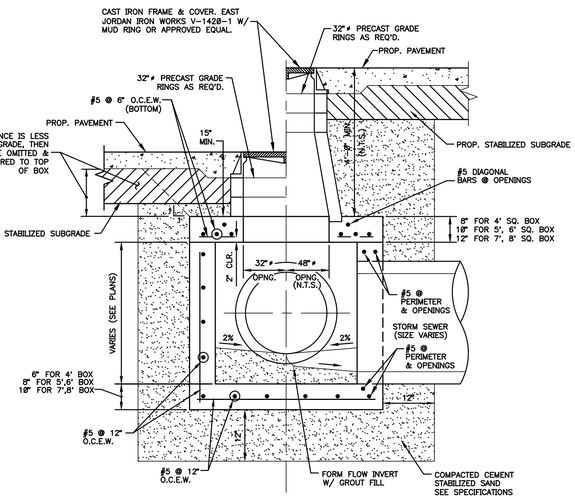
PLAN



SECTION A–A

TYPE "E" INLET

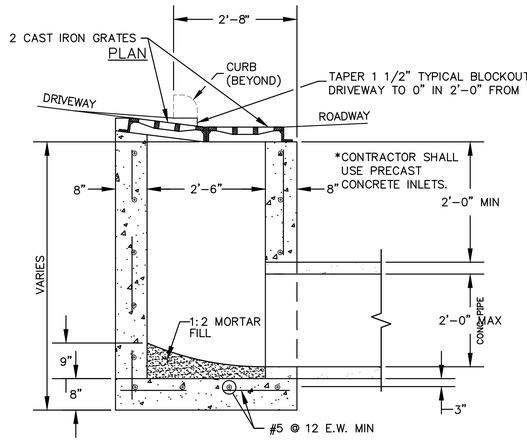
NOT TO SCALE



SECTION A

PRECAST STORM SEWER BOX MANHOLE

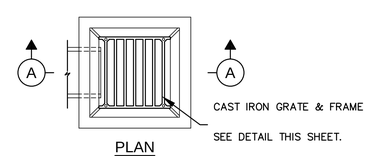
NOT TO SCALE



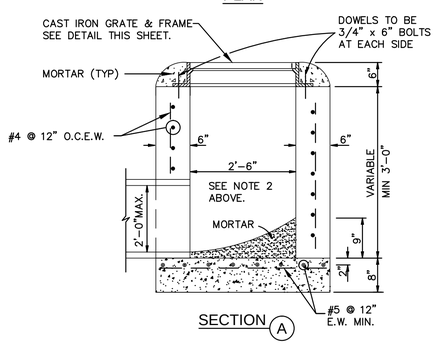
SECTION A

ALTERNATE TYPE B–B INLET WITH GRATE TOP

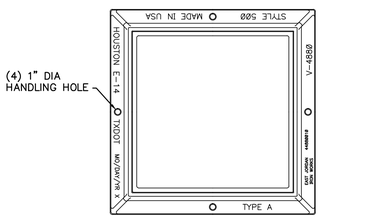
NOT TO SCALE



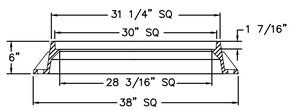
PLAN



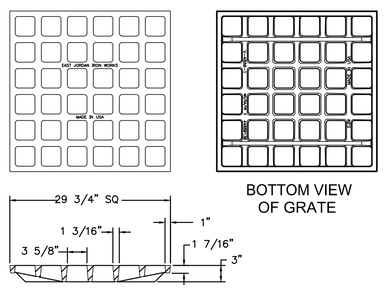
SECTION A



(4) 1" DIA HANDLING HOLE



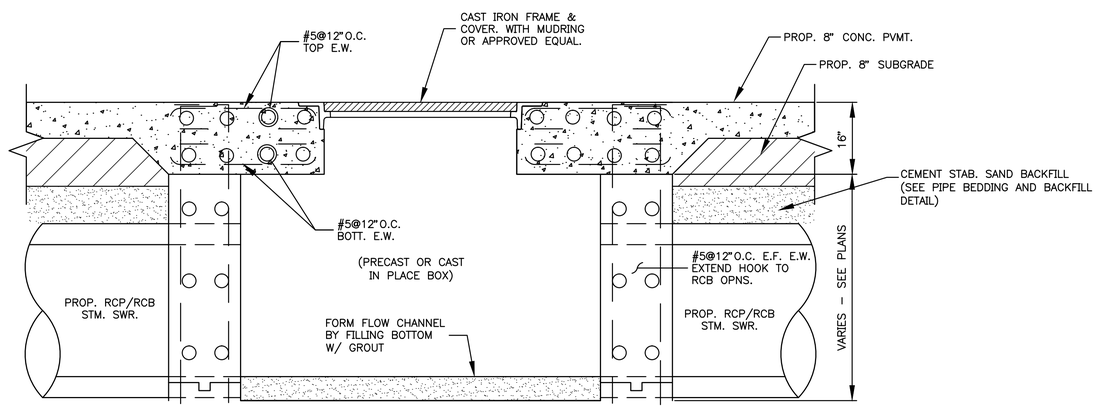
FRAME SECTION



BOTTOM VIEW OF GRATE

GRATE SECTION

TYPE "A" GRATE INLET DETAIL



SHALLOW BOX MANHOLE CAST IN PLACE TOP DETAIL

NOT TO SCALE

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9–13–19

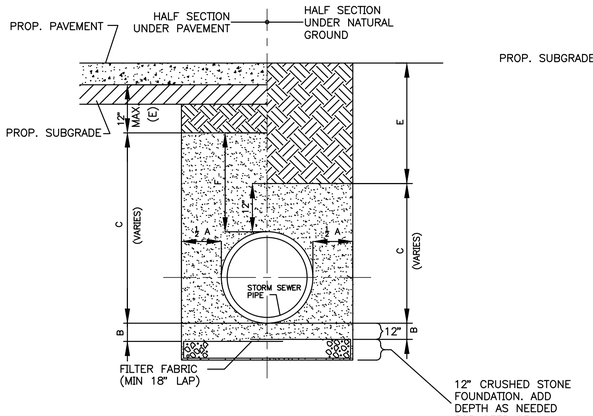
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

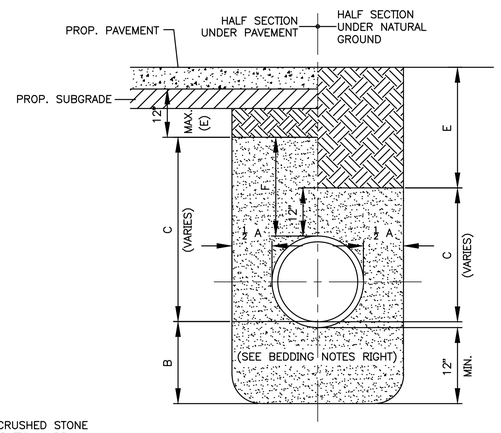
Drainage Details II

Job No.: 18–015	Scale:	SHEET
Date: September, 2019	HORZ:	41
Dwn By: D. Fattig	VERT: N/A	OF 52
Chkd By: J Rudloff		



WET CONDITION BEDDING

NOT TO SCALE



BEDDING AND BACKFILL DETAIL FOR STORM SEWER PIPES

NOT TO SCALE

BEDDING AND BACKFILL NOTES (APPLICABLE TO ALL DETAILS THIS SHEET):

A. MIN. TRENCH WIDTH SHALL BE PIPE O.D. PLUS AN ALLOWANCE "A" FOR THE NOMINAL PIPE SIZE:

NOMINAL PIPE SIZE	"A"
<18"	18"
18" TO 30"	24"
>30"	36"

MAX TRENCH WIDTH SHALL NOT BE GREATER THAN MIN TRENCH WIDTH PLUS 24". UNLESS OTHERWISE NOTED.

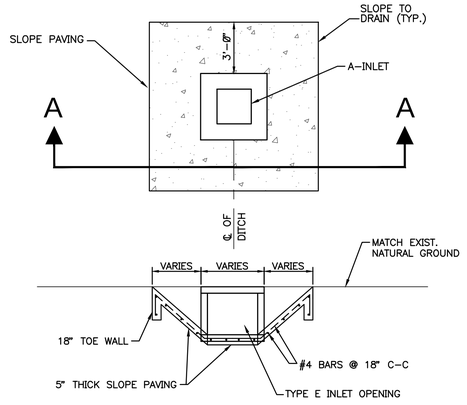
IF OUTSIDE EDGE OF PIPE IS WITHIN 2' OF BACK OF CURB, BACKFILL SHALL BE PERFORMED AS UNDER PAVEMENT.

B. CEMENT STABILIZED SAND (1.5 SACKS OF CEMENT PER CUBIC YARD, COMPACTED TO 95% OF MAX. STD. PROCTOR) PLACED BEFORE PIPE IS LAID UP TO FLOW LINE OF PIPE OR ABOVE-MINIMUM DEPTH = 12".

C. CEMENT STABILIZED SAND (AS SPECIFIED ABOVE) PLACED AFTER PIPE IS LAID IN 8" LIFTS.

D. COMPACTED BANK SAND BACKFILL, COMPACTED AS PER SPECIFICATIONS.

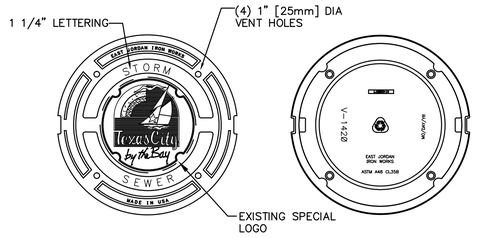
E. SELECT EARTH BACKFILL WITH MAX LIQUID LIMIT OF 40, MIN. P.I. OF 7, MAX P.I. OF 20 CONTAINING NO ROCKS OR OTHER DEBRIS NOR CONTAINING ANY DIRT CLODS EXCEEDING 6" IN ANY DIMENSION. PLACED IN 6" LAYERS, MOISTENED IF NECESSARY AND THOROUGHLY COMPACTED TO 95% DENSITY AS DETERMINED BY BY ASTM D698, UNLESS OTHERWISE NOTED.



SECTION A-A

SLOPE PAVING W/ WINGWALL AT E-INLET

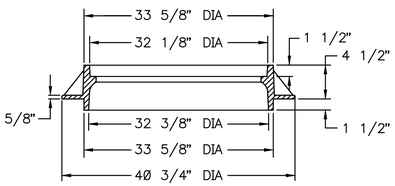
NOT TO SCALE



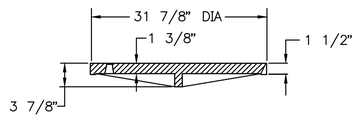
BOTTOM VIEW OF COVER

STORM MANHOLE FRAME & COVER

NOT TO SCALE



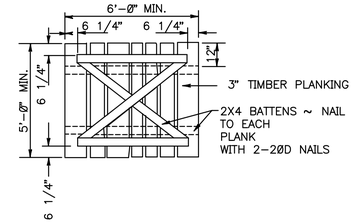
FRAME WITH MUDRING



RIBBED COVER

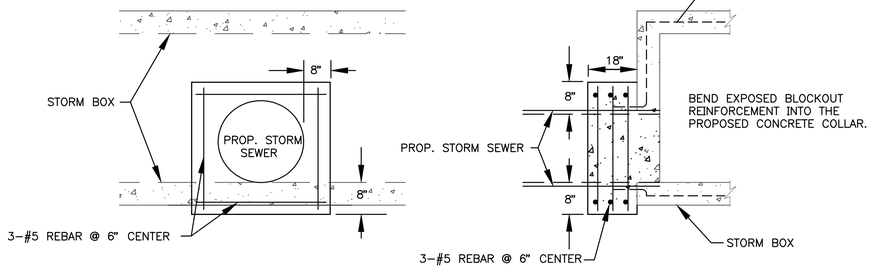
GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS A. ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4". PIPES SHALL ENTER INLETS AS SHOWN ELSEWHERE ON PLANS. SLOPE TOP OF INLETS AS DIRECTED TO MATCH GRADED SECTION.
2. ALL MATERIALS USED IN CASTING MANHOLE COVERS AND LADDER RUNG SHALL CONFORM TO A.S.T.M. SPECIFICATIONS.
3. A PERMISSIBLE CONSTRUCTION JOINT MAY BE PLACED IN THE INLET WALL WITH THE APPROVAL OF THE ENGINEER.
4. MANHOLE RING AND COVER SHALL BE 32" UNLESS OTHERWISE SPECIFIED IN THE PLANS. CONNECTION OF PIPES TO PRECAST UNITS SHALL BE MORTARED AS DIRECTED BY THE ENGINEER.



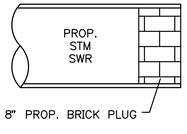
PLAN ~ TEMPORARY TIMBER COVER

NOT TO SCALE



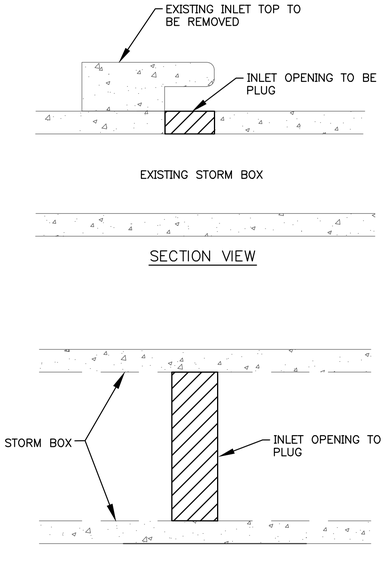
PIPE TO BOX CONNECTION DETAIL

NOT TO SCALE



PLUG PROPOSED STORM SEWER

NOT TO SCALE



PLUG PROPOSED INLET OPENING

NOT TO SCALE

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED PROFESSIONAL ENGINEER

9-13-19

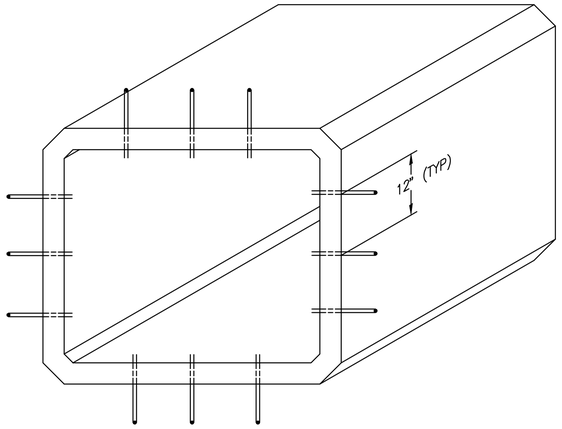
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

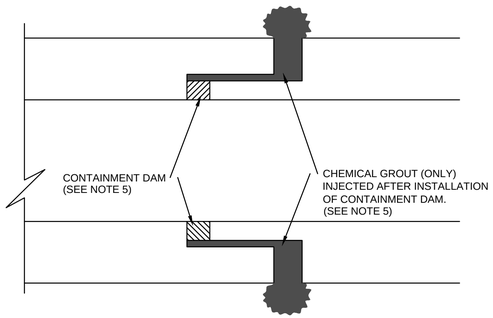
Texas Avenue Reconstrution

Drainage Details III

Job No.: 18-015	Scale:	SHEET
Date: September, 2019	HORZ:	42
Dwn By: D. Fattig	VERT: N/A	OF 52
Chkd By: J Rudloff		



JOINT REPAIR SPACING



JOINT REPAIR DETAIL

NOTES:

1. JOINT REPAIR SHALL BE PERFORMED FROM THE INSIDE OF THE STORM SEWER SYSTEM AND SHALL BE PERFORMED IN STRICT ACCORDANCE TO ALL LOCAL, STATE, AND FEDERAL LAWS. THE CONTRACTOR SHALL PROVIDE A SAFETY PLAN THAT SHALL INCLUDE BUT NOT LIMITED TO, GAS DETECTOR, TRIPOD AND WRENCH, HARNESS, VENTILATION DEVICES, ETC.

2. CONTRACTOR SHALL REMOVE ALL EXISTING FILL AND DEBRIS FROM ALL AREAS AROUND THE JOINTS TO A WIDTH OF 12" FROM CENTERLINE OF JOINT. THE FILL AND DEBRIS CAN BE TEMPORARILY PLACED ADJACENT TO THE JOINT AND BE REPLACED IN THE SAME LOCATION AT THE SAME HEIGHT AFTER REPAIR OF JOINT. FILL WILL NOT BE ALLOWED TO REMAIN IN A PILE AFTER REPAIR OF THE JOINT.

3. COFFERDAMS, SANDBAGS, PUMPS AND OTHER MEANS OF DEWATERING SHALL BE USED TO MAINTAIN THE WATER AT A LOW LEVEL. IT IS NOT NECESSARY FOR THE JOINT TO BE DRY, BUT WATER LEVEL SHALL BE MAINTAINED AT AS LOW A LEVEL AS IS PRACTICAL. FLOW IN BOX CULVERTS MUST BE CONTROLLED TO AN EXTENT THAT JOINT BEGINNING REPAIRED IS NOT INUNDATED BY WATER.

4. ALL EXISTING BITUMINOUS JOINT SEALANT MATERIAL, SHALL BE REMOVED FROM JOINTS PRIOR TO WORK. THE JOINTS SHALL BE CLEANED BY PRESSURIZED WATER BLASTERS TO TO REMOVE LOOSE DEBRIS.

5. THE JOINTS SHALL HAVE A "CONTAINMENT DAM" USED TO PROVIDE CONTAINMENT FOR THE GROUT THAT IS INJECTED BEHIND THE BOX CULVERT. THE "CONTAINMENT DAM" SHALL BE AN APPROVED CEMENTITIOUS GROUT OR SATURATED JUTE OAKUM WITH AN APPROVED CHEMICAL GROUT, AS INDICATED IN SPECIFICATIONS. CEMENTITIOUS GROUT MAY ONLY BE USED IN SECTIONS OF NON-SUBMERGED JOINTS ONLY. SATURATED JUTE OAKUM SHALL BE USED IN SUBMERGED AREAS AND MAY BE USED IN NON-SUBMERGED AREAS AS WELL. NON-SUBMERGED AREAS ARE DEFINED AS SECTIONS IN THE JOINT THAT ARE A MINIMUM OF ONE (1) FOOT ABOVE THE STANDING WATER LEVEL OF THE BOX CULVERT, AT EITHER PRE-CONSTRUCTION OR CONSTRUCTION PHASE, WHICHEVER IS HIGHER. ALL OTHER AREAS OF THE JOINT ARE CONSIDERED SUBMERGED.

6. AFTER THE INSTALLATION OF THE CONTAINMENT DAM, CHEMICAL GROUT SHALL BE PUMPED BEHIND CULVERT @ 12" SPACING STARTING AT THE MIDDLE OF THE BOTTOM JOINT UNTIL OUTCROPPING IS SEEN OR GROUT ACHIEVES A PRESSURE OF 125 PSI OR AS PER MANUFACTURERS SUGGESTED PRESSURE CRITERIA.

7. OUTCROPPED CHEMICAL GROUT MATERIAL SHALL BE REMOVED, FLUSHED TO JOINT, AND DISPOSED OF PROPERLY.

8. CLEANUP MUST BE DONE WITHOUT INORDINATE USE OF FLAMMABLE OR HAZARDOUS CHEMICALS.

9. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ANY IMPEDANCE TO FLOW, SUCH AS TEMPORARY COFFERDAMS, SANDBAGS, AND EQUIPMENT FROM THE BOX CULVERTS IN THE EVENT OF RAIN.

HORIZONTAL NOTES:

1. TRENCH CONDITIONS SHALL BE SUCH THAT PIPE JOINTING CAN BE ACCOMPLISHED WITHOUT GETTING MUD, SILT, GRAVEL OR OTHER FOREIGN MATERIALS INTO THE JOINT. GENERALLY THE TRENCH SHOULD BE DEWATERED AND HAVE A FIRM BOTTOM FREE OF MUCK.

2. PRIME JOINT AS PER MANUFACTURER'S RECOMMENDATIONS. REMOVE PROTECTIVE WRAPPER ON ONE SIDE OF PREFORMED RAM-NEK STRIP OR COIL AND PRESS FIRMLY TO DRY, CLEAN JOINT SURFACE. BEFORE LAYING THE PIPE IN THE TRENCH, ATTACH THE GASKETS END-TO-END TO THE LEADING EDGE OF THE TONGUE OR GROOVE OF EACH PIPE JOINT, FORMING A CONTINUOUS GASKET AROUND THE CIRCUMFERENCE. REMOVE PROTECTIVE WRAPPER BEFORE JOINING PIPE SECTIONS.

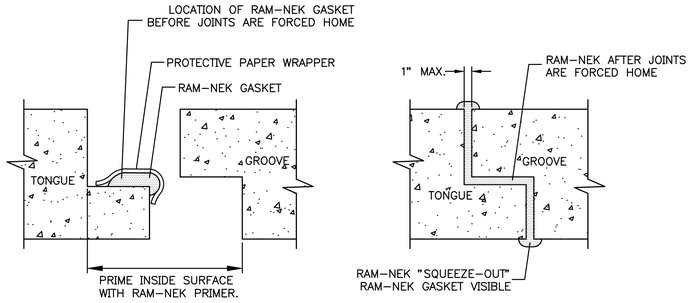
3. AFTER THE GASKET IS APPLIED, THE PIPE SHOULD BE HANDLED CAREFULLY TO AVOID DISPLACING OR SOILING OF GASKET. ANY GASKET SO DISTURBED SHOULD BE REPLACED.

4. THE PIPE SHOULD BE PROPERLY ALIGNED BEFORE JOINTS ARE FORCED HOME. FOR TONGUE AND GROOVE PIPE, THE PIPE SHOULD BE PARTIALLY SUPPORTED TO MAINTAIN CONCENTRICITY UNTIL THE GASKET IS PROPERLY COMPRESSED IN THE JOINT SPACE AND SUFFICIENT PRESSURE APPLIED TO MAKE SURE THAT THE JOINT IS PROPERLY MADE.

5. LIFT HOLE PLUG SHALL BE GROUTED IN PLACE PRIOR TO BACKFILLING.

6. BACKFILLING AND COMPACTION CAN BEGIN WHEN JOINTING & GROUTING ARE COMPLETED.

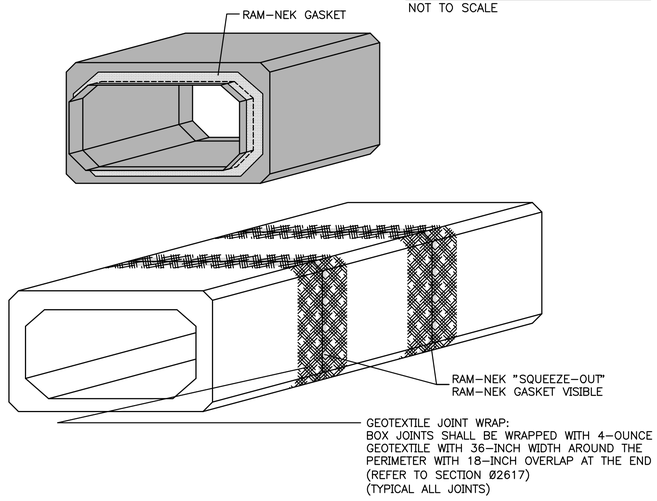
7. CONTRACTOR SHALL FOLLOW APPLICATION INSTRUCTIONS PROVIDED BY THE MANUFACTURER. THE GAP BETWEEN THE FACE OF THE TONGUE AND GROOVE SHALL NOT EXCEED 1" AFTER JOINTS ARE FORCED HOME. IF JOINT GAP EXCEEDS 1" THEN JOINT SHALL BE REPAIRED AS PER JOINT REPAIR DETAIL AND SPECIFICATION. THIS IS NOT CONSIDERED A 1" AVERAGE. JOINT REPAIR SHALL BE PERFORMED ON SECTIONS OF THE JOINT THAT EXCEED 1". IF MORE THAN HALF THE JOINT EXCEEDS 1", THEN THE WHOLE JOINT SHALL BE REPAIRED (NO SEPARATE PAY SHALL BE MADE FOR JOINT REPAIR).



HORIZONTAL APPLICATION

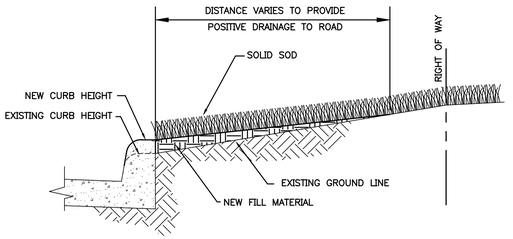
RAM-NEK GASKET INSTALLATION DETAIL

NOT TO SCALE



RAM-NEK DETAIL

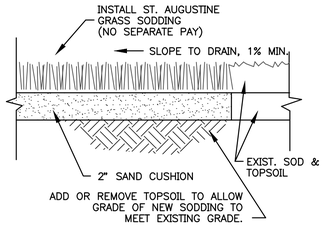
NOT TO SCALE



NOTE:
TO BE USED WHERE NECESSARY TO MAINTAIN POSITIVE DRAINAGE FROM YARD AREA OVER TOP OF CURB (NO SEPARATE PAY)

FILL BEHIND BACK OF CURB DETAIL

NOT TO SCALE



NOTES:

1. SODDING SHALL BE ON AREAS DISTURBED BY CONSTRUCTION.

4. IN THE EVENT EXISTING LANDSCAPING OTHER THAN GRASS IS WITHIN THESE AREAS, THE CONTRACTOR SHALL REBUILD OR REINSTALL THE LANDSCAPING OF THE AREA AFTER CONSTRUCTION IN AN EQUAL OR BETTER CONDITION.

TYPICAL GRASS SODDING DETAILS

NOT TO SCALE

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

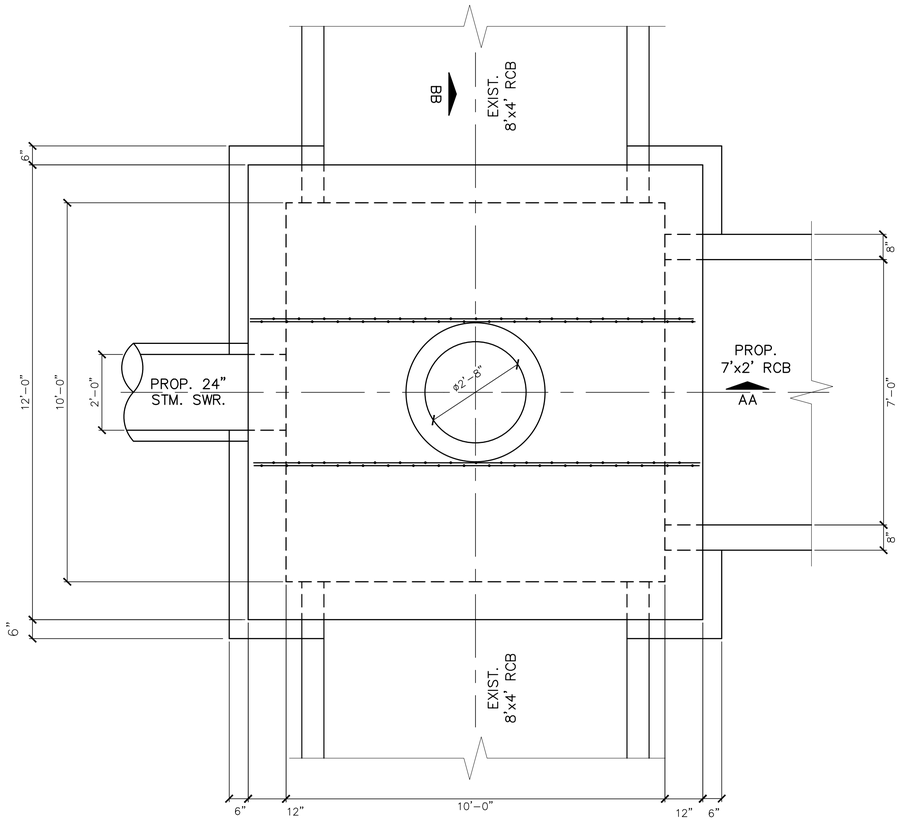
Texas Avenue Reconstrution

Drainage Details IV

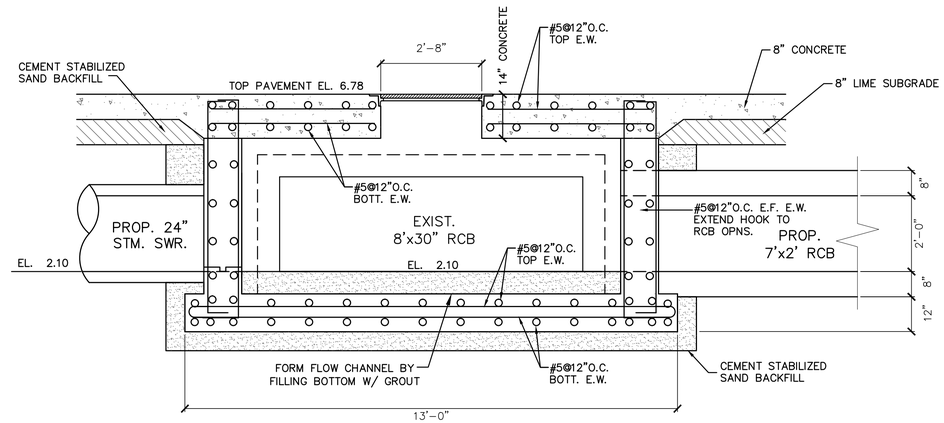
Job No.: 18-015
Date: September, 2019
Dwn By: D. Fattig
Chkd By: J Rudloff

Scale:
HORZ:
VERT: N/A

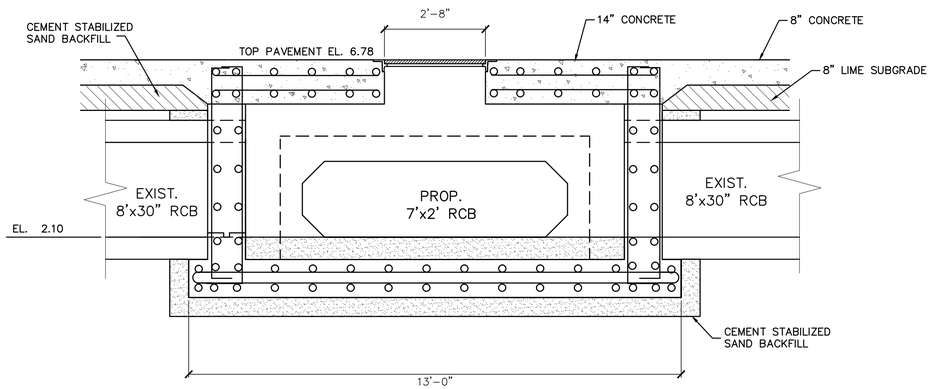
SHEET 43 OF 52



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



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



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

NOTES:

1. REFER SHEET 5Ø FOR GENERAL NOTES.
2. REFER SHEET 51 FOR TYPICAL DETAILS.
3. PROVIDE ADDITIONAL REINFORCING IN WALLS OF THE JUNCTION BOX RECEIVING PIPES PER DETAIL 6/51.
4. PROVIDE ADDITIONAL REINFORCING AT TOP & BOTTOM BEAM/SLAB OF JUNCTION BOX ABOVE AND BELOW THE TOP AND BOTTOM SLAB OR PRECAST BOX PER DETAILS 8/51 & 9/51.
5. REFER DETAIL 13/51 FOR WALLS RECEIVING PRECAST BOX.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

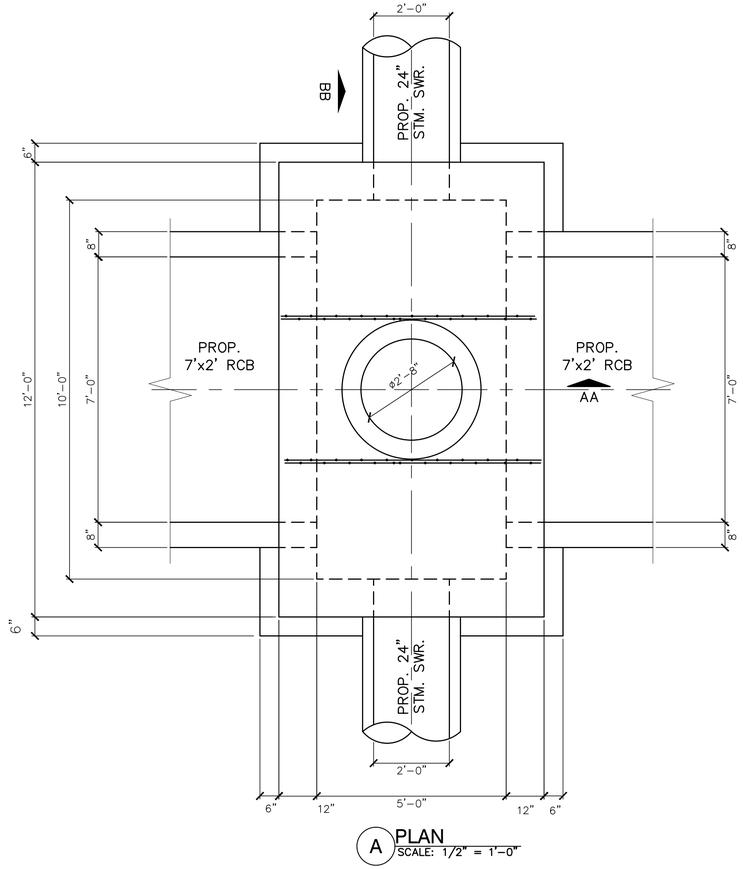
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

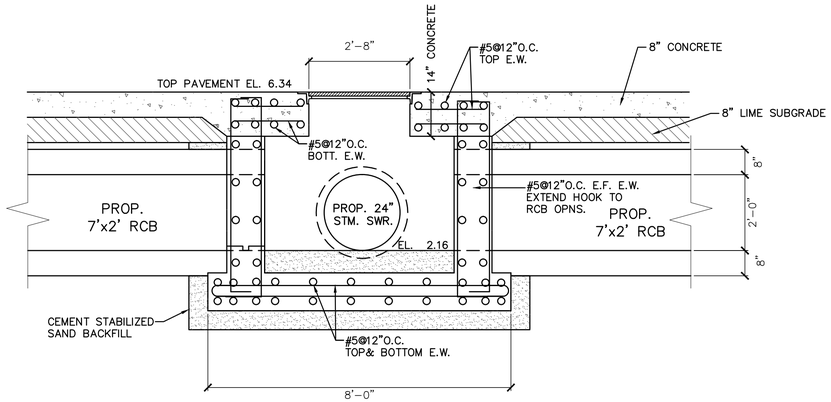
Texas Avenue Reconstrution

Junction Box A1 - Sta. 4+19.10

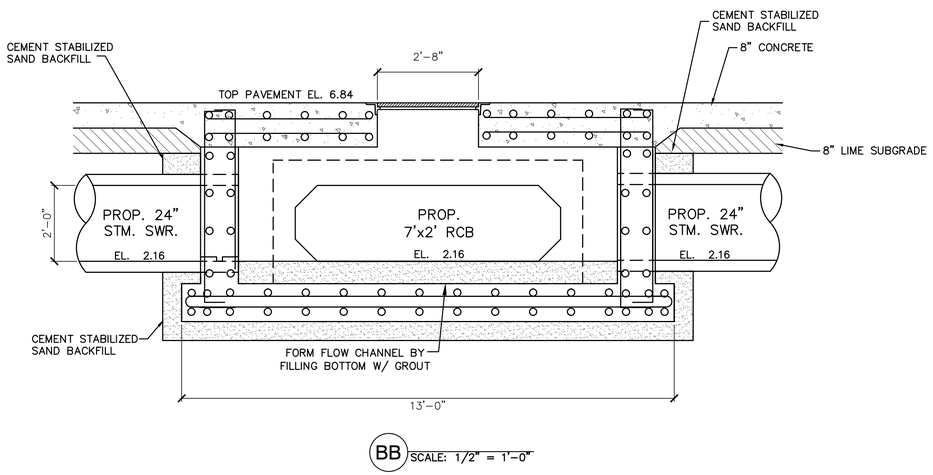
Job No.: 18-015	Scale: HORZ: 1/2"=1'-0" VERT:	SHEET 44
Date: September, 2019		OF 52
Dwn By: D. Fattig		
Chkd By: J Rudloff		



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



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



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

NOTES:

1. REFER SHEET 5Ø FOR GENERAL NOTES.
2. REFER SHEET 51 FOR TYPICAL DETAILS.
3. PROVIDE ADDITIONAL REINFORCING IN WALLS OF THE JUNCTION BOX RECEIVING PIPES PER DETAIL 6/51.
4. PROVIDE ADDITIONAL REINFORCING AT TOP & BOTTOM BEAM/SLAB OF JUNCTION BOX ABOVE AND BELOW THE TOP AND BOTTOM SLAB OR PRECAST BOX PER DETAILS 8/51 & 9/51.
5. REFER DETAIL 13/51 FOR WALLS RECEIVING PRECAST BOX.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

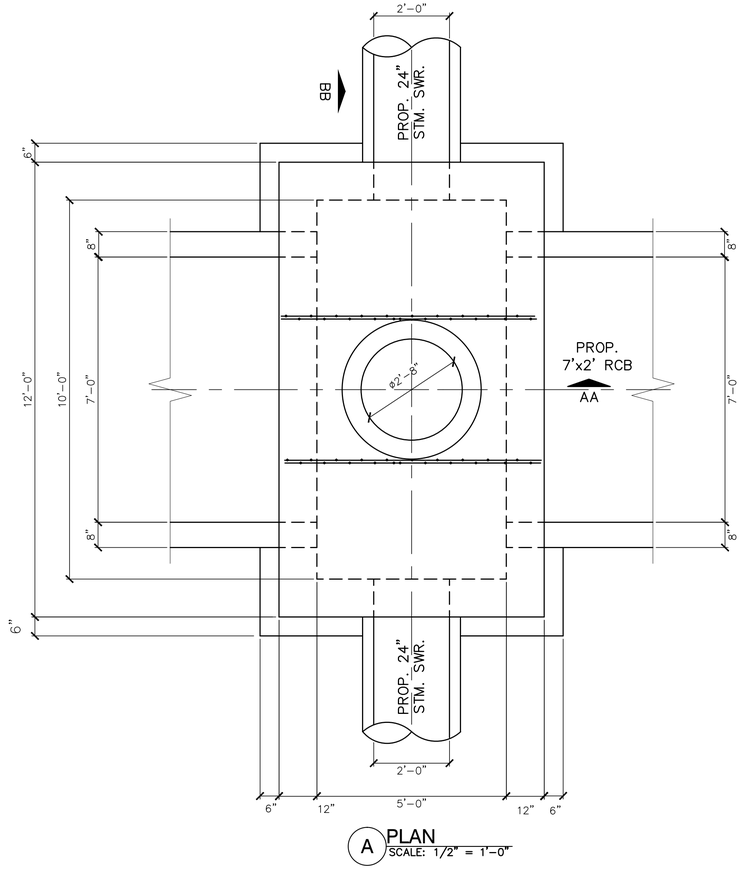
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

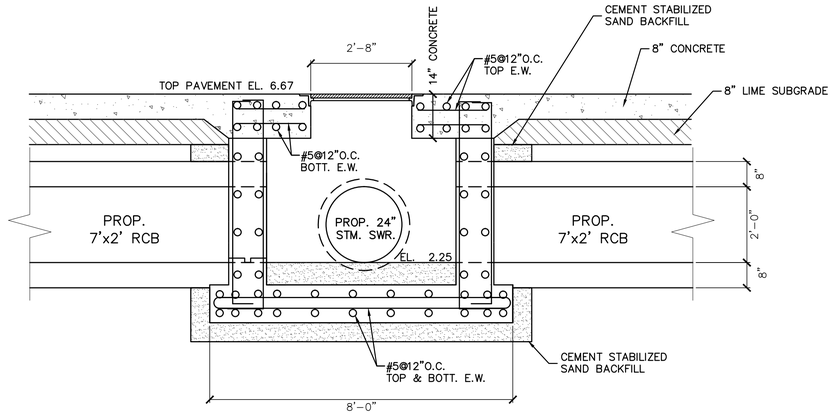
Texas Avenue Reconstrution

Junction Box A2 - Sta. 5+45.00

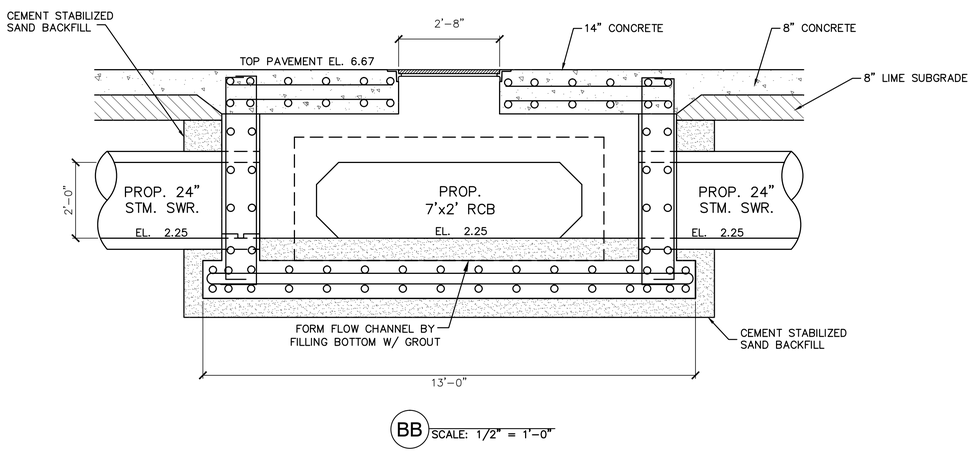
Job No.: 18-015	Scale: HORZ: 1/2"=1'-0" VERT:	SHEET 45
Date: September, 2019		
Dwn By: D. Fattig		OF 52
Chkd By: J Rudloff		



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



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



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

NOTES:

1. REFER SHEET 5Ø FOR GENERAL NOTES.
2. REFER SHEET 51 FOR TYPICAL DETAILS.
3. PROVIDE ADDITIONAL REINFORCING IN WALLS OF THE JUNCTION BOX RECEIVING PIPES PER DETAIL 6/51.
4. PROVIDE ADDITIONAL REINFORCING AT TOP & BOTTOM BEAM/SLAB OF JUNCTION BOX ABOVE AND BELOW THE TOP AND BOTTOM SLAB OR PRECAST BOX PER DETAILS 8/51 & 9/51.
5. REFER DETAIL 13/51 FOR WALLS RECEIVING PRECAST BOX.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

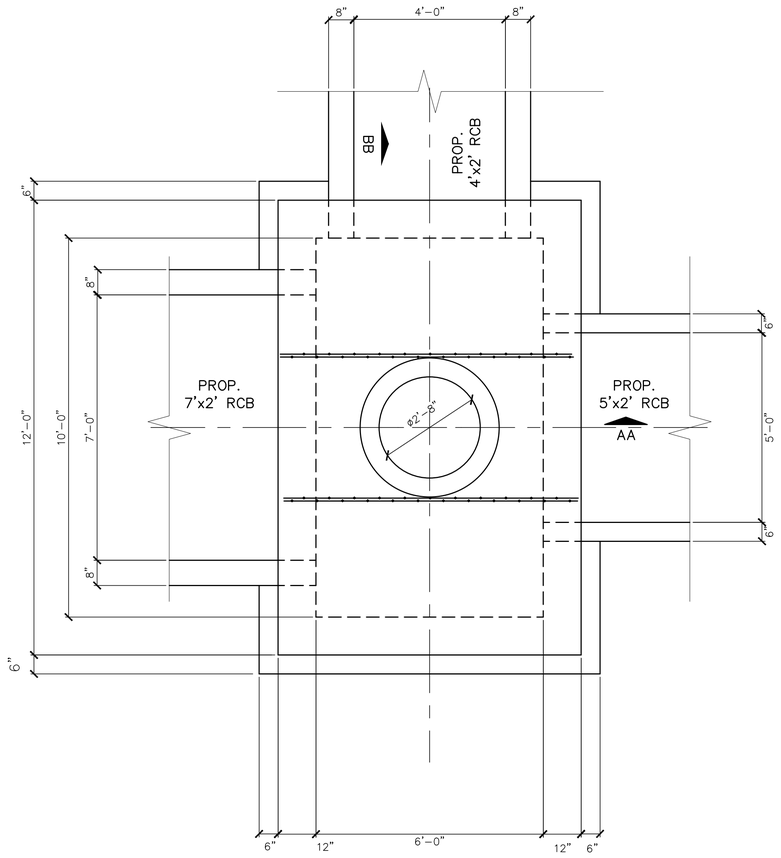
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

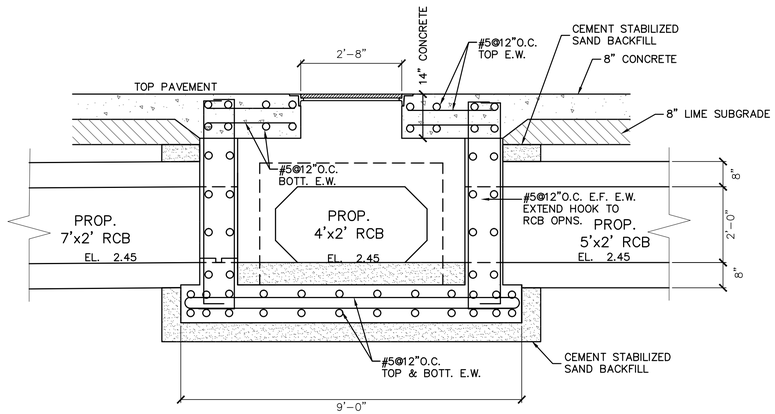
Texas Avenue Reconstrution

Junction Box #A3 - Sta. 7+26.00

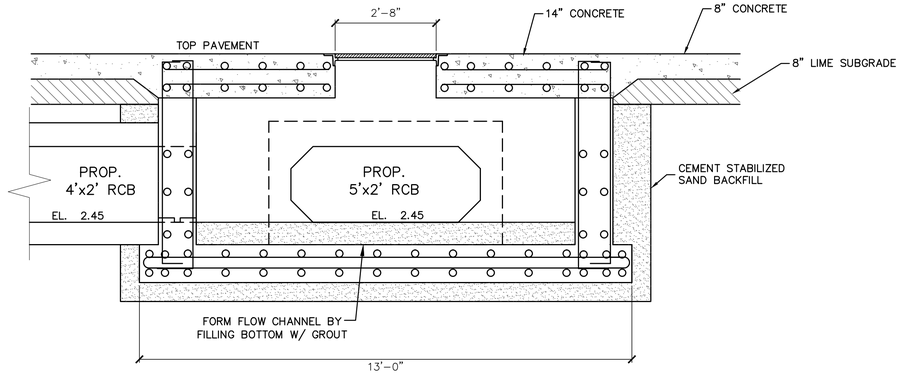
Job No.: 18-015	Scale: HORZ: 1/2"=1'-0" VERT:	SHEET 46
Date: September, 2019		
Dwn By: D. Fattig		OF 52
Chkd By: J Rudloff		



A PLAN
SCALE: 1/2" = 1'–0"



AA SCALE: 1/2" = 1'–0"



BB SCALE: 1/2" = 1'–0"

NOTES:

1. REFER SHEET 5Ø FOR GENERAL NOTES.
2. REFER SHEET 51 FOR TYPICAL DETAILS.
3. PROVIDE ADDITIONAL REINFORCING IN WALLS OF THE JUNCTION BOX RECEIVING PIPES PER DETAIL 6/51.
4. PROVIDE ADDITIONAL REINFORCING AT TOP & BOTTOM BEAM/SLAB OF JUNCTION BOX ABOVE AND BELOW THE TOP AND BOTTOM SLAB OR PRECAST BOX PER DETAILS 8/51 & 9/51.
5. REFER DETAIL 13/51 FOR WALLS RECEIVING PRECAST BOX.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9–13–19

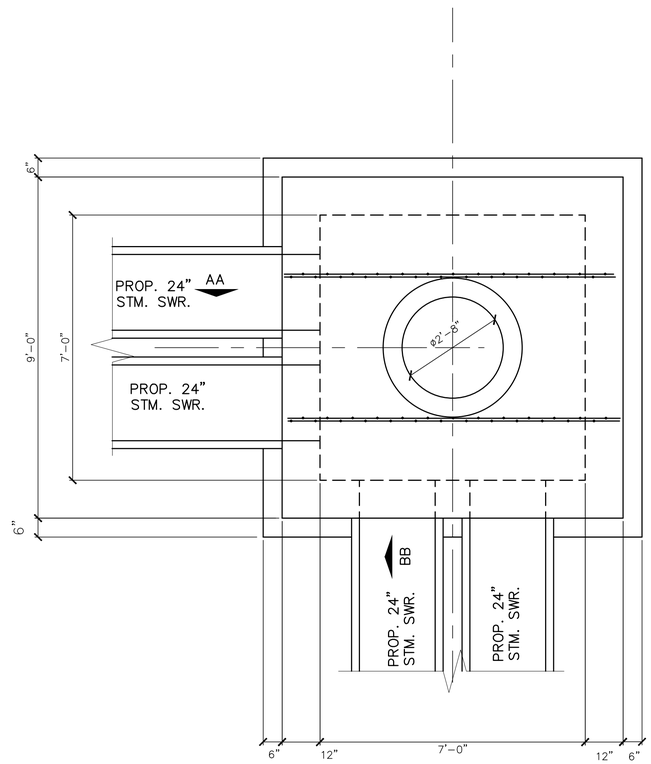
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

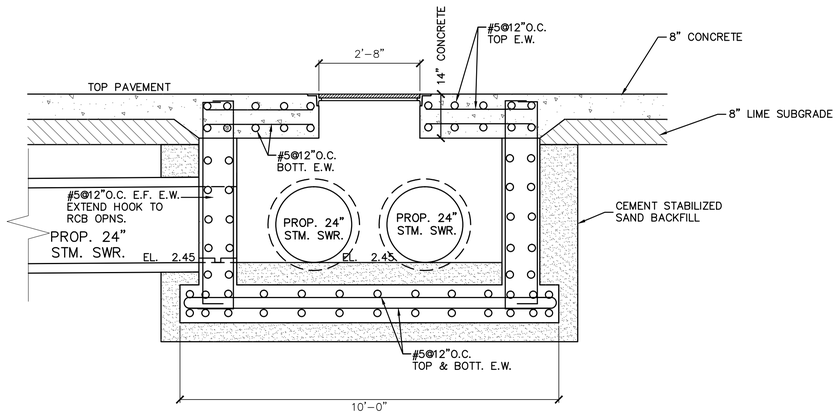
Texas Avenue Reconstrution

Junction Box A4 - Sta. 11+30.00

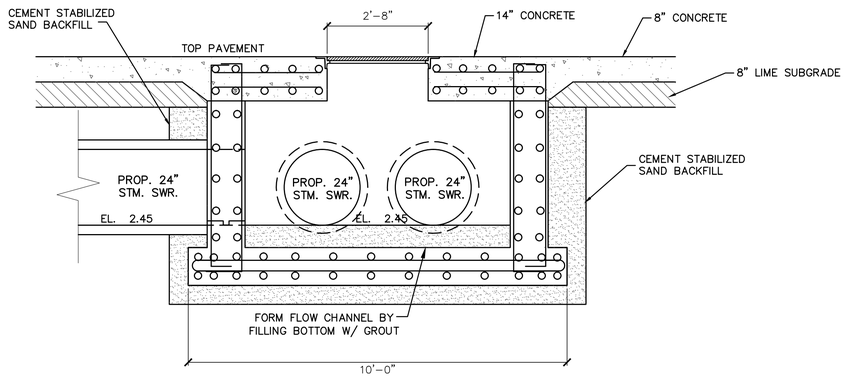
Job No.: 18–015	Scale: HORZ: 1/2"=1'–0" VERT:	SHEET 47 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



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



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



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

NOTES:

1. REFER SHEET 50 FOR GENERAL NOTES.
2. REFER SHEET 51 FOR TYPICAL DETAILS.
3. PROVIDE ADDITIONAL REINFORCING IN WALLS OF THE JUNCTION BOX RECEIVING PIPES PER DETAIL 6/51.
4. PROVIDE ADDITIONAL REINFORCING AT TOP & BOTTOM BEAM/SLAB OF JUNCTION BOX ABOVE AND BELOW THE TOP AND BOTTOM SLAB OR PRECAST BOX PER DETAILS 8/51 & 9/51.
5. REFER DETAIL 13/51 FOR WALLS RECEIVING PRECAST BOX.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

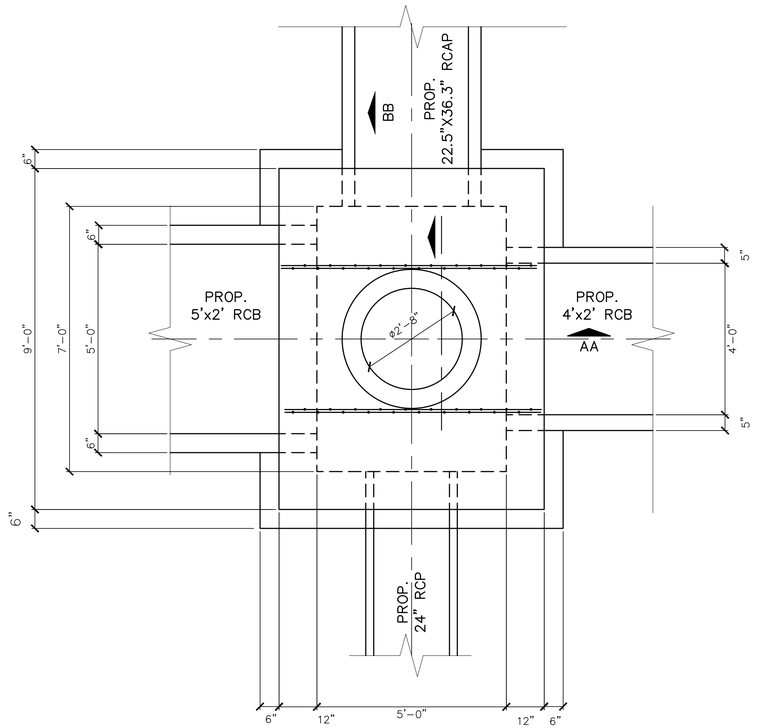
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

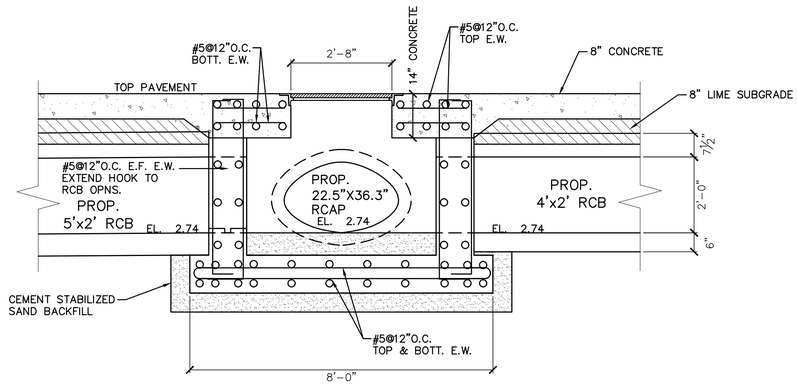
Texas Avenue Reconstrution

Junction Box A5 - Sta. 11+28.50

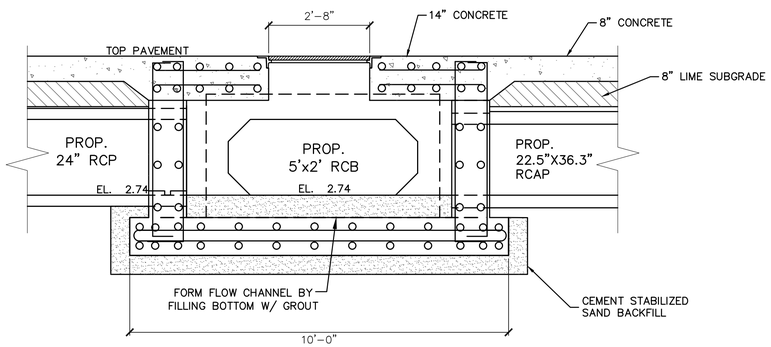
Job No.: 18-015	Scale: HORZ: 1/2"=1'-0" VERT:	SHEET 48 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		



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



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



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

NOTES:

1. REFER SHEET 5Ø FOR GENERAL NOTES.
2. REFER SHEET 51 FOR TYPICAL DETAILS.
3. PROVIDE ADDITIONAL REINFORCING IN WALLS OF THE JUNCTION BOX RECEIVING PIPES PER DETAIL 6/51.
4. PROVIDE ADDITIONAL REINFORCING AT TOP & BOTTOM BEAM/SLAB OF JUNCTION BOX ABOVE AND BELOW THE TOP AND BOTTOM SLAB OR PRECAST BOX PER DETAILS 8/51 & 9/51.
5. REFER DETAIL 13/51 FOR WALLS RECEIVING PRECAST BOX.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Junction Box A6 - Sta. 17+15.00

Job No.: 18-015	Scale: HORZ: 1/2"=1'-0" VERT:	SHEET 49
Date: September, 2019		
Dwn By: D. Fattig		OF 52
Chkd By: J Rudloff		

General Notes For Structures

CONCRETE

1. DESIGN SHALL CONFORM TO THE LATEST BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI-318) WITH SPECIAL REQUIREMENTS OF ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES (ACI-350)
2. ALL REINFORCING BARS SHALL CONFORM TO ASTM A-615, GRADE 60. ARRANGEMENT AND DETAILS OF REINFORCING STEEL, INCLUDING BAR SUPPORTS AND SPACERS, SHALL BE IN ACCORDANCE WITH THE LATEST ACI DETAILING MANUAL, UNLESS OTHERWISE NOTED.
3. ALL SLAB AND BEAM REINFORCEMENT SHALL HAVE A MINIMUM EXTENSION INTO THE SUPPORT IN ACCORDANCE WITH THE LATEST ACI CODE. IF SUCH EXTENSION IS NOT POSSIBLE, BARS SHALL TERMINATE IN STANDARD HOOKS.
4. HORIZONTAL WALL REINFORCEMENT AND TEMPERATURE REINFORCEMENT SHALL LAP A MINIMUM OF 1.7Ld AT SPLICES. WALL DOWELS AND WALL BAR EXTENSIONS AND ALL STRESS SPLICES SHALL LAP A MINIMUM OF 1.7 Lad, UNLESS OTHERWISE NOTED.
5. WALL OR COLUMNS SHALL HAVE DOWELS FROM FOUNDATIONS OR CONSTRUCTION BELOW OF SAME SIZE AND SPACING AS WALL OR COLUMN VERTICAL STEEL. SEE FOOTING SCHEDULE.
6. UNLESS OTHERWISE NOTED ON THE DRAWINGS, CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS SHALL NOT BE LESS THAN THE FOLLOWING:
   - STRUCTURAL MEMBERS, FOUNDATIONS, WALLS AND SUSPENDED SLABS — 4000 PSI
   - SLABS ON GRADE — 4000 PSI
   - LEAN CONCRETE CLASS B — 1500 PSI
   - GROUT FILL — 4000 PSI
     2 INCH AND THICKER - USE CONCRETE WITH MAX. 3/4" AGGREGATE.
   - GROUT FILL CLASS H — 3000 PSI
7. UNLESS OTHERWISE SHOWN, THE COVER FOR REINFORCING STEEL SHALL BE AS FOLLOWS:
   - SLABS

TOP AND BOTTOM OF FORMED SLABS	2"
TOP OF WALK AND DRIVEWAY SLABS	2"
SURFACES IN CONTACT WITH LIQUID	2"
BOTTOM OF SLABS ON FILL OR SOIL	3"

   - FOOTINGS:

TOP AND SIDES	2 1/2"
BOTTOM	3"

   - WALLS:

LESS THAN 12" THICK	1 1/2"
12" OR OVER IN THICKNESS WITH POURS LESS THAN 10 FEET HIGH	2"
12" OR OVER IN THICKNESS WITH POURS MORE THAN 10 FEET HIGH	2 1/2"

   - BEAMS AND GIRDERS:

     COVER AT TOP, BOTTOM OR SIDES OF LONGITUDINAL REIN. — 2"
   - COLUMNS:

     COVER FOR VERTICAL BARS — 2"
8. HORIZONTAL AND VERTICAL CONSTRUCTION JOINTS SHOWN OR NOTED ON THE PLANS ARE RECOMMENDED. ANY DEVIATION FROM THOSE SHOWN SHALL HAVE APPROVAL OF THE ENGINEER.
9. ANY STOP IN FRAMED CONCRETE WORK MUST BE MADE IN THE CENTER OF THE SPAN AND INCORPORATE AN APPROVED KEYWAY. REINFORCEMENT SHALL EXTEND THROUGH THESE JOINTS IF REQUIRED FOR CONTINUITY.
10. USE TYPE `C2' JOINT FOR ALL CONSTRUCTION JOINTS IN WALLS AND SLABS BELOW GRADE AND WALLS WHICH SEPARATE AREAS OF SOIL OR LIQUID FROM PERMANENTLY DRY AREAS SUCH AS TUNNELS, GALLERIES, BASEMENT ROOMS, ETC. USE TYPE `C1' JOINT AT ALL OTHER CONSTRUCTION JOINTS, UNLESS OTHERWISE NOTED ON DRAWINGS. REFER NEXT SHEET FOR JOINT INFORMATION.
11. CONCRETE WALLS AND PARTITIONS SHALL BE POURED IN MAXIMUM LENGTHS OF 40 FEET BETWEEN VERTICAL CONSTRUCTION JOINTS.
12. ALL CONCRETE SLABS OVER 8" IN THICKNESS, REINFORCED WITH BARS, AND POURED AGAINST SOIL SHALL BE POURED IN A STRIP PATTERN OF 40 FEET OR LESS IN EACH DIRECTION.
13. ALL EXPOSED EDGES OF BEAMS, COLUMNS, SLABS AND WALLS SHALL BE CHAMFERED 3/4" UNLESS MASONRY OR OTHER MEMBERS ARE ERECTED FLUSH WITH THEM.
14. REFER TO ARCHITECTURAL, PROCESS, MECHANICAL AND ELECTRICAL DRAWINGS FOR ALL SLEEVES, PIPES, CONDUITS AND MISCELLANEOUS ANCHORING DEVICES TO BE INCORPORATED IN THE CONSTRUCTION

STRUCTURAL STEEL

1. STRUCTURAL STEEL SHALL CONFORM TO THE LATEST AISC "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS". ALL STRUCTURAL STEEL SHALL BE ASTM A36.
2. ELEVATIONS OF STEEL BEAMS SHOWN ON FRAMING PLANS REFER TO TOP OF FLANGE, UNLESS OTHERWISE NOTED.
3. ALL BOLTED CONNECTIONS SHALL BE MADE WITH 3/4" DIAMETER ASTM A-325 BOLTS EXCEPT AS OTHERWISE SHOWN OR NOTED. ALL CONNECTIONS SHALL BE CAPABLE OF SUPPORTING ONE HALF THE MAXIMUM ALLOWABLE UNIFORM LOAD FOR INDICATED BEAM SIZE AND SPAN IN AISC MANUAL OF STEEL CONSTRUCTION, EXCEPT AS OTHERWISE NOTED.
4. FIELD CONNECTIONS SHALL BE BOLTED, EXCEPT AS OTHERWISE SHOWN OR NOTED.
5. ALL WELDING SHALL CONFORM TO THE LATEST SPECIFICATION OF THE AMERICAN WELDING SOCIETY. ALL WELDED CONNECTIONS SHALL BE MADE WITH AWS A5.1 OR A5.5 E70 XX ELECTRODE.
6. ANCHOR BOLTS AND MISC EMBEDDED STEEL----------ASTM A36.
   ANCHOR BOLTS WHICH ARE SUBMERGED, LOCATED ABOVE A LIQUID SURFACE, OR ARE IN A CORROSIVE ATMOSPHERE----------316 SS.
7. ALL EQUIPMENT ANCHOR BOLT DIMENSIONS AND LOCATIONS SHALL BE VERIFIED FROM CERTIFIED VENDOR DRAWINGS, PRIOR TO CONSTRUCTION.
8. ALL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 123. FIELD WELD AT CONNECTIONS SHALL BE PAINTED WITH GALVALUME PAINT.

FOUNDATIONS

1. ALLOWABLE SOIL BEARING PRESSURE, EXCAVATION AND BACKFILL FOR FOUNDATIONS AND STRUCTURES SHALL BE AS RECOMMENDED IN THE GEOTECHNICAL REPORT.
2. ALL EXCAVATIONS SHALL BE CARRIED OUT IN THE DRY, AND PROVISIONS SHALL BE MADE TO PREVENT THE BOTTOM OF ALL EXCAVATIONS FROM FREEZING OR FLOODING AT ALL TIMES.
3. ALL FOUNDATIONS SHALL BE CONSTRUCTED IN EXCAVATIONS FREE OF STANDING WATER.
4. BACKFILL MATERIAL, PLACING AND COMPACTION OF BACKFILL SHALL BE IN ACCORDANCE WITH THE DRAWINGS, AND THE CONTRACT SPECIFICATIONS.
5. ALL EXCAVATIONS SHALL BE SUPPORTED BY SOIL RETENTION SYSTEM DURING CONSTRUCTION.
   BACKFILL SHALL BE PLACED AFTER TESTING THE STRUCTURE FOR WATER TIGHTNESS.

Abbreviations

ADDL	ADDITIONAL	EF	EACH FACE	R	RADIUS
ALT	ALTERNATE	EW	EACH WAY	REINF	REINFORCEMENT
&	AND	EL	ELEVATION	REQD	REQUIRED
ARCH	ARCHITECTURAL	EXP	EXPANSION	SCHED	SCHEDULE
@	AT	EXT	EXTERIOR	SECT	SECTION
BM	BEAM	FTG	FOOTING	SPECS	SPECIFICATIONS
BOT	BOTTOM	H.P.	HIGH POINT	SS	STAINLESS STEEL
B/	BOTTOM OF	HORIZ	HORIZONTAL	STD	STANDARD
BLDG	BUILDING	I.F.	INSIDE FACE	STIRR	STIRRUP
℄	CENTER LINE	INT	INTERIOR	SYMM	SYMMETRICAL
C/C	CENTER TO CENTER	L.P.	LOW POINT	T	TOP
CLR	CLEAR(ANCE)	MH	MANHOLE	T/	TOP OF
COL	COLUMN	MAX	MAXIMUM	TYP	TYPICAL
CONC	CONCRETE	MISC	MISCELLANEOUS	UNO	UNLESS NOTED OTHERWISE
CONST	CONSTRUCTION	MIN	MINIMUM	VAR	VARIES
CONT	CONTINUOUS	#	NUMBER	VERT	VERTICAL
DET	DETAIL	OC	ON CENTER	WWF	WELDED WIRE FABRIC
DIA	DIAMETER	OPNG	OPENING	W/	WITH
Ø	DIAMETER	OA	OVERALL		
DWG	DRAWING	PVC	POLYVINYL CHLORIDE		
DWL	DOWEL				

Testing And Inspection Notes:

1. ALL STRUCTURAL STEEL WORK SHALL BE INSPECTED BY A TESTING AND INSPECTION AGENCY HIRED BY THE OWNER.
2. ALL WELDING SHALL BE PERFORMED BY A CERTIFIED WELDER AND INSPECTED BY THE TESTING AND INSPECTION AGENCY.
3. ALL BOLTS SHALL BE VISUALLY INSPECTED AND 20% (MINIMUM TWO BOLTS PER CONNECTION) SHALL BE TESTED FOR THEIR FULL PRESCRIBED PRETENSION.
4. ALL FULL PENETRATION WELD SHALL BE TESTED BY ULTRASONIC TEST.
5. CONCRETE STRENGTH TESTING SHALL BE PER REQUIREMENTS OF AMERICAN CONCRETE INSTITUTE.

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9–13–19

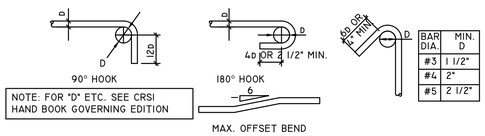
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Structural
General Notes

Job No.: 18–015	Scale:	SHEET
Date: September, 2019	HORZ: N/A	50
Dwn By: D. Fattig	VERT: N/A	OF 52
Chkd By: J Rudloff		



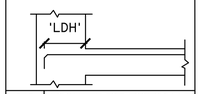
BAR DIA.	MIN. D
#3	1 1/2"
#4	2"
#5	2 1/2"

PRINCIPAL REINFORCING

NOTES:
1. ALL BENDS SHALL BE MADE COLD.
2. #14 AND #18 BARS SHALL BE BEND-TESTED AND APPROVED PRIOR TO BENDING.

1 Bar Bending Details
SCALE: N.T.S.

MINIMUM TENSION EMBEDMENT LENGTHS 'LDH' FOR STANDARD HOOKS -GRADE 60 (FY-60,000PSI) REINFORCING BARS



BAR SIZE	NORMAL WEIGHT CONCRETE	
	F'C=3000 PSI	F'C=4000 PSI
#3	6	6
#4	8	7
#5	10	9
#6	12	10
#7	14	12
#8	16	14
#9	18	15
#10	20	17
#11	22	19

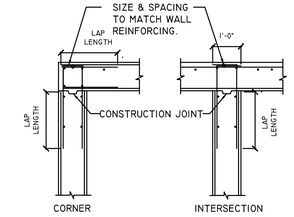
2 Reinforcing 'LDH' Lengths
SCALE: N.T.S.

SPLICE LENGTH NORMAL WEIGHT CONC.
(REFER NOTES BELOW)

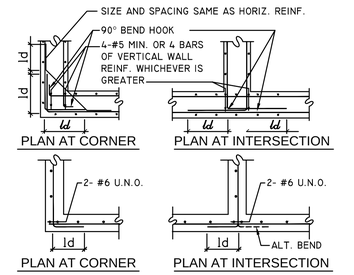
BAR SIZE	LAP CLASS	F'C=3000 PSI		F'C=4000 PSI	
		TOP	OTHER	TOP	OTHER
#3	A	22	17	19	15
	B	28	22	24	19
#4	A	29	22	25	19
	B	37	29	32	25
#5	A	36	28	31	24
	B	47	36	40	31
#6	A	43	33	37	29
	B	56	43	48	37
#7	A	63	48	54	42
	B	81	63	70	54
#8	A	72	55	62	48
	B	93	72	80	62
#9	A	81	62	70	54
	B	105	81	91	70
#10	A	91	70	79	61
	B	118	91	102	79
#11	A	101	78	87	67
	B	131	101	113	87

NOTES:
1. WHEN NOTED ON DRAWINGS CASE II FOR DEVELOPMENT LENGTH OR LAP LENGTH THE DEVELOPMENT LENGTH AND LAP LENGTH SHALL BE 1.5* VALUES SHOWN ABOVE
2. DEVELOPMENT LENGTH 'LD' OF A BARS IS EQUAL TO LENGTH OF CLASS A LAP LENGTH.

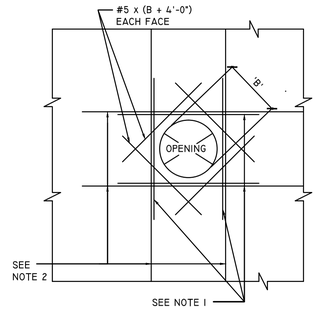
3 Reinforcing Lap Lengths- LD
SCALE: N.T.S.



4 Typical Detail Wall Reinforcing
SCALE: N.T.S.

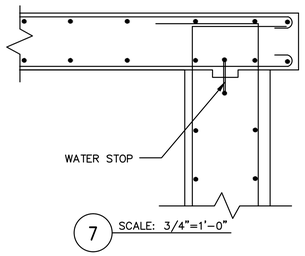


5 Typical Detail - Wall Or Beam Corner Bars
SCALE: N.T.S.

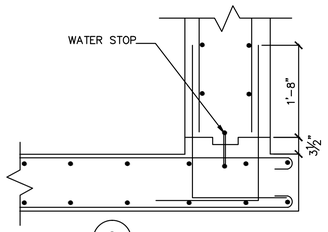


6 Additional Reinforcing At Opening (Slab & Wall)
Scale: N.T.S.

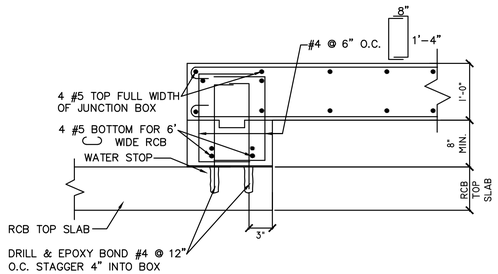
NOTES:
1. PROVIDE 2 #6 x (B+4') ADDITIONAL REINFORCING BARS AT TOP & BOTTOM & SIDES OF OPENING.
2. PROVIDE ADDITIONAL BARS EQUAL TO ONE HALF OF BARS INTERRUPTED PLUS ONE AT EACH SIDE OF OPENING IN SHORT SPAN DIRECTION OF WALL OR SLAB AT 3" O.C. THESE BARS SHALL BE SAME SIZE & LENGTH AS THOSE OF THE INTERRUPTED BARS.



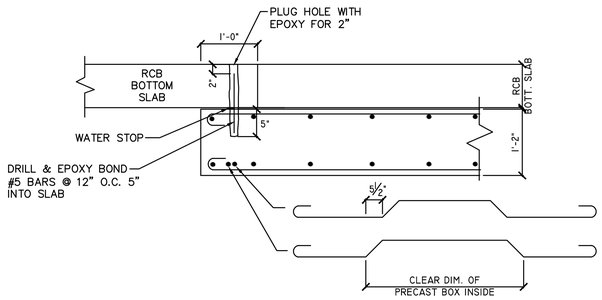
7 SCALE: 3/4"=1'-0"



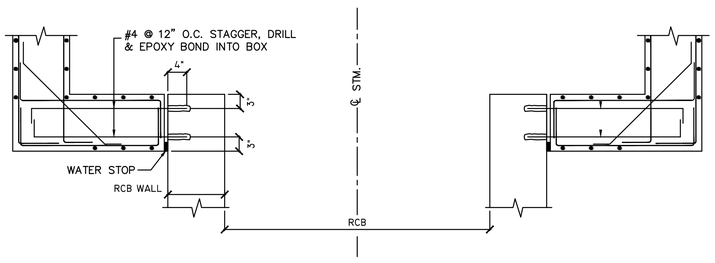
8 SCALE: 3/4"=1'-0"



9 SECTION – PRECAST BOX & JUNCTION BOX SLAB
SCALE: 3/4"=1'-0"



10 SECTION – PRECAST BOX & JUNCTION BOX WALL
SCALE: 3/4"=1'-0"



13 PLAN – PRECAST BOX & JUNCTION BOX WALL
SCALE: 3/4"=1'-0"

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

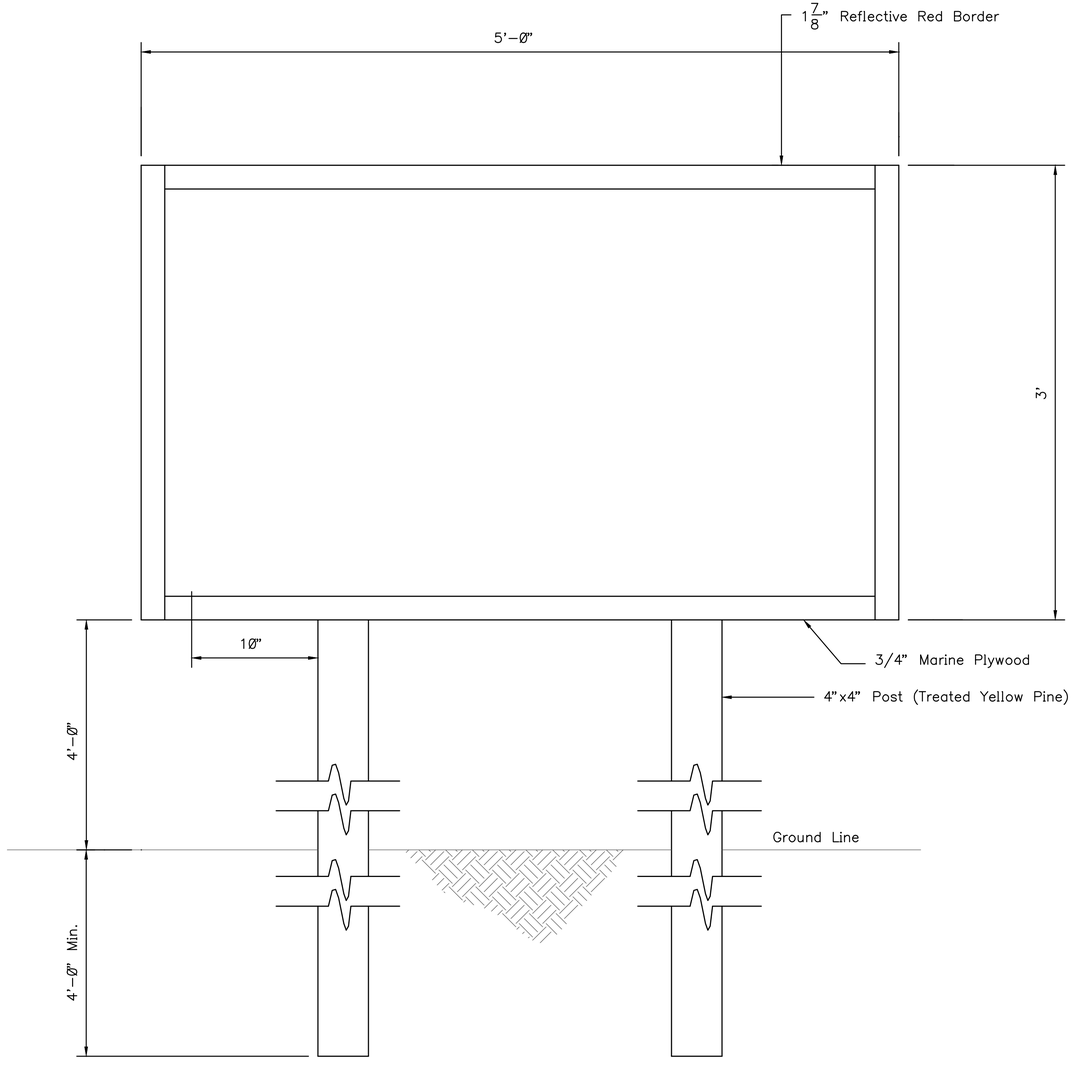
ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

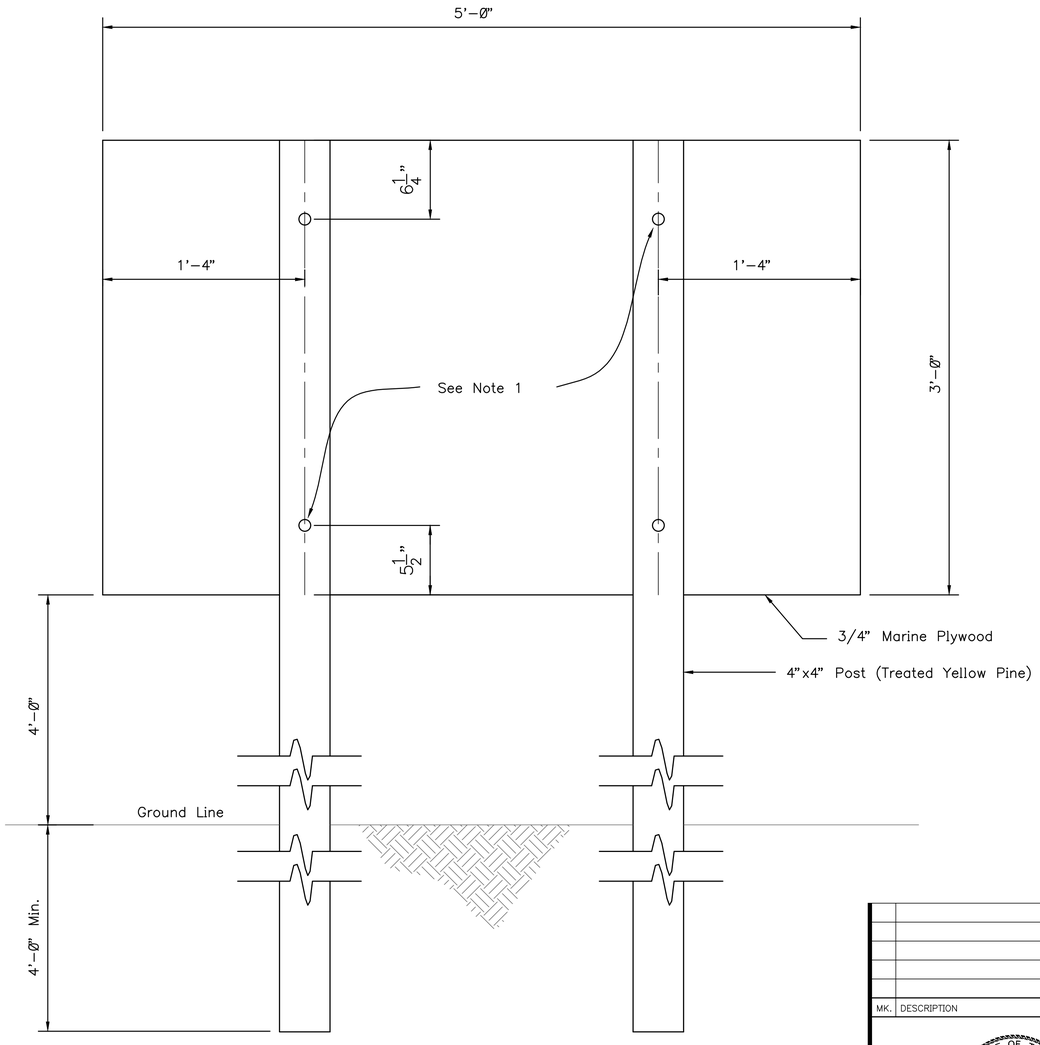
Galveston County.Texas

Texas Avenue Reconstrution

Structural
Typical Details

Job No.: 18-015	Scale: HORZ: N/A VERT: N/A	SHEET 51 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		





Notes:

1. 4"x 4" Post Fastened to Sign with 1/2"ø x 5 1/2" Button Head Carriage Bolts, Nuts and Flat Washers.
2. Verify all information prior to ordering Project Sign.
3. Location(s) of the Project sign(s) will be determined at the pre-construction conference.

Project Sign Detail

Not to Scale

MK.	DESCRIPTION	DATE	DWN.	CHK.

STATE OF TEXAS
JOHN D. RUDLOFF
83386
LICENSED
PROFESSIONAL ENGINEER

9-13-19

ARKK ENGINEERS
7322 Southwest Freeway, Suite 1040 • Houston, Texas 77074
(713) 400-2755 • www.arkkengineers.com • TX PE Firm No. 13872

Galveston County.Texas

Texas Avenue Reconstrution

Project Sign Detail

Job No.: 18-015	Scale: HORZ: N/A VERT: N/A	SHEET 52 OF 52
Date: September, 2019		
Dwn By: D. Fattig		
Chkd By: J Rudloff		

THE COUNTY OF GALVESTON

RUFUS G. CROWDER, CPPO, CPPB
PURCHASING AGENT

GWEN MCLAREN, CPPB
ASST. PURCHASING AGENT

COUNTY COURTHOUSE
722 Moody (21st Street)
Fifth (5th) Floor
GALVESTON, TEXAS 77550

November 7, 2019

PROJECT NAME: Texas Avenue Reconstruction

SOLICITATION NO: B201007

RE: ADDENDUM #1

To All Prospective Proposers,

The following information is being provided to aid in preparation of your proposal submittal(s):

Question #1: ***Is there a geotechnical report?***

Response: The geotechnical report is attached with this addendum.

Question #2: ***Time of Completion is stated to be within 300 calendar days of Notice to Proceed issuance. However, a date for when the Notice to Proceed is projected to be issued is not state. What is the estimated project start date?***

Response: The estimated start date is February of 2020.

Question #3: ***Can you post the pre-bid meeting sign-in sheet please?***

Response: The pre-bid meeting sign-in sheet is attached with this addendum.

Question #4: ***Are there soil boring available? Can you send me any pre-bid notes?***

Response: Please refer to the response to question #1. There are no pre-bid notes.

As a reminder, all questions regarding this proposal must be submitted in writing to:

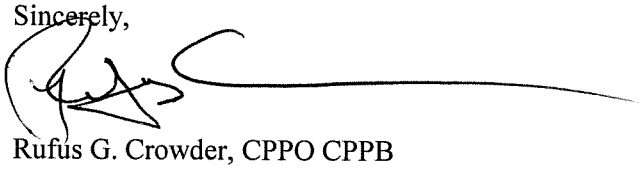
Rufus G. Crowder, CPPO CPPB
Galveston County Purchasing Agent
722 Moody, Fifth (5th) Floor
Galveston, Texas 77550
E-mail: purchasing.bids@co.galveston.tx.us

If you have any further questions regarding this proposal, please address them to Rufus Crowder, CPPO CPPB, Purchasing Agent, via e-mail at purchasing.bids@co.galveston.tx.us, or contact the Purchasing Department at (409) 770-5371.

If you have any further questions regarding this proposal, please address them to Rufus Crowder, CPPO CPPB, Purchasing Agent, via e-mail at purchasing.bids@co.galveston.tx.us, or contact the Purchasing Department at (409) 770-5371.

Please excuse us for any inconvenience that this may have caused.

Sincerely,



Rufus G. Crowder, CPPO CPPB
Purchasing Agent
Galveston County

GEOTECHNICAL INVESTIGATION
TEXAS AVENUE (FM 1765) RECONSTRUCTION
FROM 14TH STREET TO 6TH STREET
CITY OF TEXAS CITY, GALVESTON COUNTY, TEXAS

REPORT NO. 1140243301

Reported to:

ARKK ENGINEERS, INC.

Houston, Texas

Reported by:

GEOTEST ENGINEERING, INC.

Houston, Texas

Key Map Nos. 738 G & H

GEOTEST ENGINEERING, INC.

Geotechnical Engineers & Materials Testing

5600 Bintliff Drive Houston, Texas 77036 Telephone: (713) 266-0588
Fax: (713) 266-2977

Report No. 1140243301
June 6, 2019

Mr. Madhu Kilambi, P.E.
ARKK Engineers, Inc.
7322 Southwest Freeway, Suite 1040
Houston, Texas 77074

Re: Geotechnical Investigation
Texas Avenue (FM 1765) Reconstruction
From 14th Street to 6th Street
City of Texas City, Galveston County, Texas

Dear Mr. Kilambi:

Presented herein is our geotechnical investigation report for the above referenced project. Preliminary field logs were submitted to you on April 17, 2019. This report supersedes all previously submitted reports, transmittals, etc. for the referenced project. This study was authorized by you on April 3, 2019, by accepting our Proposal No. 1140443399, dated March 26, 2019.

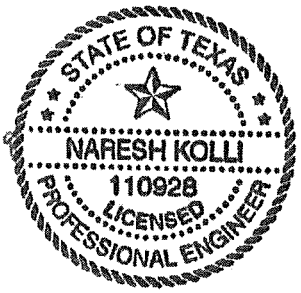
We appreciate this opportunity to be of service to you. If you have any questions regarding the report, or if we can be of further service to you, please call us.

Sincerely,
GEOTEST ENGINEERING, INC.
TBPE Registration No. F-410

Krishna M Pradeep, E.I.T.
Graduate Engineer

Naresh Kolli, P.E.
Project Manager

6/6/19



NK\kmp\ego
Copies Submitted: (1+1-pdf)
PC38\GEOTECHNICAL\40243301.DOC

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

ILLUSTRATIONS

TABLES

APPENDIX A

EXECUTIVE SUMMARY

A geotechnical investigation was conducted for the Texas Avenue (FM 1765) Reconstruction Project in the City of Texas City, Galveston County, Texas. The project includes reconstructing approximately 3,800 LF of existing 5-lane concrete paving along Texas Avenue (FM 1765) from 14th Street to 6th Street, with new concrete pavement. The project also includes storm sewer installation and water line replacement along Texas Avenue. Based on the information provided, we understand that the invert depth of the proposed storm sewer (24" RCP, 4' x 2' RCB, 5' x 2' RCB, and 7' x 2' RCB) ranges from approximately 4 to 6 feet, and will be installed primarily by open-cut method of construction. The proposed water line will be installed by trenchless (auger) method of construction.

This study included drilling and sampling of five (5) soil borings each to a depth of 15 feet, performing laboratory tests on recovered soil samples, performing engineering analyses and preparing a geotechnical report.

The principal findings and conclusions developed from this investigation are summarized below:

- The existing pavement along Texas Avenue from 14th Street to 6th Street, as obtained in borings GB-1 through GB-5 consists of 0.5 inches of asphalt over 8 to 9 inches of concrete.

- The subsurface soils below the existing pavement, as revealed by borings GB-1 through GB-5, consist of soft to hard gray, brown, reddish brown and gray, and yellowish brown and gray fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand to the explored depth of 15 feet. Fill material consisting of gray and brown fat clay, lean clay, and lean clay with sand, calcareous and ferrous nodules, and shell fragments were encountered to depths ranging from 1 feet to 6 feet in borings GB-1, GB-3 and GB-4.

- No groundwater was encountered in the borings drilled for this investigation.

- All excavation operations should be in accordance with OSHA Standards, and Galveston

County Standard Specification, Section 01526, "Trench Safety Systems".

- The bedding and backfill for the proposed utilities should be in accordance with ARKK Standard Specification, Section 02227, and Galveston County Standard Specification, Section 02227, "Excavation and Backfill for Utilities".

- The auger pits/insertion and reception pits for the water line should be constructed as per the ARKK Standard Specifications Section 02317, "Auguring Pipe for Waterlines."

- The foundation recommendations for new manholes are presented in Section 5.5 of this report.

- The recommended pavement section and subgrade stabilization for Texas Avenue (FM 1765) reconstruction are presented in Section 5.6 of this report.

1.0 INTRODUCTION

1.1 Location and Description of Project

A geotechnical investigation was conducted for the Texas Avenue (FM 1765) Reconstruction Project in the City of Texas City, Galveston County, Texas. The project location is bounded by 14th Street to the west, and 6th Street to the east in Galveston County, Texas within the Key Map Page No. 738 Grid G and H.

The project includes reconstructing approximately 3,800 LF of existing 5-lane concrete paving along Texas Avenue (FM 1765) from 14th Street to 6th Street, with new concrete pavement. The project also includes storm sewer installation and water line replacement along Texas Avenue. Based on the information provided, we understand that the invert depth of the proposed storm sewer (24" RCP, 4' x 2' RCB, 5' x 2' RCB, and 7' x 2' RCB) ranges from approximately 4 to 6 feet, and will be installed primarily by open-cut method of construction. The proposed water line will be installed by trenchless (auger) method of construction. The vicinity map of the project alignment is shown on Figure 1.

1.2 Scope of Work

The purpose of this investigation was to evaluate the soil and groundwater (if any) conditions along Texas Avenue in the City of Texas City, and to provide geotechnical recommendations for the proposed roadway reconstruction and utilities replacement. The scope of this investigation consisted of the following tasks:

- Cored the existing pavement at five (5) locations along Texas Avenue to obtain the existing pavement thickness and for boring access.

- Drilled and sampled five (5) soil borings each to a depth of 15 feet along Texas Avenue (FM 1765) from 14th Street to 6th Street.

- Performed appropriate laboratory tests on selected representative soil samples to develop the engineering properties of the soil.

- Performed engineering analyses to develop geotechnical recommendations for pavement thickness including subgrade stabilization for the pavement construction, bedding and backfill and water level control for open cut construction for storm sewer and water line installation.

- Prepared a geotechnical investigation report including field and laboratory data and geotechnical recommendations.

2.0 FIELD EXPLORATION

Subsurface conditions along the project alignment were investigated by drilling a total of five (5) soil borings (GB-1 through GB-5) drilled each to a depth of 15 feet below existing pavement. All borings were drilled with a truck-mounted rotary drilling rig. Pavement coring was performed at each boring location to verify the existing pavement thickness and to access the subsurface soils. All the boring locations are shown on Plan of Borings, Figure 2. Survey information for the completed borehole locations was not available to us at the time of preparation of this report.

Samples were taken at continuous 2-foot intervals to a depth of 15 feet. Cohesive soil samples were obtained with a 3-inch diameter thin-walled tube sampler in general accordance with ASTM D1587. Each sample was removed from the sampler in the field, carefully examined and logged by an experienced soils technician. Suitable portions of each sample were then sealed and packaged for transportation to Geotest's laboratory. The shear strength of cohesive soil samples was estimated using a calibrated hand penetrometer in the field. After taking water level measurements (if any), all borings were grouted with cement bentonite grout.

Detailed descriptions of the soils encountered along the project alignment are given on the boring logs GB-1 through GB-5 and are presented on Figures A-1 through A-5 in Appendix A. A key to symbols and terms used on the boring logs is presented on Figure A-6 in Appendix A.

Groundwater level observations were made at each boring location during field investigation. The results of these observations are noted on the boring logs.

3.0 LABORATORY TESTING PROGRAM

The laboratory testing program was designed to evaluate the pertinent physical properties and shear strength characteristics of the subsurface soils. Classification tests were performed on selected samples to aid in soil classification.

Undrained shear strengths of selected cohesive samples were measured by unconsolidated undrained (UU) triaxial compression tests (ASTM D2850). The results of the UU triaxial compression tests are plotted on the boring logs as solid squares. The shear strength of cohesive samples was measured in the field with a calibrated hand penetrometer and also in the laboratory with a Torvane. The shear strength values obtained from the penetrometer and Torvane are plotted on the boring logs as open circles and triangles, respectively.

Moisture content and dry unit weight were measured for each unconfined compression test and UU triaxial compression test samples. Moisture content measurements (ASTM D2216) were also made on other samples to establish the moisture profile at each boring location. Atterberg limit tests (ASTM D4318) were performed on soil samples to measure plasticity characteristics. Percent passing No. 200 sieve (ASTM D1140) tests were also performed on selected samples. The result of all these tests are plotted or summarized on the boring logs GB-1 through GB-5 and are presented on Figures A-1 through A-5 in Appendix A.

4.0 GENERAL SUBSURFACE CONDITIONS

4.1 Existing Pavement

The existing pavement along Texas Avenue from 14th Street to 6th Street, as obtained in borings GB-1 through GB-5 consists of 0.5 inches of asphalt over 8 to 9 inches of concrete. The details of the pavement encountered at each boring location are presented below.

Street	Boring Nos.	Asphalt Surface Thickness (in.)	Concrete Thickness (in.)	Total (in.)
Texas Avenue	GB-1	0.5	8.5	9.0
	GB-2	0.5	8.5	9.0
	GB-3	0.5	8.75	9.25
	GB-4	0.5	8.0	8.5
	GB-5	0.5	9.0	9.5

4.2 Subsurface Soil

The subsurface soils below the existing pavement, as revealed by borings GB-1 through GB-5, consist of soft to hard gray, brown, reddish brown and gray, and yellowish brown and gray fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand to the explored depth of 15 feet. Fill material consisting of gray and brown fat clay, lean clay, and lean clay with sand, calcareous and ferrous nodules, and shell fragments were encountered to depths ranging from 1 feet to 6 feet in borings GB-1, GB-3 and GB-4.

The fat clay, fat clay with sand, and sandy fat clay are of high plasticity with liquid limits ranging from 50 to 53 and plasticity indices ranging from 30 to 31. The lean clay and lean clay with sand are of medium plasticity with liquid limits ranging from 30 to 49 and plasticity indices ranging from 13 to 28. The fines content (passing No. 200 sieve) of fat clay and lean clay ranges from 95 to 97 percent. The fines content of fat clay with sand and lean clay with sand ranges from 74 to 83 percent, and the fines content of sandy fat clay was about 61 percent.

4.3 Water Levels

No groundwater was encountered in the borings drilled for this investigation. However, it should be noted that various environmental and man-made factors such as amount of precipitation, nearby subsurface construction activities, and change in area drainage can substantially influence the groundwater level.

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 General

The project includes reconstructing approximately 3,800 LF of existing 5-lane concrete paving along Texas Avenue (FM 1765) from 14th Street to 6th Street, with new concrete pavement. The project also includes storm sewer installation and water line replacement along Texas Avenue. Based on the information provided, we understand that the invert depth of the proposed storm sewer (24" RCP, 4' x 2' RCB, 5' x 2' RCB, and 7' x 2' RCB) ranges from approximately 4 to 6 feet, and will be installed primarily by open-cut method of construction. The proposed water line will be installed by trenchless (auger) method of construction.

5.2 Open-Cut Excavation

5.2.1 Geotechnical Parameters. Based on the soil conditions revealed by the borings, geotechnical parameters were developed for the design of open cut excavation for the proposed storm sewer, and auger (insertion/reception) pits planned for the trenchless installation. The geotechnical design parameters for open cut excavation for auger (insertion/reception) pits are provided in Table 1. For design, the groundwater level should be assumed to exist at the ground surface, since this condition may exist after a heavy rain or flooding.

5.2.2 Excavation Stability. The open excavations may be shored, laid back to a stable slope or some other equivalent means used to provide safety for workers and adjacent structures. The excavating and trenching operations should be in accordance with OSHA Standards, OSHA 2207, Subpart P, latest revision and Galveston County Standard Specification, Section 01526, "Trench Safety Systems".

- Excavation Shallower Than 5 Feet – For excavations that are less than 5 feet, the need for protection should be evaluated by a competent person to examine the ground for any indication of ground movement or potential cave-in. When any indication of hazardous ground movement or potential cave-in is anticipated during construction,

adequate protective system should be provided for all excavation even that if the excavations are shallower than 5 feet.

- Excavation Deeper Than 5 Feet - Excavations that are deeper than 5 feet should be sloped, shored, sheeted, braced or laid back to a stable slope or supported by some other equivalent means or protection such that workers are not exposed to moving ground or cave-ins. The slopes and shoring should be in accordance with the trench safety requirements per OSHA Standards. The following items provide design criteria for trench stability.

  (i) OSHA's Soil Type. Based on the soil conditions revealed by the borings and the assumed groundwater level at surface, OSHA's soil type "C" should be used for the determination of allowable maximum slope and/or the design of a shoring system. For shoring deeper than 20 feet, an engineering evaluation is required.

  (ii) Excavation Support Earth Pressure. Based on the subsurface conditions indicated by this investigation and laboratory testing results, the excavation support earth pressure diagram was developed and is presented on Figure 5. The pressure diagram can be used for the design of temporary excavation bracing. For a trench box, a lateral earth pressure resulting from an equivalent fluid with a unit weight of 97 pcf is recommended. The above value of equivalent fluid pressure is based upon an assumption that the groundwater level is near the ground surface, since these conditions may exist after a heavy rain or flooding. Effect of surcharge loads at the ground surface should be added to the computed lateral earth pressure. A surcharge load, q, will typically result in a lateral load equal to 0.5 q.

  (iii) Bottom Stability. In braced cuts, if tight sheeting is terminated at the base of the cut, the bottom of the excavation can become unstable under certain conditions. The stability of the trench bottom is governed by the shear strength of the soils and by the differential hydrostatic head. For cuts in cohesive soils as encountered in the

borings for excavation depths of 4 to 6 feet, stability of the bottom can be evaluated in accordance with the procedure outlined on Figure 6.

5.2.3 Groundwater Control. Excavations for the proposed utilities installation may encounter groundwater seepage to varying degrees depending on groundwater conditions at the time of construction and the location and depth of excavation. Based on the soil conditions identified in the borings for the proposed utilities installation, all the excavations will be in cohesive soils. In general, for cohesive soils as encountered in all the borings for the excavation depths (maximum depth of 6 feet), groundwater (if encountered) may be managed by collection in excavation bottom sumps for pumped disposal.

The contractor should verify the groundwater level at the time of construction and should provide an adequate dewatering system, where required. The groundwater control should be carried out in accordance with the ARKK Standard Specifications, Section 01563, and Galveston County Standard Specification, Section 01563, "Control of Ground Water and Surface Water".

5.2.4 Live Loads on Pipe Due to Traffic. Loads on pipe due to traffic (if any) should be considered. A graph providing calculated vertical stress on pipe due to traffic loads is given on Figure 7.

5.2.5 Bedding and Backfill for Utilities. The bedding and backfill for the storm sewer and water line should be in accordance with ARKK Standard Specification, Section 02227, and Galveston County Standard Specification, Section 02227, "Excavation and Backfill for Utilities".

5.2.6 Bedding and Backfill for the Auger Pits/Insertion and Receiving Pits. The auger pits or insertion and receiving pits should be constructed and backfilled in accordance with ARKK, Standard Specification Section, 02317, "Auguring Pipe for Waterlines."

5.3 Trenchless Installation

It is understood that the proposed water line will be replaced by auger method of construction. The trenchless method of construction should be per ARKK, Specification Section

02317, "Augering Pipe for Water Lines."

5.3.1 Geotechnical Parameters. Based on the soil conditions revealed by soil borings (GB-1 through GB-5), laboratory test data and geotechnical design parameters were developed for cohesive soils and are provided in Table 2. The cohesive soils include fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand. For design conditions, the groundwater level should be assumed to exist at the ground surface.

5.3.2 Earth Pressure on Pipe Casing. The earth pressures on augering should be determined from Figure 8. Equations to calculate the pipe casing loads are also shown on Figure 8.

5.3.3 Carrier Pipe Design Parameters. Carrier pipe must be sufficiently strong to withstand anticipated long-term ground loads and must not be subjected to deterioration by substance either in ground or in the auger casing. The carrier pipe design should include consideration of not only the loads applied to the pipe but also factors other than soil loading. These factors could include minimum structural code requirements, loading from augering and other construction loads. The drained geotechnical design parameters given in Table 2 should be used to analyze the soil structure intersection of the carrier pipe.

5.3.4 Influence of Augering on Adjacent Structures. Surface and near-surface structures near the tunnel alignment consist primarily of private properties, city streets and public and private utilities.

Ground movement, in terms of loss of ground or ground lost, is commonly associated with soft ground tunneling. If such ground movement is excessive, it may cause damage to the structures, roads and services located above the tunnel. While ground movement cannot be eliminated, it can be controlled within certain limits by the use of proper construction techniques and good quality workmanship. These include, but are not limited to, prevention of excessive ground loss during tunneling with the use of grouting and filling the annular space between the pipe or casing and the surrounding soil and prevention of undue loss of fines through dewatering.

The selection and execution of tunneling methods that are best suited to anticipated ground conditions along the proposed tunnel are, in fact, the contractor's primary contribution to successful completion of the proposed auger or directional drilling. On review of the boring logs, the ground conditions for tunneling (excavation face) will be primarily through cohesive soils. The cohesive soils as encountered in borings GB-1 through GB-5 consist of soft to hard gray, brown, reddish brown and gray, and yellowish brown and gray fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand, and the ground in this area may be expected to behave as firm to raveling ground near the invert. Close monitoring of ground movement should be carried out during the trenchless installation.

The ground conditions for trenchless operation (excavation face) will be through predominantly in cohesive soils near borings GB-1 through GB-5. However, due to spacing of borings, soil conditions other than those encountered in borings could exist.

The proposed auger is parallel with or cross beneath utility lines. The largest potential problems from utilities may result from:

- Leaking water pipes
- Gas pipe breakage leading to a potential explosion
- Breakage of storm or sanitary sewers

In general, it is the contractor's responsibility to investigate these and other possible third party interactions along the proposed tunnel alignment and to accommodate all of these interactions with the use of good construction methods.

5.4 Piping System Thrust Restraint

Unbalanced thrust forces will occur at any point in the pipe where the direction or cross sectional area of the flow changes. The force diagram shown in Figure 9 illustrates the thrust force generated by flow at a bend in the pipe. The equations for computing this thrust force are also given in this figure. The thrust force will often require more resistance or support than is available just from the pipe bearing against the backfill. In order to prevent intolerable

movement and overstressing of the pipe, suitable buttressing should be provided.

Proposed horizontal bends may require restraint in addition to that supplied by the pipe bearing on the backfill. In general, thrust blocks, both horizontal and vertical and restrained joints are common methods of supplying additional reaction. However, it is noted that restrained joints are considered for supplying additional reaction for the project and is discussed below.

5.4.1 Restrained Joints. Where thrust blocks are not practical, restrained joints, allowing thrust and shear forces to be transmitted across the pipe joints, are employed to allow a number of pipe sections to act integrally in bearing. The equations necessary to determine the restrained pipe length on each side of the bend are given below:

$$L = \frac{PA\ \ Sin(\theta/2)}{f(2W_e + W_p + W_w)}$$

where, L = restrained pipe length on each side of the bend, in feet

P = internal pressure, in pounds per square inch

A = cross sectional area of first unrestrained pipe joint, in square inches

θ = deflection angle of bend, in degrees

f = co-efficient of friction between pipe and soil (recommended 0.3)

W_e = overburden load, in pounds per liner foot = $\Upsilon_b\ B_c H$

W_p = weight of pipe, in pounds per linear foot

W_w = weight of water in pipe, in pounds per linear foot

Υ_b = wet unit weight of backfill material, in pounds per cubic foot (recommended 120 pcf)

B_c = pipe outer diameter, in feet

H = earth cover, in feet

Reinforced concrete encasement may be used in lieu of the manufactured joint restrained system. The equations and soil parameters given above can be used for the design of reinforced concrete encasement.

5.5 Structures

5.5.1 Description. The structure associated with this project will be new manholes. The new manholes for the proposed utilities will be placed at depths ranging from 4 to 6 feet below existing pavement (elevations ranging from approximately 1.0 to 2.2 feet).

5.5.2 Foundation Conditions. Based on the soil conditions revealed by the borings GB-1 through GB-5, the manholes bottom will be in medium stiff to very stiff lean clay, lean clay with sand, sandy fat clay, and fat clay fill soils.

5.5.3 Foundation Design Recommendations. The following items provide recommendations and design criteria for construction of the new manholes.

- Allowable Bearing Pressures. The mat foundation for supporting the new manholes placed at depths ranging from 4 to 6 feet [into medium stiff to very stiff lean clay, lean clay with sand, sandy fat clay, and fat clay] should be designed for an allowable (net) bearing pressure of 1,850 psf. The allowable bearing pressure includes a safety factor of 2.0.

  The above recommendation assumes that the final bearing surfaces consist of undisturbed natural soils and that underlying semi-transmissive zones are properly pressure-relieved and stable undisturbed bearing surfaces are attained.

- Bottom Stability. In braced cuts, if tight sheeting is terminated at the base of the cut, the bottom of the excavation can become unstable. The parameters that govern the stability of the excavation base are the soil shear strength and the differential hydrostatic head between the water level within the retained soils and the water level at the interior of the trench excavation. For cuts in cohesive soils as predominantly encountered in the borings, the bottom stability can be evaluated as outlined on Figure 6.

- Lateral Earth Pressure. The pressure diagram presented on Figure 5 can be used for the design of braced excavation. The lateral earth pressure diagram presented on Figure 10 is applicable for the design of the permanent walls.

- Hydrostatic Uplift Resistance. Structures extending below the water level should be designed to resist uplift pressure resulting from excess piezometric head. Design uplift pressures should be computed based on the assumption that the water table is at ground surface. To resist the hydrostatic uplift at the bottom of the structure, one of the following sources of resistance can be utilized in each of the designs.

    a. Dead weight of structure,
    b. Weight of soil above base extensions plus weight of structure, or
    c. Soil-wall friction plus dead weight of structure.

    The uplift force and resistance to uplift should be computed as detailed on Figure 11. In determining the configuration and dimensions of the structure using one of the approaches presented on Figure 11, the following factors of safety are recommended.

    a. Dead weight of concrete structure, $S_{f1} = 1.10$,
    b. Weight of soil (backfill) above base extension, $S_{f2} = 1.5$, and
    c. Soil-wall friction, $S_{f3} = 3.0$.

    Friction resistance should be discounted for the upper 5 feet, since this zone is affected by seasonal moisture changes.

5.5.4 Protection of Below Grade Structures. The design of the proper means for protection of below grade structures will depend upon the potential of the aggressivity or corrosivity of soil and groundwater properties. Aggressivity testing was not within the scope of this investigation. The design of the protection of below grade structures is beyond the scope of services for this investigation.

5.5.5 Water Level Control During Construction. Water level control should be in accordance with section 5.2.3 of this report.

5.5.6 Structure Backfill. Excavations for the proposed structures should be backfilled in accordance with the ARKK Standard Specifications, and Galveston County Standard Specification, Section 02226, "Excavation and Backfill for Structures."

5.6 Pavement Structure Design

We understand that the existing 5-lane concrete paving along Texas Avenue (FM 1765) from 14th Street to 6th Street, will be reconstructed with new concrete pavement with curb and gutter. The pavement design presented below was developed in accordance with "AASHTO Guide for Design of Pavement Structures," 1993 Edition.

5.6.1 Design Parameters

Subgrade Soil Properties. California Bearing Ratio (CBR) tests were not within the scope of this project. Therefore, the roadbed soil resilient modulus is estimated based on physical properties and strength characteristics of the natural subgrade soils. Based on the physical properties and strength characteristics of the natural subgrade soils obtained from laboratory tests, the effective roadbed soil resilient modulus (M_R) was estimated to be about 1,941 psi from an assumed CBR value of 1.0. Based on an estimated resilient modulus of the 8-inch lime-stabilized subgrade, the effective modulus of subgrade reaction (k) is estimated to be about 49 pci.

Traffic Data. No traffic count and vehicle classification data was provided to us at the time of preparation of this report. Based on the information provided by ARKK, the new concrete pavement section will be constructed in general accordance with a standard pavement design. A traffic loading of 6.2×10^6 kips ESALs was calculated over a 20-year design period and was utilized for the

pavement design.

Other Design Parameters. Other design parameters used in the development of rigid pavement thickness are given below:

Material Properties of Concrete:

Modulus of Elasticity of Concrete (E_c): 3,604,997 psi

Mean value of Modulus of Rupture of Concrete after 28 days (S'_c): 630 psi (based on compressive strength of 4,000 psi)

Load Transfer coefficient (J): 2.7

Drainage coefficient (C_d): 1.2

Overall Standard Deviation (S_o): 0.35

Reliability Level (R): 90%

Serviceability Index

Initial (P_o): 4.5

Terminal (P_t): 2.25

Reinforcement Variables

Allowable Working Stress (f_s): 45,000 psi (grade 60 steel)

Friction Factor (F): 1.8

5.6.2 Recommended Pavement Section

Based on the design parameters described above and the AASHTO design, the thickness of rigid pavement was determined. The recommended pavement section is given below:

Pavement Course	**Thickness, inches**
Reinforced Concrete	8
5% Lime-stabilized subgrade	8

For the 8-inch concrete pavement, the required longitudinal reinforcing steel for an expansion joint spacing of 80 feet and transverse reinforcement steel for a pavement width of 24

feet back to back are given below for the grade 60 steel.

Pavement Thickness (Inches)	**Longitudinal Steel**	**Transverse Steel**
	Center to Center Spacing (in)	**Center to Center Spacing (in)**
	# 5 bars	# 5 bars
8	24	30

5.6.3 Preparation of Pavement Subgrade

Based on the field and laboratory test data, the subgrade soils below the existing pavement sections consist of high plasticity lean clay, lean clay with sand, fat clay, fat clay with sand and sandy fat clay. These subgrade soils have high volume change potential. Hence, lime stabilization of the fat clay and lean clay subgrade soils will be required to reduce the swelling and shrinkage potential, to accelerate the construction and provide a stable subgrade on which to construct the pavement sections. The fat clay subgrade soils should be stabilized with 5 percent lime (by dry unit weight of soil) to a depth of at least 8 inches. This corresponds to approximately 33 pounds of lime per square yard based on a dry unit weight of 110 pcf. The actual percentage of lime should be confirmed by laboratory tests at the time of construction.

Subgrade preparation for the proposed pavement after removing the existing pavement should consist of stripping, proof-rolling, and stabilization. The following procedures for subgrade preparation are recommended:

1. Strip the surficial soils to a suitable depth to remove all surficial vegetation and achieve grade. In isolated areas where soft, compressible, or very loose soils are encountered, additional stripping may be required.

2. After stripping, the exposed surface should be proof-rolled with a minimum of 3 passes of a 30-ton pneumatic-tired roller or a partially loaded truck utilizing a tire pressure of approximately 90 psi. If rutting develops, the tire pressure should be reduced. The purpose of the proof-rolling operation is to identify any

underlying zones or pockets of soft soils so these weak materials can be removed and replaced.

3. Lime stabilization of cohesive subgrade should be performed in accordance with ARKK Standard Specification, Section 02241, "Lime Stabilized Subgrade".

6.0 PROVISIONS

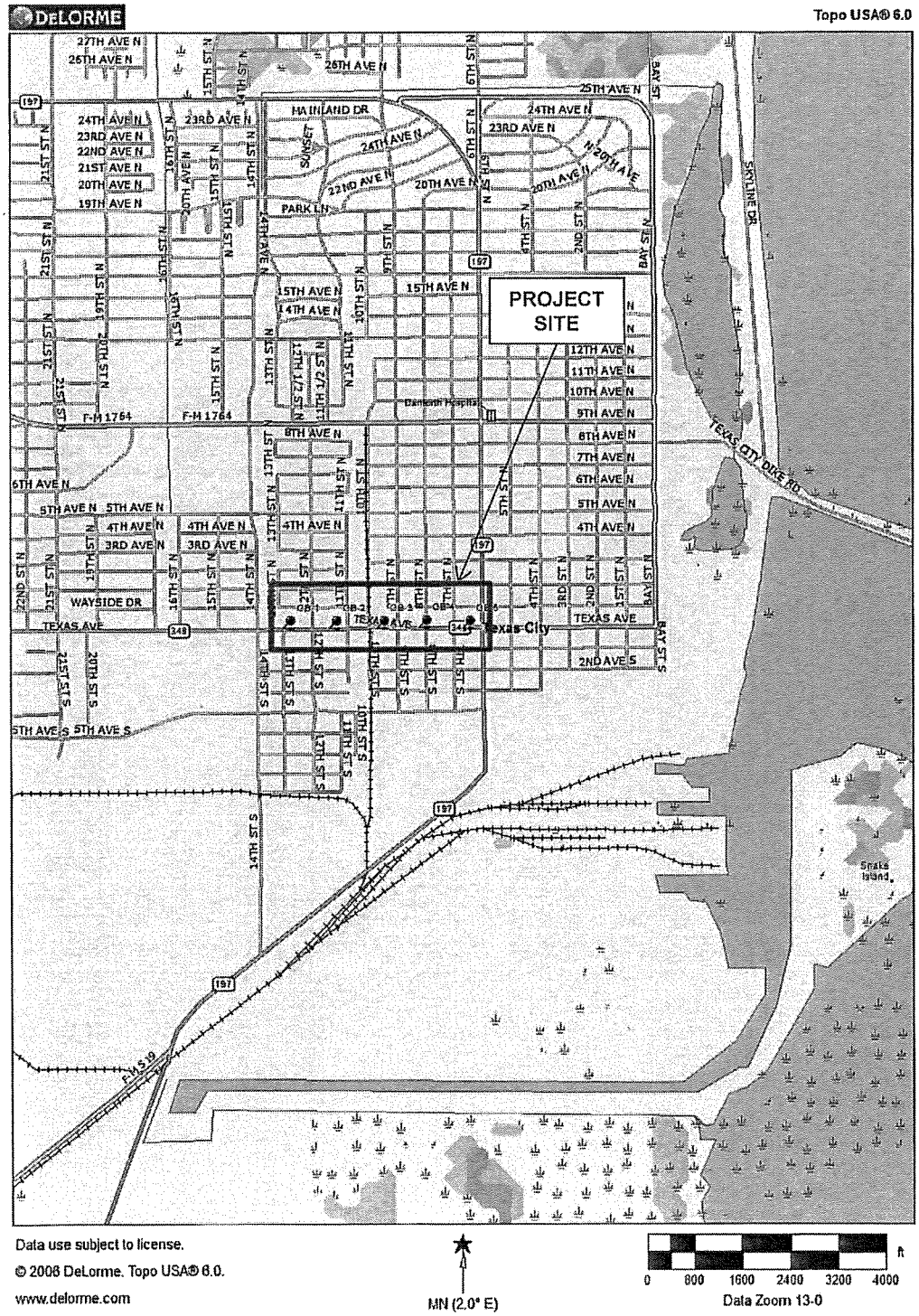
The description of subsurface conditions and the design information contained in this report are based on the test borings made at the time of drilling at specific locations. However, some variation in soil conditions may occur between test borings. Should any subsurface conditions other than those described in our boring logs be encountered, Geotest should be immediately notified so that further investigation and supplemental recommendations can be provided. The depth of the groundwater level may vary with changes in environmental conditions such as frequency and magnitude of rainfall. The stratification lines on the log of borings represent the approximate boundaries between soil types, however, the transition between soil types may be more gradual than depicted.

This report has been prepared for the exclusive use of ARKK Engineers, Inc, for the Texas Avenue (FM 1765) Reconstruction in City of Texas City, Texas.

This report shall not be reproduced without the written permission of Geotest Engineering, Inc., ARKK Engineers, Inc. and City of Texas City.

ILLUSTRATIONS

Job No. 1140243301



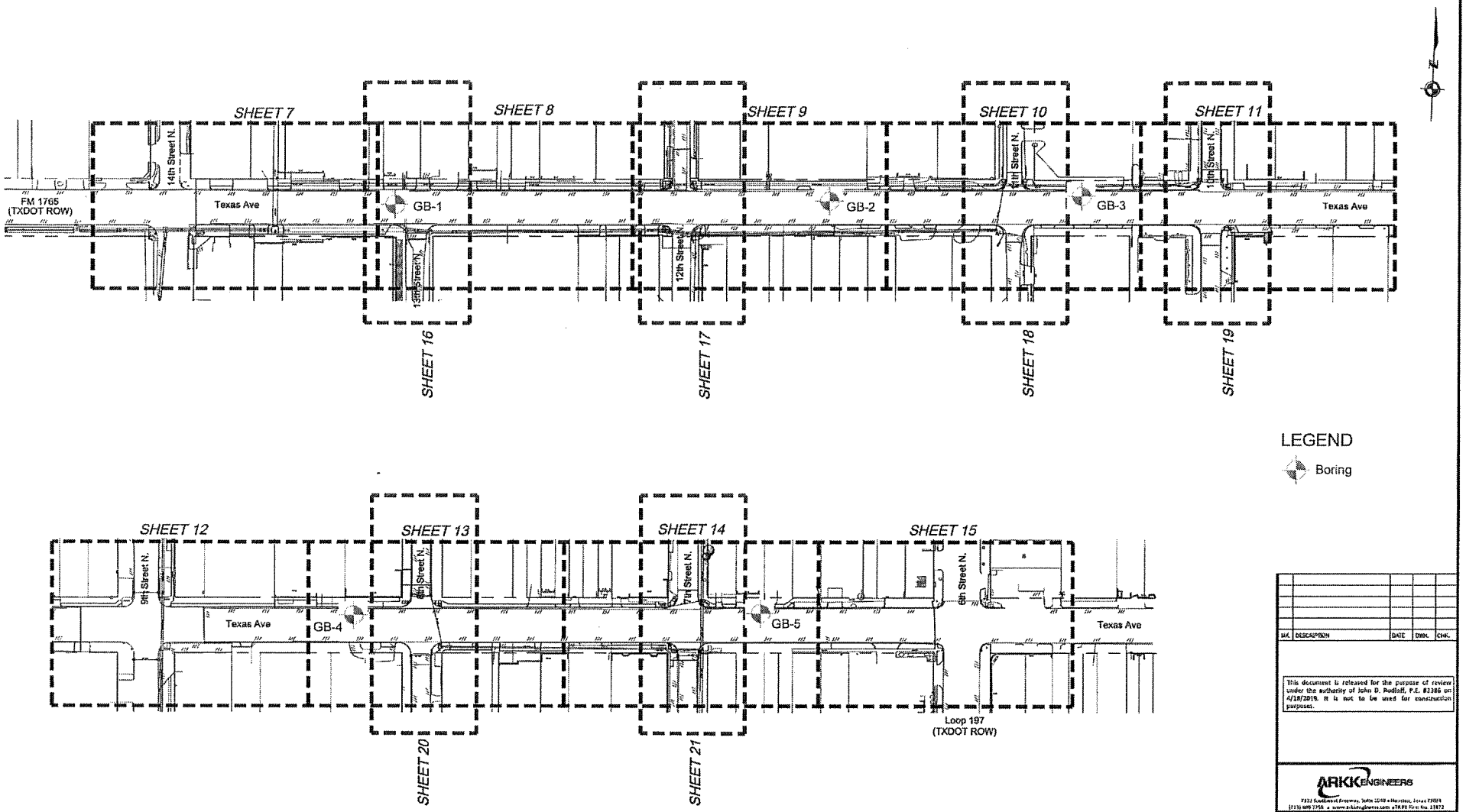
PAVING IMPROVEMENTS ALONG TEXAS AVENUE (FM 1765)
FROM 14TH STREET TO 6TH STREET
CITY OF TEXAS CITY, GALVESTON COUNTY, TEXAS

VICINITY MAP

Geotest Engineering, Inc.

FIGURE 1

Job No. 1140243301



NO.	DESCRIPTION	DATE	DWN.	CHK.

This document is released for the purpose of review under the authority of John D. Rudloff, P.E. 82386 on 4/18/2019. It is not to be used for construction purposes.

ARKK ENGINEERS

Galveston County,Texas

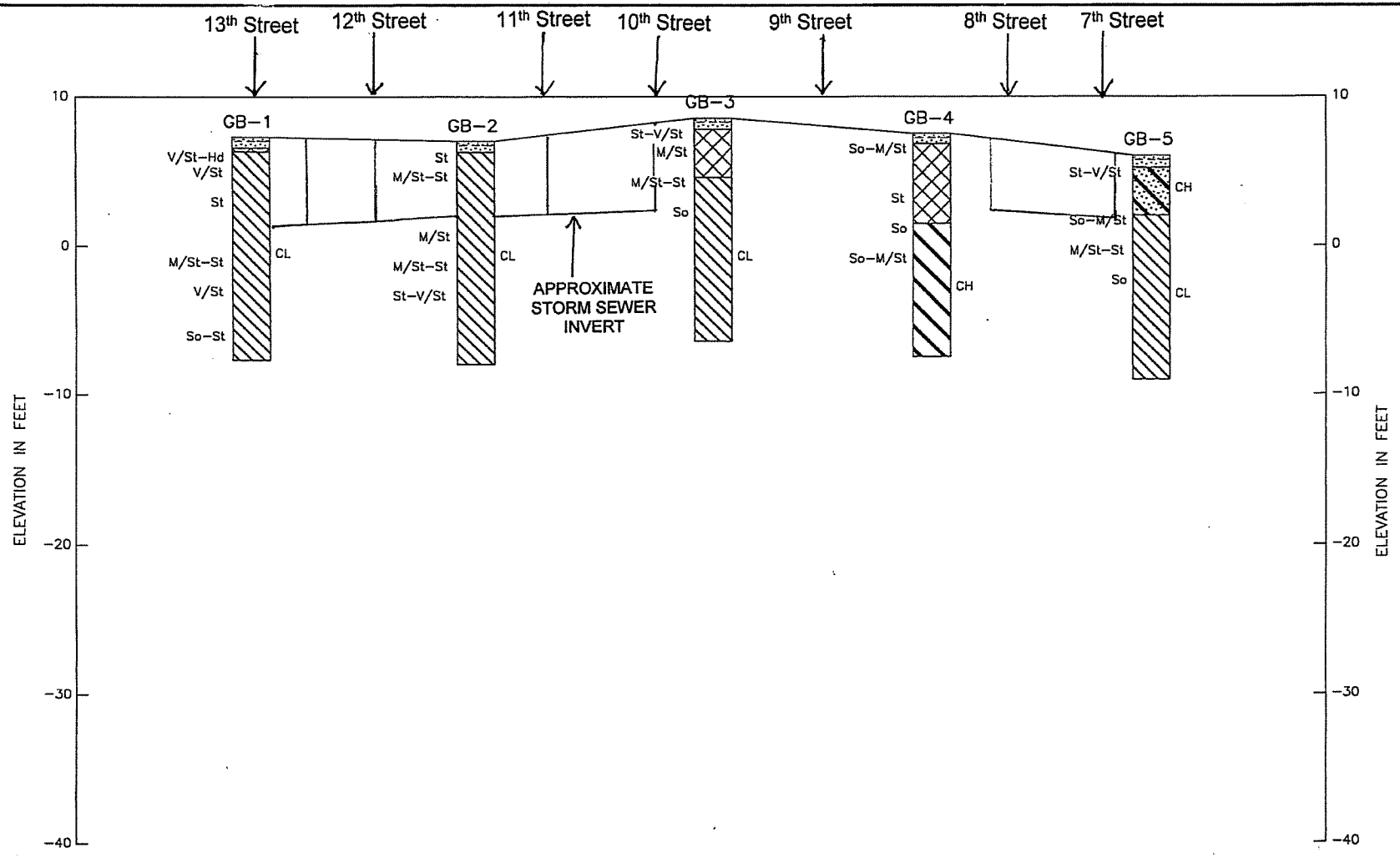
Texas Avenue Reconstruction

Overall Layout Plan

Job No.: 18--015	Scale: HORZ:1" = 160' VERT:
Date: April, 2019	
Des By: D. Fattig	FIGURE 2
Chkd By: J Rudloff	

Job No. 1140243301

Geotest Engineering, Inc.



GENERAL NOTES:

1. See Figure 2 for approximate location of borings.
2. Data concerning subsurface conditions have been obtained at boring locations only. Actual conditions between borings may differ from the profile shown here.
3. See logs of boring for detailed description of soils encountered in each borehole.
4. See Figure 4 for symbols and abbreviations used on this profile.

BORING LOG PROFILE

TEXAS AVENUE RECONSTRUCTION
BORINGS GB–1 TO GB–5

0 250 500 750 1000

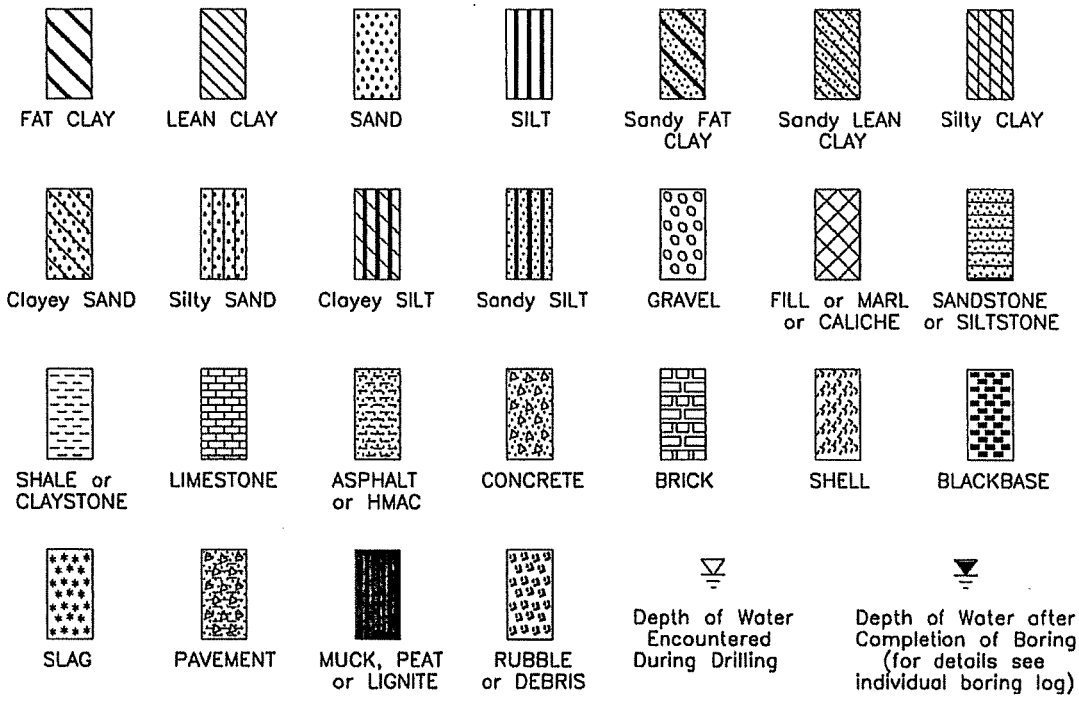
HORIZONTAL SCALE IN FEET

FIGURE 3

Job No. 1140243301

SYMBOLS AND ABBREVIATIONS USED ON BORING LOG PROFILE

LEGEND



ABBREVIATIONS USED FOR CONSISTENCY/DENSITY

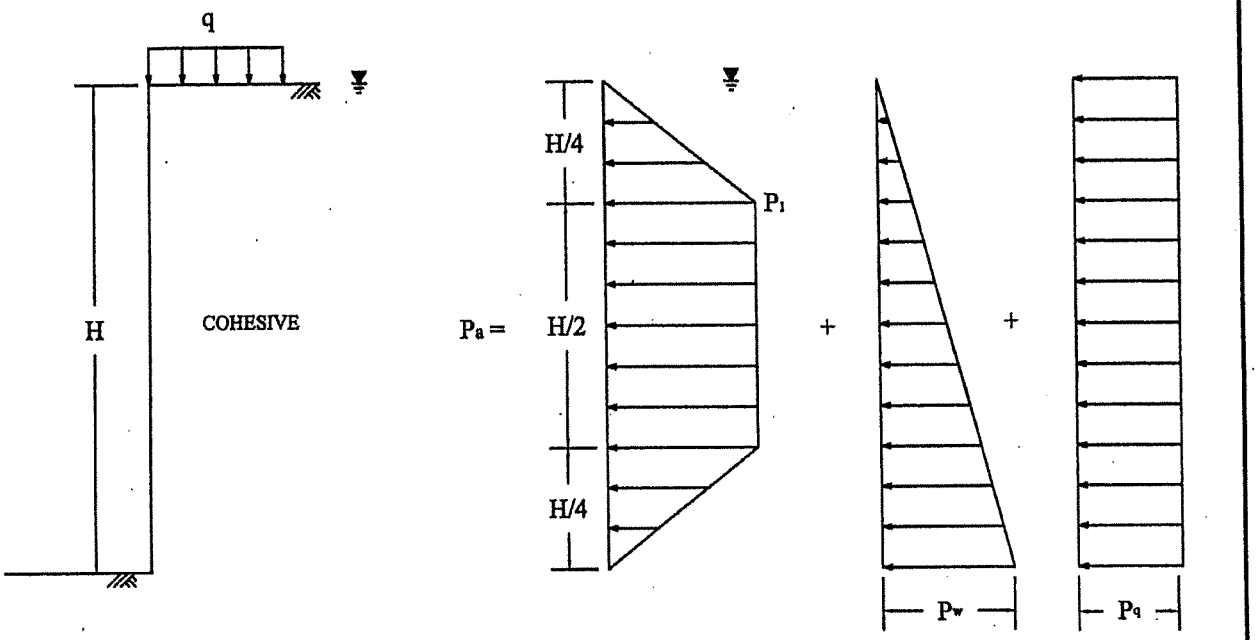
COHESIVE SOILS

V/So	:	Very Soft
So	:	Soft
Fm	:	Firm
M/St	:	Medium Stiff
St	:	Stiff
V/St	:	Very Stiff
Hd	:	Hard
V/Hd	:	Very Hard

COHESIONLESS SOILS

V/Lo	:	Very Loose
Lo	:	Loose
S/Co	:	Slightly Compact
Co	:	Compact
M/De	:	Medium Dense
De	:	Dense
V/De	:	Very Dense

Job No. 1140243301



TYPICAL SOIL PARAMETERS

See Table 1 for typical values of soil parameters

BRACED WALL

For $\gamma H/c \leq 4$

$P_1 = 0.3\ \gamma_c' H$
$P_w = \gamma_w H = 62.4\ H$
$P_q = 0.5\ q$

Where:

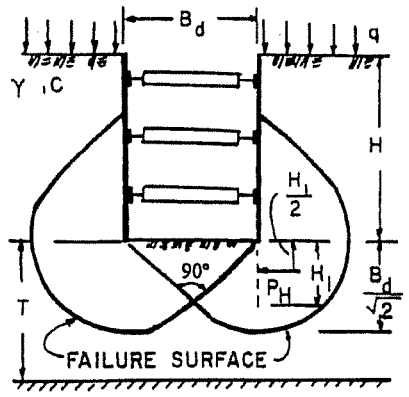
γ_c' = Submerged unit weight of cohesive soil, pcf;
γ_w = Unit weight of water, pcf;
q = Surcharge load at surface, psf;
P_a = Lateral pressure, psf;
P_1 = Active earth pressure, psf;
P_q = Horizontal pressure due to surcharge, psf;
P_w = Hydrostatic pressure due to groundwater, psf;
H = Depth of braced excavation, feet
c = Shear strength of cohesion soil, psf;

TRENCH SUPPORT EARTH PRESSURE

SUBMERGED COHESIVE SOIL

Job No. 1140243301

CUT IN COHESIVE SOIL,
DEPTH OF COHESIVE SOIL UNLIMITED (T>0.7 B_d)
L = LENGTH OF CUT



If sheeting terminates at base of cut:

$$\text{Safety factor, } F_S = \frac{N_C C}{\gamma H + q}$$

N_C = Bearing capacity factor, which depends on dimensions of the excavation : B_d, L and H (use N_C from graph below)

C = Undrained shear strength of clay in failure zone beneath and surrounding base of cut

γ = Unit weight of soil (see Table 1)

q = Surface surcharge (assumed q = 500 psf)

If safety factor is less than 1.5, sheeting or soldier piles must be carried below the base of cut to insure stability - (see note)

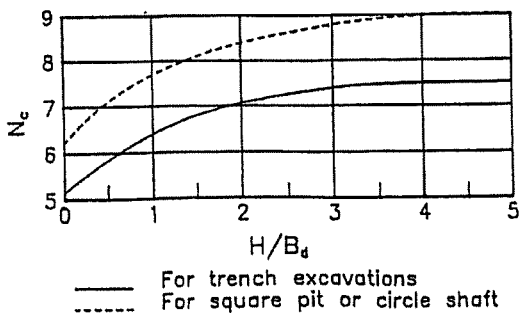
H_1 = Buried length = $\frac{B_d}{2} \geq 5$ feet

Note : If soldier piles are used, the center to center spacing should not exceed 3 times the width or diameter of soldier pile .

Force on buried length, P_H:

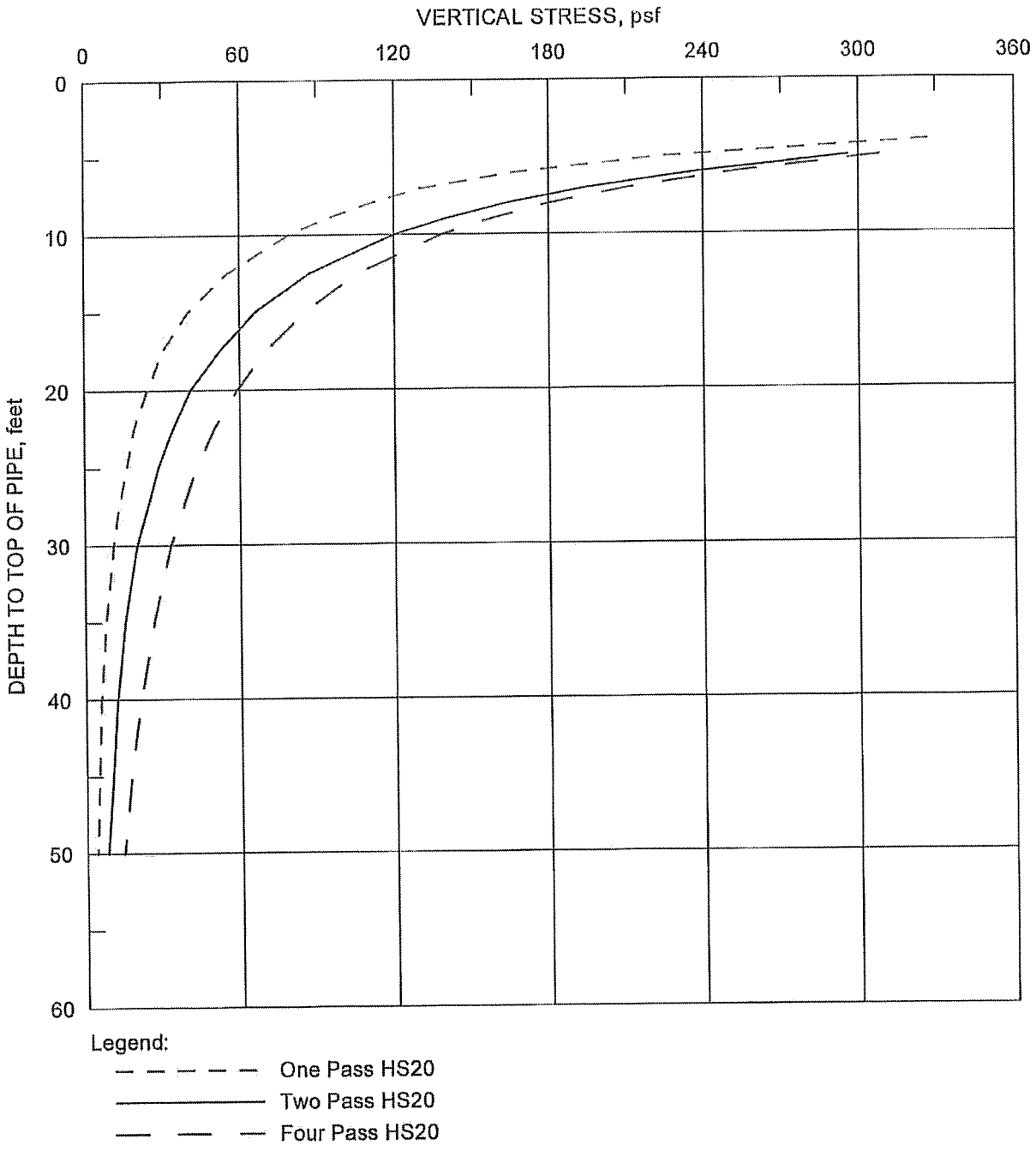
If $H_1 > \frac{2}{3}\frac{B_d}{\sqrt{2}}$, $P_H = 0.7\,(\gamma H B_d - 1.4CH \cdot \pi C B_d)$ in lbs/ linear foot

If $H_1 < \frac{2}{3}\frac{B_d}{\sqrt{2}}$, $P_H = 1.5H_1\,(\gamma H - \frac{1.4CH}{B_d} \cdot \pi C)$ in lbs/ linear foot



STABILITY OF BOTTOM FOR BRACED CUT

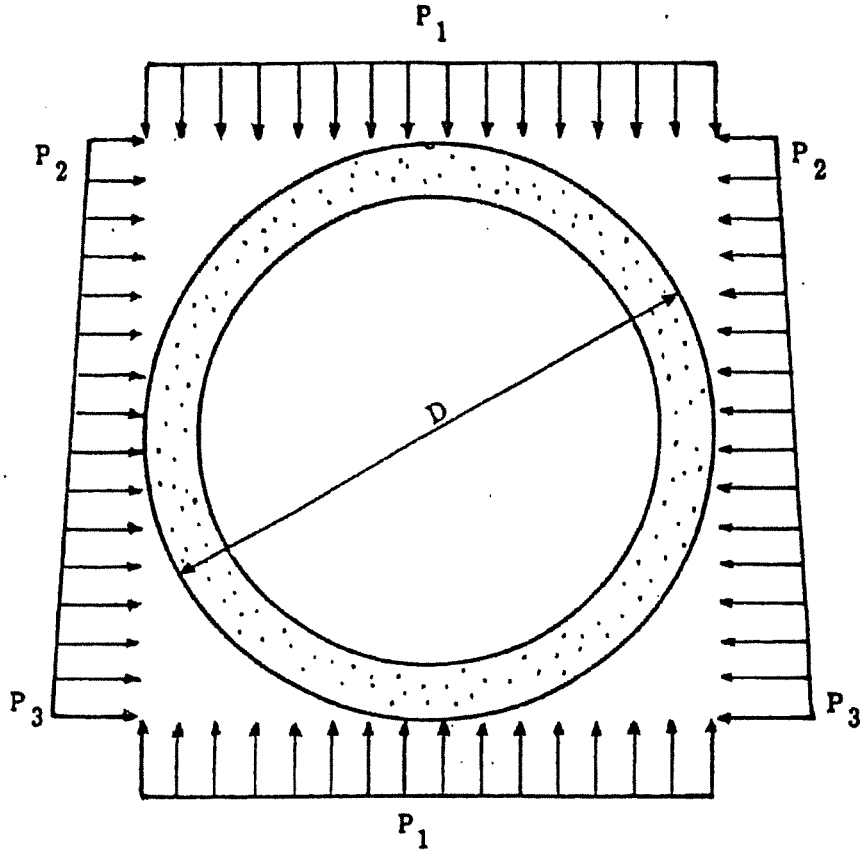
Job No. 1140243301



Notes:
1. Based on standard AASHTO H20 or HS20 dual wheel truck axle loadings
2. The vertical stress was estimated by using Westergaard solution

VERTICAL STRESS ON PIPE
DUE TO TRAFFIC LOAD

Job No. 1140243301



$$P_1 = [(H + \frac{D}{2}) \times (\gamma - \gamma_w) + D_w \times \gamma_w] + q_s \text{ , for } D_w < H + \frac{D}{2}$$

$$P_1 = [(H + \frac{D}{2}) \times \gamma] + q_s \text{ , for } D_w \geq H + \frac{D}{2}$$

$$P_2 = (H \times \gamma) + q_s$$

$$P_3 = [(H + D) \times \gamma] + q_s$$

Where: P_1, P_2, P_3 = Tunnel liner load, psf.

D = Tunnel outside diameter, ft.

H = Depth to top of tunnel; ft.

D_w = Depth to ground water level; ft.

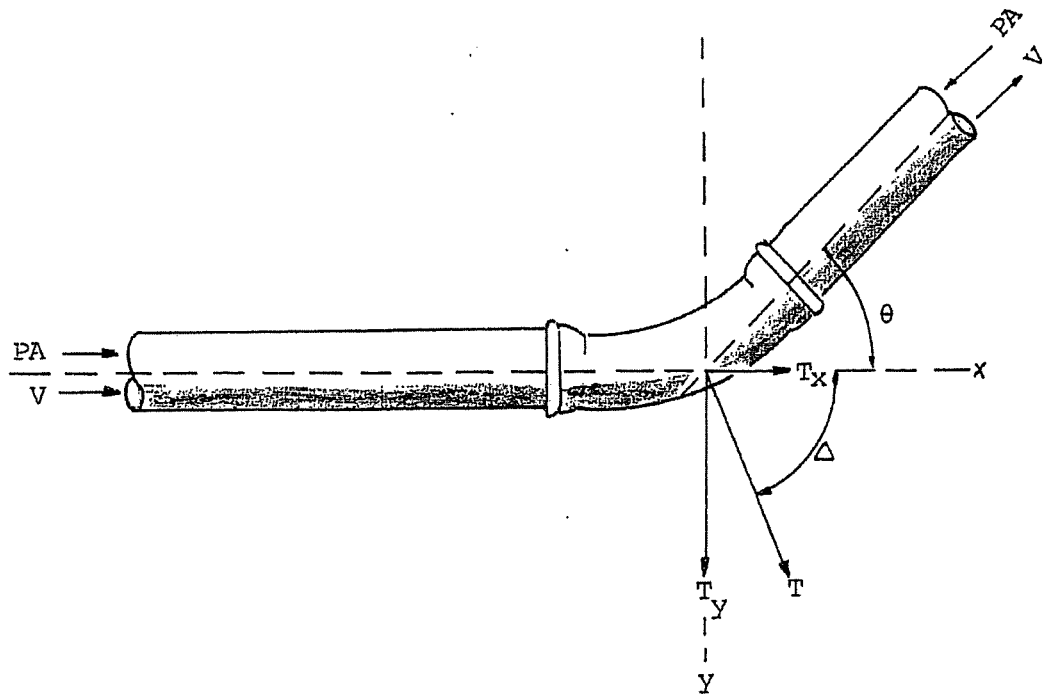
γ = Wet unit weight of soil, pcf (see Table 2)

γ_w = Unit weight of water, 62.4 pcf

q_s = Surcharge load, psf.

EARTH PRESSURE
ON AUGERING

Job No. 1140243301



$T_x = PA\ (1 - COS\ \theta)$

$T_y = PA\ SIN\ \theta$

$T = 2\ PA\ SIN\ \frac{\theta}{2}$

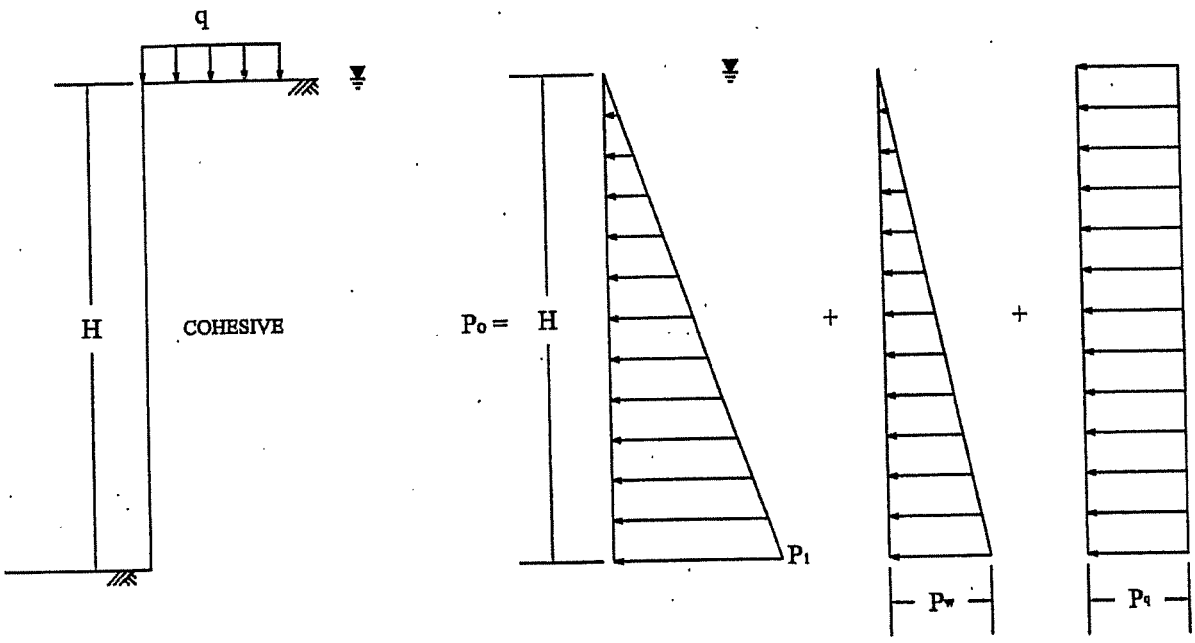
$\Delta = (90 - \frac{\theta}{2})$

Where:

- T is the resultant force on the bend
- T_x is the component of thrust force in x-direction
- T_y is the component of thrust force in y-direction
- P is the maximum sustained pressure
- A is the pipe cross-sectional area
- θ is the bend deflection angle
- Δ is the angle between T and X-axis
- V is the fluid velocity

THRUST FORCES ACTING ON A BEND

Job No. 1140243301



TYPICAL SOIL PARAMETERS

See Table 1 for typical values of soil parameters

$K_{oc} = 1.0$

PERMANENT WALL

$P_1 = K_{oc}\,\gamma_c'\,H$
$P_w = \gamma_w\,H = 62.4\,H$
$P_q = 0.5\,q$

Where:

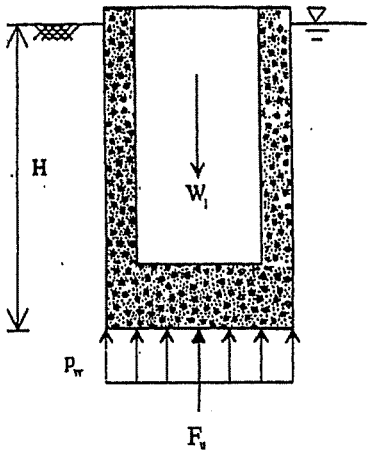
γ_c' = Submerged unit weight of cohesive soil, pcf;
K_{oc} = Coefficient of at-rest earth pressure in cohesive soil;
γ_w = Unit weight of water, pcf;
q = Surcharge load at surface, psf;
P_o = Lateral pressure, psf;
P_1 = At-rest earth pressure, psf;
P_q = Horizontal pressure due to surcharge, psf;
P_w = Hydrostatic pressure due to groundwater, psf;
H = Depth of excavation, feet

LATERAL EARTH PRESSURE DIAGRAM FOR PERMANENT WALL

SUBMERGED COHESIVE SOIL

Job No. 1140243301

(a) DEAD WEIGHT OF STRUCTURE

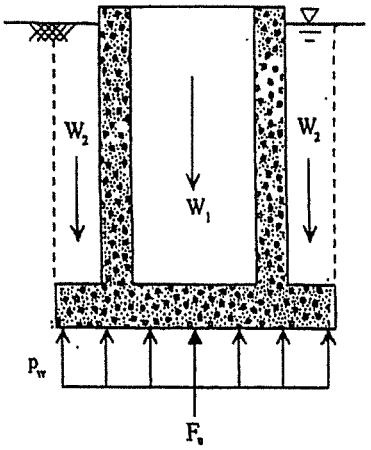


$P_w = H\gamma_w$

$F_u = A_b P_w$

$\frac{W_1}{Sf_1} = F_u$

(b) WEIGHT OF SOIL ABOVE BASE EXTENSION PLUS DEAD WEIGHT OF STRUCTURE

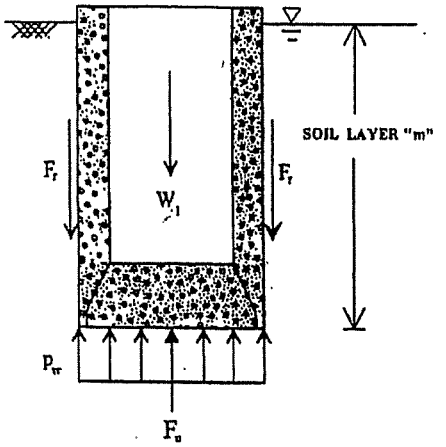


$P_w = H\gamma_w$

$F_u = A_b P_w$

$\frac{W_1}{Sf_1} + \frac{W_2}{Sf_2} = F_u$

(c) SOIL-WALL FRICTION PLUS DEAD WEIGHT OF STRUCTURE



$P_w = H\gamma_w$

$F_u = A_b P_w$

$\frac{W_1}{Sf_1} + \frac{F_r}{Sf_3} = F_u$

Predominantly Cohesive Soils, $F_r = \alpha\, c_m A_m$

Predominantly Cohesionless Soils, $F_r = p_m A_m K \tan \delta_m$

See Table 1 for typical values of soil parameters

Where:

A_b	=	area of base, sq. ft.
A_m	=	cylindrical surface area of layer "m" , sq. ft.
c_m	=	undrained cohesion of soil layer "m", psf.
F_u	=	hydrostatic uplift force, lbs.
F_r	=	frictional resistance, lbs.
H	=	height of buried structure, ft.
K	=	coefficient of lateral pressure = 0.5.
p_m	=	average overburden pressure for layer "m," psf.
p_w	=	hydrostatic uplift pressure, psf.
$Sf_{1,\,2,\,3}$	=	factor of safety.
W_1	=	dead weight of concrete structure, lbs.
W_2	=	weight of backfill above base extension, lbs.
α	=	cohesion reduction factor = 0.5.
δ_m	=	friction angle between soil layer "m" and concrete wall, degrees = 0.75 ϕ_m
ϕ_m	=	internal angle of friction of soil layer "m", degrees.
γ_w	=	unit weight of water = 62.4 pcf.

UPLIFT PRESSURE AND RESISTANCE

TABLES

TABLE 1

GEOTECHNICAL DESIGN PARAMETER SUMMARY
OPEN-CUT EXCAVATION

Boring Nos.	Stratigraphic Unit	Range of Depths, ft	Wet Unit Weight, γ, pcf	Submerged Unit Weight, γ', pcf	Undrained Cohesion, psf	Internal Friction Angle, φ, degree
GB-1 thru GB-5	FILL/Cohesive Cohesive	0-4 4-6 6-10 10-15	129 133 133 132	65 67 67 66	750 1,000 500 250	-- -- -- --

Notes:

1. Cohesive soils include fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand.
2. Fill soils include fat clay, lean clay, and lean clay with sand and shell fragments.

TABLE 2

GEOTECHNICAL DESIGN PARAMETER SUMMARY
TRENCHLESS INSTALLATION ALONG TEXAS AVENUE (FM 1765)
(GB-1 THROUGH GB-5)

PROPERTY		COHESIVE SOILS [1]
Wet Unit Weight, γ, pcf	0-4 ft.	129
	4-6 ft.	133
	6-10 ft.	133
	10-15 ft.	132
Submerged Unit Weight, γ', pcf	0-4 ft.	65
	4-6 ft.	67
	6-10 ft.	67
	10-15 ft.	66
Moisture Content (%)	0-4 ft.	20
	4-6 ft.	20
	6-10 ft.	25
	10-15 ft.	23
UNDRAINED PROPERTIES *		
Undrained Cohesion, C_u, psf	0-4 ft.	750
	4-6 ft.	1,500
	6-10 ft.	500
	10-12 ft.	250
Angle of Internal, ϕ, degrees	0-4 ft.	0
	4-6 ft.	0
	6-10 ft.	0
	10-12 ft.	0
Elastic Modulus, E, psf	0-4 ft.	225,000
	4-6 ft.	450,000
	6-10 ft.	200,000
	10-12 ft.	100,000
Coefficient of Lateral Earth Pressure at Rest, K_o	0-4 ft.	1.2
	4-6 ft.	1.2
	6-10 ft.	1.2
	10-12 ft.	1.2
Poisson's Ratio		0.45
DRAINED PROPERTIES *		
Drained Cohesion, C', psf	0-4 ft.	0
	4-6 ft.	0
	6-10 ft.	0
	10-12 ft.	0
Angle of Internal Friction, ϕ', degrees	0-4 ft.	25
	4-6 ft.	25
	6-10 ft.	27
	10-12 ft.	27
Elastic Modulus, E, psf	0-4 ft.	135,000
	4-6 ft.	270,000
	6-10 ft.	120,000
	10-12 ft.	60,000

Notes:

1. Cohesive soils include fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand.

* Tunnel zone which includes depth plus 6 feet above invert plus 6 feet below invert.

APPENDIX A

LOG OF BORING NO. GB-1

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street
City of Texas City, Galveston County, Texas

PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)

COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade

DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon
DRY AUGER : 0.0 TO 15.0 FT.
WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			0.5" Asphalt over 8.5" Concrete				14.1			
				FILL: gray lean clay w/calcareous and ferrous nodules		95.7		20.4	49	21	28
	5			Very stiff to hard gray LEAN CLAY (CL) w/calcareous and ferrous nodules and ferrous stains			105	24.8			
				-very stiff 2'-4'				20.3			
				-stiff 4'-8'							
				-w/silt seams 6'-10'							
	10			-medium stiff to stiff 8'-10'		94.6	104	26.1	48	21	27
				-very stiff 10'-12'				24.0			
				-reddish brown and gray 10'-15'							
				-medium stiff to stiff w/silt seams 13'-15'				26.4			
	15										
	20										
	25										
	30										
	35										

UNDRAINED SHEAR STRENGTH, TSF
- ○ HAND PENETROMETER
- ● UNCONFINED COMPRESSION
- ■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
- △ TORVANE

0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

Geotest Engineering, Inc.

FIGURE A-1

LOG OF BORING NO. GB-2

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street City of Texas City, Galveston County, Texas

PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)

COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade

DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon

DRY AUGER : 0.0 TO 15.0 FT.

WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			0.5" Asphalt over 8.5" Concrete				18.2			
				Stiff gray and brown LEAN CLAY WITH SAND (CL) w/ferrous stains				19.4			
	5			-medium stiff to stiff 2'-4'							
				-gray and yellowish brown 2'-15'		78.8	113	18.9	38	19	19
				-medium stiff 6'-8'				22.7			
				-medium stiff to stiff 8'-10'							
	10			-stiff to very stiff 10'-12'		75.8	110	21.9	35	17	18
								19.5			
	15							19.8			
	20										
	25										
	30										
	35										

UNDRAINED SHEAR STRENGTH, TSF

- ○ HAND PENETROMETER
- ● UNCONFINED COMPRESSION
- ■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
- △ TORVANE

0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

Geotest Engineering, Inc.

FIGURE A-2

LOG OF BORING NO. GB-3

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street City of Texas City, Galveston County, Texas

PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)

COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade

DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon
DRY AUGER : 0.0 TO 15.0 FT.
WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			0.5" Asphalt over 8.75" Concrete				17.6			
				FILL: stiff to very stiff gray lean clay with sand and ferrous stains		75.6		26.0	49	21	28
	5			-w/shell fragments 9.25"-2' -medium stiff 2'-4'			112	22.6			
				Medium stiff to stiff yellowish brown LEAN CLAY WITH SAND (CL) w/ferrous nodules and ferrous stains -soft 6'-10' -w/silt seams 8'-12' -soft to medium stiff 10'-12'				27.5			
	10							24.8			
						74.3	103	24.7	33	17	16
	15			-w/silty sand layer 13'-15'				20.9			
	20										
	25										
	30										
	35										

UNDRAINED SHEAR STRENGTH, TSF
- ○ HAND PENETROMETER
- ● UNCONFINED COMPRESSION
- ■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
- △ TORVANE

0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

Geotest Engineering, Inc.

FIGURE A-3

LOG OF BORING NO. GB-4

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street City of Texas City, Galveston County, Texas

PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)

COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade

DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon
DRY AUGER : 0.0 TO 15.0 FT.
WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			0.5" Asphalt over 8" Concrete				20.1			
				FILL: soft to medium stiff dark gray fat clay w/limestone and shell fragments		96.9		32.3	50	20	30
	5			-stiff gray and brown 4'-6'			109	14.4			
				Soft yellowish brown and gray FAT CLAY WITH SAND (CH) w/ferrous nodules and ferrous stains		75.6		29.5	53	22	31
	10			-soft to medium stiff 8'-10'			109	22.1			
								23.1			
				-w/sand seams 13'-15'							
	15							22.7			
	20										
	25										
	30										
	35										

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

Geotest Engineering, Inc.

FIGURE A-4

LOG OF BORING NO. GB-5

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street City of Texas City, Galveston County, Texas

PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)

COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade

DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon

DRY AUGER : 0.0 TO 15.0 FT.

WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			0.5" Asphalt over 9" Concrete				17.0			
				Stiff to very stiff gray and brown SANDY FAT CLAY (CH) -w/shell fragments 9.5"-2' -w/calcareous and ferrous nodules 2'-4'		60.7	113	17.6	52	21	31
	5							20.0			
				Soft to medium stiff brown LEAN CLAY WITH SAND (CL) w/ferrous nodules and ferrous stains -medium stiff to stiff 6'-8' -soft 8'-12'		82.7	112	24.2	30	17	13
	10							26.1			
								22.9			
				-w/silty sand seams 13'-15'							
	15							29.7			
	20										
	25										
	30										
	35										

UNDRAINED SHEAR STRENGTH, TSF

- ○ HAND PENETROMETER
- ● UNCONFINED COMPRESSION
- ■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
- △ TORVANE

0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

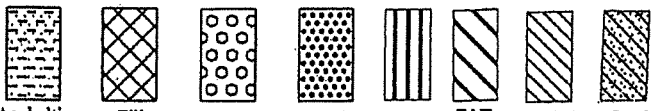
Geotest Engineering, Inc.

FIGURE A-5

Job No. 1140243301

SYMBOLS AND TERMS USED ON BORING LOGS

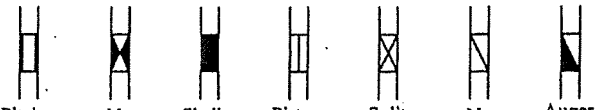
SOIL TYPES
(SHOWN IN SYMBOL COLUMN)



Asphaltic Concrete | Fill | Gravel | Sand | SILT | FAT CLAY | LEAN CLAY | Sandy LEAN CLAY

Predominant type shown heavy

SAMPLER TYPES
(SHOWN IN SAMPLES COLUMN)



Pitcher Barrel | Nx Core | Shelby Tube | Piston | Split Spoon | No Recovery | Auger

TERMS DESCRIBING CONSISTENCY OR CONDITION

Basic Soil Type	Density or Consistency	Standard Penetration Resistance, [1] Blows/ft.	Unconfined Compressive Strength (q_u), [2] Tons/sq. ft.
Cohesionless	Very loose	Less than 4	Not applicable
	Loose	4 to <10	Not applicable
	Medium dense	10 to <30	Not applicable
	Dense	30 to <50	Not applicable
	Very dense	50 or greater	Not applicable
Cohesive	Very soft	Less than 2	Less than 0.25
	Soft	2 to <4	0.25 to <0.5
	Firm/Medium stiff	4 to <8	0.5 to <1.0
	Stiff	8 to <15	1.0 to <2.0
	Very stiff	15 to <30	2.0 to <4.0
	Hard	30 or greater	4 or greater

(1) Number of blows from 140-lb. weight falling 30-in. to drive 2-in. OD, 1-3/8-in. ID, split barrel sampler (ASTM D1586)

(2) q_u may also be approximated using a pocket penetrometer

TERMS CHARACTERIZING SOIL STRUCTURE

Parting: -paper thin in size Seam: -1/8" to 3" thick Layer: -greater than 3"

Slickensided	- having inclined planes of weakness that are slick and glossy in appearance.
Fissured	- containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
Laminated	- composed of thin layers of varying color and texture.
Interbedded	- composed of alternate layers of different soil types.
Calcareous	- containing appreciable quantities of calcium carbonate.
Well graded	- having wide range in grain sizes and substantial amounts of all intermediate particle sizes.
Poorly graded	- predominantly of one grain size, or having a range of sizes with some intermediate size missing.
Flocculated	- pertaining to cohesive soils that exhibit a loose knit or flakey structure.

Bid #B201007
DATE: 10/28/2019
TIME: 10:00 A.M.

PRE-BID CONFERENCE
TEXAS AVENUE RECONSTRUCTION
GALVESTON COUNTY, TEXAS

Pre-bid Conference for Bid #B201007 will be held on Monday, October 28, 2019 at Galveston County Courthouse, Purchasing Department, 722 Moody, 5th Floor, Galveston, TX

PRINTED NAME	SIGNATURE	COMPANY NAME	E-MAIL ADDRESS	PHONE
Rufus Crowder		Galveston County	rufus.crowder@co.galveston.tx.us	409.770.5372
Lili Thoreson		Texas Sterling Construction	lili.thoreson@strlco.com	832-364-8145
Jack Haralson		City of Texas City	jharalson@texascitytx.gov	409-643-5810
John Ruthloff		ARKK Engineers	John.Ruthloff@ARKKEngineers.Com	713-400-2755
Madhu Kilambi		ARKK ENGINEERS	Madhu.Kilambi@arkkengineers.com	713-400-2755
Nancy Baker		Galveston County	NANCY.BAKER@CO.GALVESTON.TX.US	409 770-5556
Amber Forrest		R.G. Miller Engineers	aforrest@rgmiller.com	281-921-8756
Taylor Becerril		Spaw Glass	Taylor.Becerril@spawglass.com	281-889-0195

THE COUNTY OF GALVESTON

RUFUS G. CROWDER, CPPO, CPPB
PURCHASING AGENT

GWEN MCLAREN, CPPB
ASST. PURCHASING AGENT

COUNTY COURTHOUSE
722 Moody (21st Street)
Fifth (5th) Floor
GALVESTON, TEXAS 77550

November 7, 2019

PROJECT NAME: Texas Avenue Reconstruction

SOLICITATION NO: B201007

RE: ADDENDUM #2

To All Prospective Proposers,

The following information is being provided to aid in preparation of your proposal submittal(s):

Question #1: ***Is there a geotechnical report?***

Response: The geotechnical report is attached with this addendum.

Question #2: ***Time of Completion is stated to be within 300 calendar days of Notice to Proceed issuance. However, a date for when the Notice to Proceed is projected to be issued is not state. What is the estimated project start date?***

Response: The estimated start date is February of 2020.

Question #3: ***Can you post the pre-bid meeting sign-in sheet please?***

Response: The pre-bid meeting sign-in sheet is attached with this addendum.

Question #4: ***Are there soil boring available? Can you send me any pre-bid notes?***

Response: Please refer to the response to question #1. There are no pre-bid notes.

As a reminder, all questions regarding this proposal must be submitted in writing to:

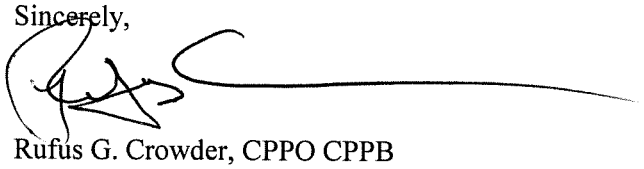
Rufus G. Crowder, CPPO CPPB
Galveston County Purchasing Agent
722 Moody, Fifth (5th) Floor
Galveston, Texas 77550
E-mail: purchasing.bids@co.galveston.tx.us

If you have any further questions regarding this proposal, please address them to Rufus Crowder, CPPO CPPB, Purchasing Agent, via e-mail at purchasing.bids@co.galveston.tx.us, or contact the Purchasing Department at (409) 770-5371.

If you have any further questions regarding this proposal, please address them to Rufus Crowder, CPPO CPPB, Purchasing Agent, via e-mail at purchasing.bids@co.galveston.tx.us, or contact the Purchasing Department at (409) 770-5371.

Please excuse us for any inconvenience that this may have caused.

Sincerely,



Rufus G. Crowder, CPPO CPPB
Purchasing Agent
Galveston County

GEOTECHNICAL INVESTIGATION
TEXAS AVENUE (FM 1765) RECONSTRUCTION
FROM 14TH STREET TO 6TH STREET
CITY OF TEXAS CITY, GALVESTON COUNTY, TEXAS

REPORT NO. 1140243301

Reported to:

ARKK ENGINEERS, INC.

Houston, Texas

Reported by:

GEOTEST ENGINEERING, INC.

Houston, Texas

Key Map Nos. 738 G & H

GEOTEST ENGINEERING, INC.

Geotechnical Engineers & Materials Testing

5600 Bintliff Drive Houston, Texas 77036 Telephone: (713) 266-0588
Fax: (713) 266-2977

Report No. 1140243301
June 6, 2019

Mr. Madhu Kilambi, P.E.
ARKK Engineers, Inc.
7322 Southwest Freeway, Suite 1040
Houston, Texas 77074

Re: Geotechnical Investigation
Texas Avenue (FM 1765) Reconstruction
From 14th Street to 6th Street
City of Texas City, Galveston County, Texas

Dear Mr. Kilambi:

Presented herein is our geotechnical investigation report for the above referenced project. Preliminary field logs were submitted to you on April 17, 2019. This report supersedes all previously submitted reports, transmittals, etc. for the referenced project. This study was authorized by you on April 3, 2019, by accepting our Proposal No. 1140443399, dated March 26, 2019.

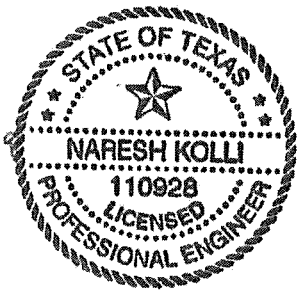
We appreciate this opportunity to be of service to you. If you have any questions regarding the report, or if we can be of further service to you, please call us.

Sincerely,
GEOTEST ENGINEERING, INC.
TBPE Registration No. F-410

Krishna M Pradeep, E.I.T.
Graduate Engineer

Naresh Kolli, P.E.
Project Manager

6/6/19



NK\kmp\ego
Copies Submitted: (1+1-pdf)
PC38\GEOTECHNICAL\40243301.DOC

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

ILLUSTRATIONS

TABLES

APPENDIX A

EXECUTIVE SUMMARY

A geotechnical investigation was conducted for the Texas Avenue (FM 1765) Reconstruction Project in the City of Texas City, Galveston County, Texas. The project includes reconstructing approximately 3,800 LF of existing 5-lane concrete paving along Texas Avenue (FM 1765) from 14th Street to 6th Street, with new concrete pavement. The project also includes storm sewer installation and water line replacement along Texas Avenue. Based on the information provided, we understand that the invert depth of the proposed storm sewer (24" RCP, 4' x 2' RCB, 5' x 2' RCB, and 7' x 2' RCB) ranges from approximately 4 to 6 feet, and will be installed primarily by open-cut method of construction. The proposed water line will be installed by trenchless (auger) method of construction.

This study included drilling and sampling of five (5) soil borings each to a depth of 15 feet, performing laboratory tests on recovered soil samples, performing engineering analyses and preparing a geotechnical report.

The principal findings and conclusions developed from this investigation are summarized below:

- The existing pavement along Texas Avenue from 14th Street to 6th Street, as obtained in borings GB-1 through GB-5 consists of 0.5 inches of asphalt over 8 to 9 inches of concrete.

- The subsurface soils below the existing pavement, as revealed by borings GB-1 through GB-5, consist of soft to hard gray, brown, reddish brown and gray, and yellowish brown and gray fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand to the explored depth of 15 feet. Fill material consisting of gray and brown fat clay, lean clay, and lean clay with sand, calcareous and ferrous nodules, and shell fragments were encountered to depths ranging from 1 feet to 6 feet in borings GB-1, GB-3 and GB-4.

- No groundwater was encountered in the borings drilled for this investigation.

- All excavation operations should be in accordance with OSHA Standards, and Galveston

County Standard Specification, Section 01526, "Trench Safety Systems".

- The bedding and backfill for the proposed utilities should be in accordance with ARKK Standard Specification, Section 02227, and Galveston County Standard Specification, Section 02227, "Excavation and Backfill for Utilities".

- The auger pits/insertion and reception pits for the water line should be constructed as per the ARKK Standard Specifications Section 02317, "Auguring Pipe for Waterlines."

- The foundation recommendations for new manholes are presented in Section 5.5 of this report.

- The recommended pavement section and subgrade stabilization for Texas Avenue (FM 1765) reconstruction are presented in Section 5.6 of this report.

1.0 INTRODUCTION

1.1 Location and Description of Project

A geotechnical investigation was conducted for the Texas Avenue (FM 1765) Reconstruction Project in the City of Texas City, Galveston County, Texas. The project location is bounded by 14th Street to the west, and 6th Street to the east in Galveston County, Texas within the Key Map Page No. 738 Grid G and H.

The project includes reconstructing approximately 3,800 LF of existing 5-lane concrete paving along Texas Avenue (FM 1765) from 14th Street to 6th Street, with new concrete pavement. The project also includes storm sewer installation and water line replacement along Texas Avenue. Based on the information provided, we understand that the invert depth of the proposed storm sewer (24" RCP, 4' x 2' RCB, 5' x 2' RCB, and 7' x 2' RCB) ranges from approximately 4 to 6 feet, and will be installed primarily by open-cut method of construction. The proposed water line will be installed by trenchless (auger) method of construction. The vicinity map of the project alignment is shown on Figure 1.

1.2 Scope of Work

The purpose of this investigation was to evaluate the soil and groundwater (if any) conditions along Texas Avenue in the City of Texas City, and to provide geotechnical recommendations for the proposed roadway reconstruction and utilities replacement. The scope of this investigation consisted of the following tasks:

- Cored the existing pavement at five (5) locations along Texas Avenue to obtain the existing pavement thickness and for boring access.

- Drilled and sampled five (5) soil borings each to a depth of 15 feet along Texas Avenue (FM 1765) from 14th Street to 6th Street.

- Performed appropriate laboratory tests on selected representative soil samples to develop the engineering properties of the soil.

- Performed engineering analyses to develop geotechnical recommendations for pavement thickness including subgrade stabilization for the pavement construction, bedding and backfill and water level control for open cut construction for storm sewer and water line installation.

- Prepared a geotechnical investigation report including field and laboratory data and geotechnical recommendations.

2.0 FIELD EXPLORATION

Subsurface conditions along the project alignment were investigated by drilling a total of five (5) soil borings (GB-1 through GB-5) drilled each to a depth of 15 feet below existing pavement. All borings were drilled with a truck-mounted rotary drilling rig. Pavement coring was performed at each boring location to verify the existing pavement thickness and to access the subsurface soils. All the boring locations are shown on Plan of Borings, Figure 2. Survey information for the completed borehole locations was not available to us at the time of preparation of this report.

Samples were taken at continuous 2-foot intervals to a depth of 15 feet. Cohesive soil samples were obtained with a 3-inch diameter thin-walled tube sampler in general accordance with ASTM D1587. Each sample was removed from the sampler in the field, carefully examined and logged by an experienced soils technician. Suitable portions of each sample were then sealed and packaged for transportation to Geotest's laboratory. The shear strength of cohesive soil samples was estimated using a calibrated hand penetrometer in the field. After taking water level measurements (if any), all borings were grouted with cement bentonite grout.

Detailed descriptions of the soils encountered along the project alignment are given on the boring logs GB-1 through GB-5 and are presented on Figures A-1 through A-5 in Appendix A. A key to symbols and terms used on the boring logs is presented on Figure A-6 in Appendix A.

Groundwater level observations were made at each boring location during field investigation. The results of these observations are noted on the boring logs.

3.0 LABORATORY TESTING PROGRAM

The laboratory testing program was designed to evaluate the pertinent physical properties and shear strength characteristics of the subsurface soils. Classification tests were performed on selected samples to aid in soil classification.

Undrained shear strengths of selected cohesive samples were measured by unconsolidated undrained (UU) triaxial compression tests (ASTM D2850). The results of the UU triaxial compression tests are plotted on the boring logs as solid squares. The shear strength of cohesive samples was measured in the field with a calibrated hand penetrometer and also in the laboratory with a Torvane. The shear strength values obtained from the penetrometer and Torvane are plotted on the boring logs as open circles and triangles, respectively.

Moisture content and dry unit weight were measured for each unconfined compression test and UU triaxial compression test samples. Moisture content measurements (ASTM D2216) were also made on other samples to establish the moisture profile at each boring location. Atterberg limit tests (ASTM D4318) were performed on soil samples to measure plasticity characteristics. Percent passing No. 200 sieve (ASTM D1140) tests were also performed on selected samples. The result of all these tests are plotted or summarized on the boring logs GB-1 through GB-5 and are presented on Figures A-1 through A-5 in Appendix A.

4.0 GENERAL SUBSURFACE CONDITIONS

4.1 Existing Pavement

The existing pavement along Texas Avenue from 14th Street to 6th Street, as obtained in borings GB-1 through GB-5 consists of 0.5 inches of asphalt over 8 to 9 inches of concrete. The details of the pavement encountered at each boring location are presented below.

Street	Boring Nos.	Asphalt Surface Thickness (in.)	Concrete Thickness (in.)	Total (in.)
Texas Avenue	GB-1	0.5	8.5	9.0
	GB-2	0.5	8.5	9.0
	GB-3	0.5	8.75	9.25
	GB-4	0.5	8.0	8.5
	GB-5	0.5	9.0	9.5

4.2 Subsurface Soil

The subsurface soils below the existing pavement, as revealed by borings GB-1 through GB-5, consist of soft to hard gray, brown, reddish brown and gray, and yellowish brown and gray fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand to the explored depth of 15 feet. Fill material consisting of gray and brown fat clay, lean clay, and lean clay with sand, calcareous and ferrous nodules, and shell fragments were encountered to depths ranging from 1 feet to 6 feet in borings GB-1, GB-3 and GB-4.

The fat clay, fat clay with sand, and sandy fat clay are of high plasticity with liquid limits ranging from 50 to 53 and plasticity indices ranging from 30 to 31. The lean clay and lean clay with sand are of medium plasticity with liquid limits ranging from 30 to 49 and plasticity indices ranging from 13 to 28. The fines content (passing No. 200 sieve) of fat clay and lean clay ranges from 95 to 97 percent. The fines content of fat clay with sand and lean clay with sand ranges from 74 to 83 percent, and the fines content of sandy fat clay was about 61 percent.

4.3 Water Levels

No groundwater was encountered in the borings drilled for this investigation. However, it should be noted that various environmental and man-made factors such as amount of precipitation, nearby subsurface construction activities, and change in area drainage can substantially influence the groundwater level.

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 General

The project includes reconstructing approximately 3,800 LF of existing 5-lane concrete paving along Texas Avenue (FM 1765) from 14th Street to 6th Street, with new concrete pavement. The project also includes storm sewer installation and water line replacement along Texas Avenue. Based on the information provided, we understand that the invert depth of the proposed storm sewer (24" RCP, 4' x 2' RCB, 5' x 2' RCB, and 7' x 2' RCB) ranges from approximately 4 to 6 feet, and will be installed primarily by open-cut method of construction. The proposed water line will be installed by trenchless (auger) method of construction.

5.2 Open-Cut Excavation

5.2.1 Geotechnical Parameters. Based on the soil conditions revealed by the borings, geotechnical parameters were developed for the design of open cut excavation for the proposed storm sewer, and auger (insertion/reception) pits planned for the trenchless installation. The geotechnical design parameters for open cut excavation for auger (insertion/reception) pits are provided in Table 1. For design, the groundwater level should be assumed to exist at the ground surface, since this condition may exist after a heavy rain or flooding.

5.2.2 Excavation Stability. The open excavations may be shored, laid back to a stable slope or some other equivalent means used to provide safety for workers and adjacent structures. The excavating and trenching operations should be in accordance with OSHA Standards, OSHA 2207, Subpart P, latest revision and Galveston County Standard Specification, Section 01526, "Trench Safety Systems".

- Excavation Shallower Than 5 Feet – For excavations that are less than 5 feet, the need for protection should be evaluated by a competent person to examine the ground for any indication of ground movement or potential cave-in. When any indication of hazardous ground movement or potential cave-in is anticipated during construction,

adequate protective system should be provided for all excavation even that if the excavations are shallower than 5 feet.

- Excavation Deeper Than 5 Feet - Excavations that are deeper than 5 feet should be sloped, shored, sheeted, braced or laid back to a stable slope or supported by some other equivalent means or protection such that workers are not exposed to moving ground or cave-ins. The slopes and shoring should be in accordance with the trench safety requirements per OSHA Standards. The following items provide design criteria for trench stability.

  (i) OSHA's Soil Type. Based on the soil conditions revealed by the borings and the assumed groundwater level at surface, OSHA's soil type "C" should be used for the determination of allowable maximum slope and/or the design of a shoring system. For shoring deeper than 20 feet, an engineering evaluation is required.

  (ii) Excavation Support Earth Pressure. Based on the subsurface conditions indicated by this investigation and laboratory testing results, the excavation support earth pressure diagram was developed and is presented on Figure 5. The pressure diagram can be used for the design of temporary excavation bracing. For a trench box, a lateral earth pressure resulting from an equivalent fluid with a unit weight of 97 pcf is recommended. The above value of equivalent fluid pressure is based upon an assumption that the groundwater level is near the ground surface, since these conditions may exist after a heavy rain or flooding. Effect of surcharge loads at the ground surface should be added to the computed lateral earth pressure. A surcharge load, q, will typically result in a lateral load equal to 0.5 q.

  (iii) Bottom Stability. In braced cuts, if tight sheeting is terminated at the base of the cut, the bottom of the excavation can become unstable under certain conditions. The stability of the trench bottom is governed by the shear strength of the soils and by the differential hydrostatic head. For cuts in cohesive soils as encountered in the

borings for excavation depths of 4 to 6 feet, stability of the bottom can be evaluated in accordance with the procedure outlined on Figure 6.

5.2.3 Groundwater Control. Excavations for the proposed utilities installation may encounter groundwater seepage to varying degrees depending on groundwater conditions at the time of construction and the location and depth of excavation. Based on the soil conditions identified in the borings for the proposed utilities installation, all the excavations will be in cohesive soils. In general, for cohesive soils as encountered in all the borings for the excavation depths (maximum depth of 6 feet), groundwater (if encountered) may be managed by collection in excavation bottom sumps for pumped disposal.

The contractor should verify the groundwater level at the time of construction and should provide an adequate dewatering system, where required. The groundwater control should be carried out in accordance with the ARKK Standard Specifications, Section 01563, and Galveston County Standard Specification, Section 01563, "Control of Ground Water and Surface Water".

5.2.4 Live Loads on Pipe Due to Traffic. Loads on pipe due to traffic (if any) should be considered. A graph providing calculated vertical stress on pipe due to traffic loads is given on Figure 7.

5.2.5 Bedding and Backfill for Utilities. The bedding and backfill for the storm sewer and water line should be in accordance with ARKK Standard Specification, Section 02227, and Galveston County Standard Specification, Section 02227, "Excavation and Backfill for Utilities".

5.2.6 Bedding and Backfill for the Auger Pits/Insertion and Receiving Pits. The auger pits or insertion and receiving pits should be constructed and backfilled in accordance with ARKK, Standard Specification Section, 02317, "Auguring Pipe for Waterlines."

5.3 Trenchless Installation

It is understood that the proposed water line will be replaced by auger method of construction. The trenchless method of construction should be per ARKK, Specification Section

02317, "Augering Pipe for Water Lines."

5.3.1 Geotechnical Parameters. Based on the soil conditions revealed by soil borings (GB-1 through GB-5), laboratory test data and geotechnical design parameters were developed for cohesive soils and are provided in Table 2. The cohesive soils include fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand. For design conditions, the groundwater level should be assumed to exist at the ground surface.

5.3.2 Earth Pressure on Pipe Casing. The earth pressures on augering should be determined from Figure 8. Equations to calculate the pipe casing loads are also shown on Figure 8.

5.3.3 Carrier Pipe Design Parameters. Carrier pipe must be sufficiently strong to withstand anticipated long-term ground loads and must not be subjected to deterioration by substance either in ground or in the auger casing. The carrier pipe design should include consideration of not only the loads applied to the pipe but also factors other than soil loading. These factors could include minimum structural code requirements, loading from augering and other construction loads. The drained geotechnical design parameters given in Table 2 should be used to analyze the soil structure intersection of the carrier pipe.

5.3.4 Influence of Augering on Adjacent Structures. Surface and near-surface structures near the tunnel alignment consist primarily of private properties, city streets and public and private utilities.

Ground movement, in terms of loss of ground or ground lost, is commonly associated with soft ground tunneling. If such ground movement is excessive, it may cause damage to the structures, roads and services located above the tunnel. While ground movement cannot be eliminated, it can be controlled within certain limits by the use of proper construction techniques and good quality workmanship. These include, but are not limited to, prevention of excessive ground loss during tunneling with the use of grouting and filling the annular space between the pipe or casing and the surrounding soil and prevention of undue loss of fines through dewatering.

The selection and execution of tunneling methods that are best suited to anticipated ground conditions along the proposed tunnel are, in fact, the contractor's primary contribution to successful completion of the proposed auger or directional drilling. On review of the boring logs, the ground conditions for tunneling (excavation face) will be primarily through cohesive soils. The cohesive soils as encountered in borings GB-1 through GB-5 consist of soft to hard gray, brown, reddish brown and gray, and yellowish brown and gray fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand, and the ground in this area may be expected to behave as firm to raveling ground near the invert. Close monitoring of ground movement should be carried out during the trenchless installation.

The ground conditions for trenchless operation (excavation face) will be through predominantly in cohesive soils near borings GB-1 through GB-5. However, due to spacing of borings, soil conditions other than those encountered in borings could exist.

The proposed auger is parallel with or cross beneath utility lines. The largest potential problems from utilities may result from:

- Leaking water pipes
- Gas pipe breakage leading to a potential explosion
- Breakage of storm or sanitary sewers

In general, it is the contractor's responsibility to investigate these and other possible third party interactions along the proposed tunnel alignment and to accommodate all of these interactions with the use of good construction methods.

5.4 Piping System Thrust Restraint

Unbalanced thrust forces will occur at any point in the pipe where the direction or cross sectional area of the flow changes. The force diagram shown in Figure 9 illustrates the thrust force generated by flow at a bend in the pipe. The equations for computing this thrust force are also given in this figure. The thrust force will often require more resistance or support than is available just from the pipe bearing against the backfill. In order to prevent intolerable

movement and overstressing of the pipe, suitable buttressing should be provided.

Proposed horizontal bends may require restraint in addition to that supplied by the pipe bearing on the backfill. In general, thrust blocks, both horizontal and vertical and restrained joints are common methods of supplying additional reaction. However, it is noted that restrained joints are considered for supplying additional reaction for the project and is discussed below.

5.4.1 Restrained Joints. Where thrust blocks are not practical, restrained joints, allowing thrust and shear forces to be transmitted across the pipe joints, are employed to allow a number of pipe sections to act integrally in bearing. The equations necessary to determine the restrained pipe length on each side of the bend are given below:

$$L = \frac{PA\ \ Sin(\theta/2)}{f(2W_e + W_p + W_w)}$$

where, L = restrained pipe length on each side of the bend, in feet

P = internal pressure, in pounds per square inch

A = cross sectional area of first unrestrained pipe joint, in square inches

θ = deflection angle of bend, in degrees

f = co-efficient of friction between pipe and soil (recommended 0.3)

W_e = overburden load, in pounds per liner foot = $\Upsilon_b\ B_c H$

W_p = weight of pipe, in pounds per linear foot

W_w = weight of water in pipe, in pounds per linear foot

Υ_b = wet unit weight of backfill material, in pounds per cubic foot (recommended 120 pcf)

B_c = pipe outer diameter, in feet

H = earth cover, in feet

Reinforced concrete encasement may be used in lieu of the manufactured joint restrained system. The equations and soil parameters given above can be used for the design of reinforced concrete encasement.

5.5 Structures

5.5.1 Description. The structure associated with this project will be new manholes. The new manholes for the proposed utilities will be placed at depths ranging from 4 to 6 feet below existing pavement (elevations ranging from approximately 1.0 to 2.2 feet).

5.5.2 Foundation Conditions. Based on the soil conditions revealed by the borings GB-1 through GB-5, the manholes bottom will be in medium stiff to very stiff lean clay, lean clay with sand, sandy fat clay, and fat clay fill soils.

5.5.3 Foundation Design Recommendations. The following items provide recommendations and design criteria for construction of the new manholes.

- Allowable Bearing Pressures. The mat foundation for supporting the new manholes placed at depths ranging from 4 to 6 feet [into medium stiff to very stiff lean clay, lean clay with sand, sandy fat clay, and fat clay] should be designed for an allowable (net) bearing pressure of 1,850 psf. The allowable bearing pressure includes a safety factor of 2.0.

  The above recommendation assumes that the final bearing surfaces consist of undisturbed natural soils and that underlying semi-transmissive zones are properly pressure-relieved and stable undisturbed bearing surfaces are attained.

- Bottom Stability. In braced cuts, if tight sheeting is terminated at the base of the cut, the bottom of the excavation can become unstable. The parameters that govern the stability of the excavation base are the soil shear strength and the differential hydrostatic head between the water level within the retained soils and the water level at the interior of the trench excavation. For cuts in cohesive soils as predominantly encountered in the borings, the bottom stability can be evaluated as outlined on Figure 6.

- Lateral Earth Pressure. The pressure diagram presented on Figure 5 can be used for the design of braced excavation. The lateral earth pressure diagram presented on Figure 10 is applicable for the design of the permanent walls.

- Hydrostatic Uplift Resistance. Structures extending below the water level should be designed to resist uplift pressure resulting from excess piezometric head. Design uplift pressures should be computed based on the assumption that the water table is at ground surface. To resist the hydrostatic uplift at the bottom of the structure, one of the following sources of resistance can be utilized in each of the designs.

    a. Dead weight of structure,
    b. Weight of soil above base extensions plus weight of structure, or
    c. Soil-wall friction plus dead weight of structure.

    The uplift force and resistance to uplift should be computed as detailed on Figure 11. In determining the configuration and dimensions of the structure using one of the approaches presented on Figure 11, the following factors of safety are recommended.

    a. Dead weight of concrete structure, $S_{f1} = 1.10$,
    b. Weight of soil (backfill) above base extension, $S_{f2} = 1.5$, and
    c. Soil-wall friction, $S_{f3} = 3.0$.

    Friction resistance should be discounted for the upper 5 feet, since this zone is affected by seasonal moisture changes.

5.5.4 Protection of Below Grade Structures. The design of the proper means for protection of below grade structures will depend upon the potential of the aggressivity or corrosivity of soil and groundwater properties. Aggressivity testing was not within the scope of this investigation. The design of the protection of below grade structures is beyond the scope of services for this investigation.

5.5.5 Water Level Control During Construction. Water level control should be in accordance with section 5.2.3 of this report.

5.5.6 Structure Backfill. Excavations for the proposed structures should be backfilled in accordance with the ARKK Standard Specifications, and Galveston County Standard Specification, Section 02226, "Excavation and Backfill for Structures."

5.6 Pavement Structure Design

We understand that the existing 5-lane concrete paving along Texas Avenue (FM 1765) from 14th Street to 6th Street, will be reconstructed with new concrete pavement with curb and gutter. The pavement design presented below was developed in accordance with "AASHTO Guide for Design of Pavement Structures," 1993 Edition.

5.6.1 Design Parameters

Subgrade Soil Properties. California Bearing Ratio (CBR) tests were not within the scope of this project. Therefore, the roadbed soil resilient modulus is estimated based on physical properties and strength characteristics of the natural subgrade soils. Based on the physical properties and strength characteristics of the natural subgrade soils obtained from laboratory tests, the effective roadbed soil resilient modulus (M_R) was estimated to be about 1,941 psi from an assumed CBR value of 1.0. Based on an estimated resilient modulus of the 8-inch lime-stabilized subgrade, the effective modulus of subgrade reaction (k) is estimated to be about 49 pci.

Traffic Data. No traffic count and vehicle classification data was provided to us at the time of preparation of this report. Based on the information provided by ARKK, the new concrete pavement section will be constructed in general accordance with a standard pavement design. A traffic loading of 6.2×10^6 kips ESALs was calculated over a 20-year design period and was utilized for the

pavement design.

Other Design Parameters. Other design parameters used in the development of rigid pavement thickness are given below:

Material Properties of Concrete:

Modulus of Elasticity of Concrete (E_c): 3,604,997 psi

Mean value of Modulus of Rupture of Concrete after 28 days (S'_c): 630 psi (based on compressive strength of 4,000 psi)

Load Transfer coefficient (J): 2.7

Drainage coefficient (C_d): 1.2

Overall Standard Deviation (S_o): 0.35

Reliability Level (R): 90%

Serviceability Index

Initial (P_o): 4.5

Terminal (P_t): 2.25

Reinforcement Variables

Allowable Working Stress (f_s): 45,000 psi (grade 60 steel)

Friction Factor (F): 1.8

5.6.2 Recommended Pavement Section

Based on the design parameters described above and the AASHTO design, the thickness of rigid pavement was determined. The recommended pavement section is given below:

Pavement Course	**Thickness, inches**
Reinforced Concrete	8
5% Lime-stabilized subgrade	8

For the 8-inch concrete pavement, the required longitudinal reinforcing steel for an expansion joint spacing of 80 feet and transverse reinforcement steel for a pavement width of 24

feet back to back are given below for the grade 60 steel.

Pavement Thickness (Inches)	**Longitudinal Steel**	**Transverse Steel**
	Center to Center Spacing (in)	**Center to Center Spacing (in)**
	# 5 bars	# 5 bars
8	24	30

5.6.3 Preparation of Pavement Subgrade

Based on the field and laboratory test data, the subgrade soils below the existing pavement sections consist of high plasticity lean clay, lean clay with sand, fat clay, fat clay with sand and sandy fat clay. These subgrade soils have high volume change potential. Hence, lime stabilization of the fat clay and lean clay subgrade soils will be required to reduce the swelling and shrinkage potential, to accelerate the construction and provide a stable subgrade on which to construct the pavement sections. The fat clay subgrade soils should be stabilized with 5 percent lime (by dry unit weight of soil) to a depth of at least 8 inches. This corresponds to approximately 33 pounds of lime per square yard based on a dry unit weight of 110 pcf. The actual percentage of lime should be confirmed by laboratory tests at the time of construction.

Subgrade preparation for the proposed pavement after removing the existing pavement should consist of stripping, proof-rolling, and stabilization. The following procedures for subgrade preparation are recommended:

1. Strip the surficial soils to a suitable depth to remove all surficial vegetation and achieve grade. In isolated areas where soft, compressible, or very loose soils are encountered, additional stripping may be required.

2. After stripping, the exposed surface should be proof-rolled with a minimum of 3 passes of a 30-ton pneumatic-tired roller or a partially loaded truck utilizing a tire pressure of approximately 90 psi. If rutting develops, the tire pressure should be reduced. The purpose of the proof-rolling operation is to identify any

underlying zones or pockets of soft soils so these weak materials can be removed and replaced.

3. Lime stabilization of cohesive subgrade should be performed in accordance with ARKK Standard Specification, Section 02241, "Lime Stabilized Subgrade".

6.0 PROVISIONS

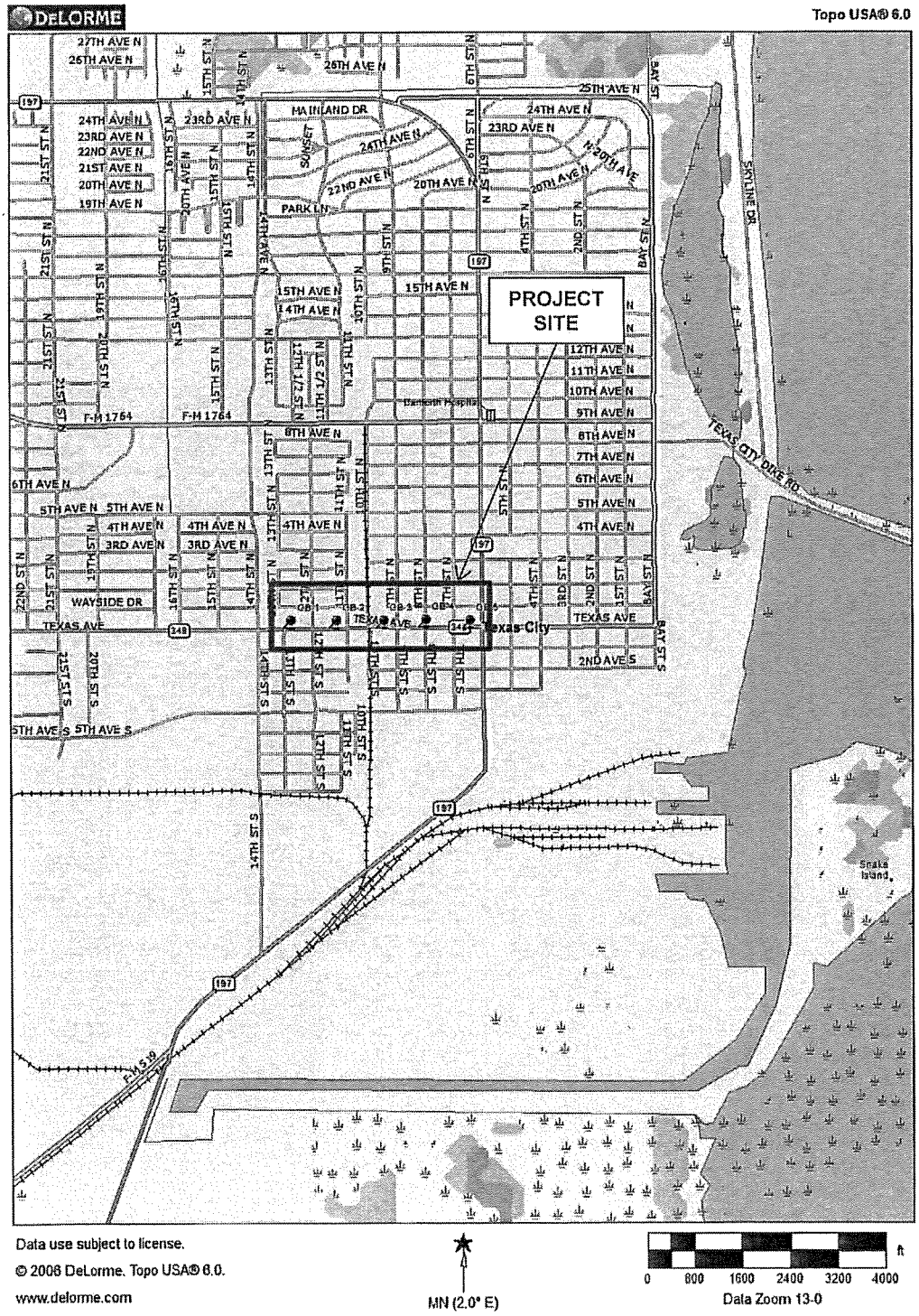
The description of subsurface conditions and the design information contained in this report are based on the test borings made at the time of drilling at specific locations. However, some variation in soil conditions may occur between test borings. Should any subsurface conditions other than those described in our boring logs be encountered, Geotest should be immediately notified so that further investigation and supplemental recommendations can be provided. The depth of the groundwater level may vary with changes in environmental conditions such as frequency and magnitude of rainfall. The stratification lines on the log of borings represent the approximate boundaries between soil types, however, the transition between soil types may be more gradual than depicted.

This report has been prepared for the exclusive use of ARKK Engineers, Inc, for the Texas Avenue (FM 1765) Reconstruction in City of Texas City, Texas.

This report shall not be reproduced without the written permission of Geotest Engineering, Inc., ARKK Engineers, Inc. and City of Texas City.

ILLUSTRATIONS

Job No. 1140243301



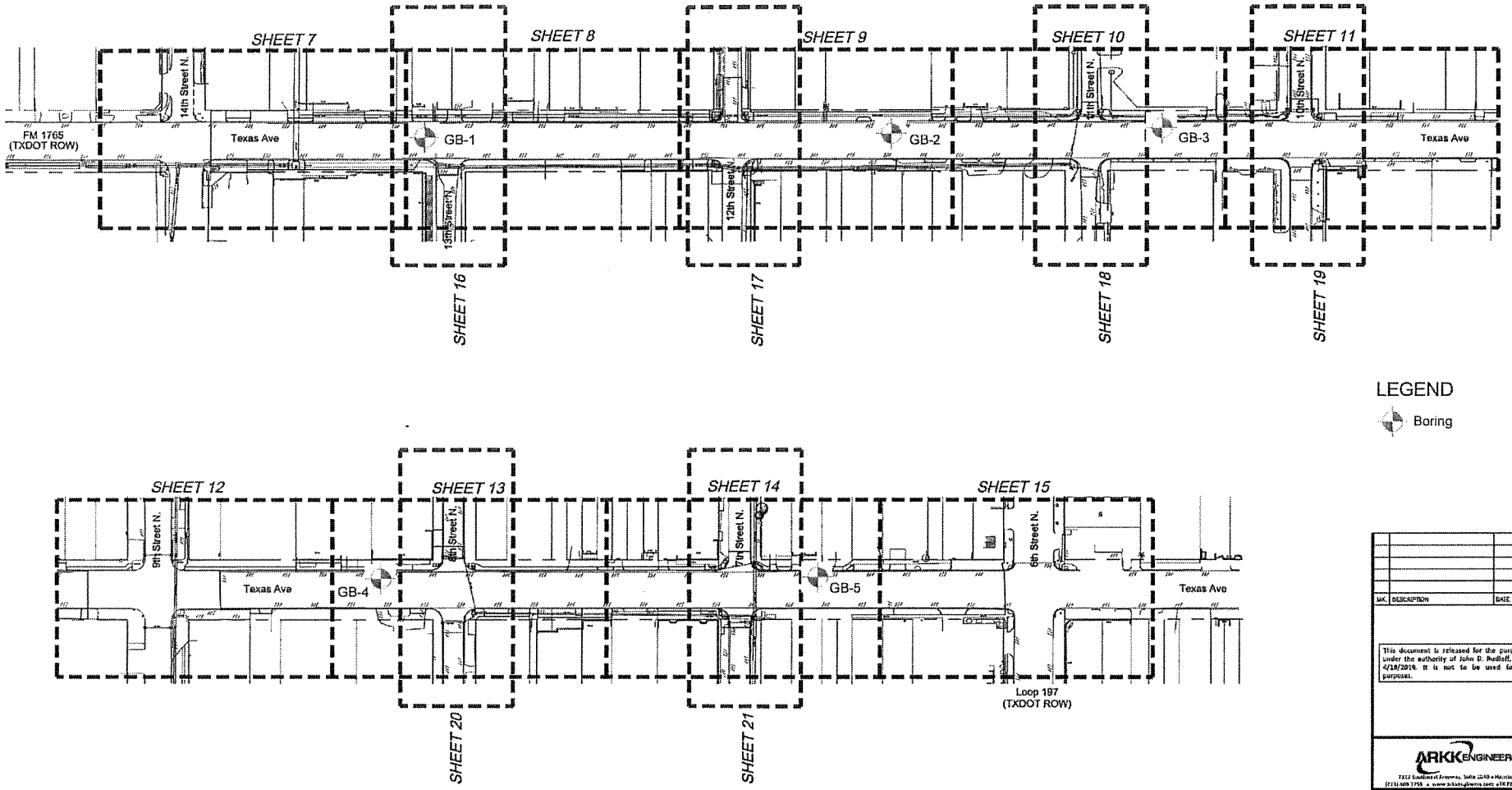
PAVING IMPROVEMENTS ALONG TEXAS AVENUE (FM 1765)
FROM 14TH STREET TO 6TH STREET
CITY OF TEXAS CITY, GALVESTON COUNTY, TEXAS

VICINITY MAP

Geotest Engineering, Inc.

FIGURE 1

Job No. 1140243301



LEGEND

Boring

MK.	DESCRIPTION	DATE	DWN.	CHK.

This document is released for the purpose of review under the authority of John D. Rudloff, P.E. 83386 on 4/18/2019. It is not to be used for construction purposes.

ARKK ENGINEERS

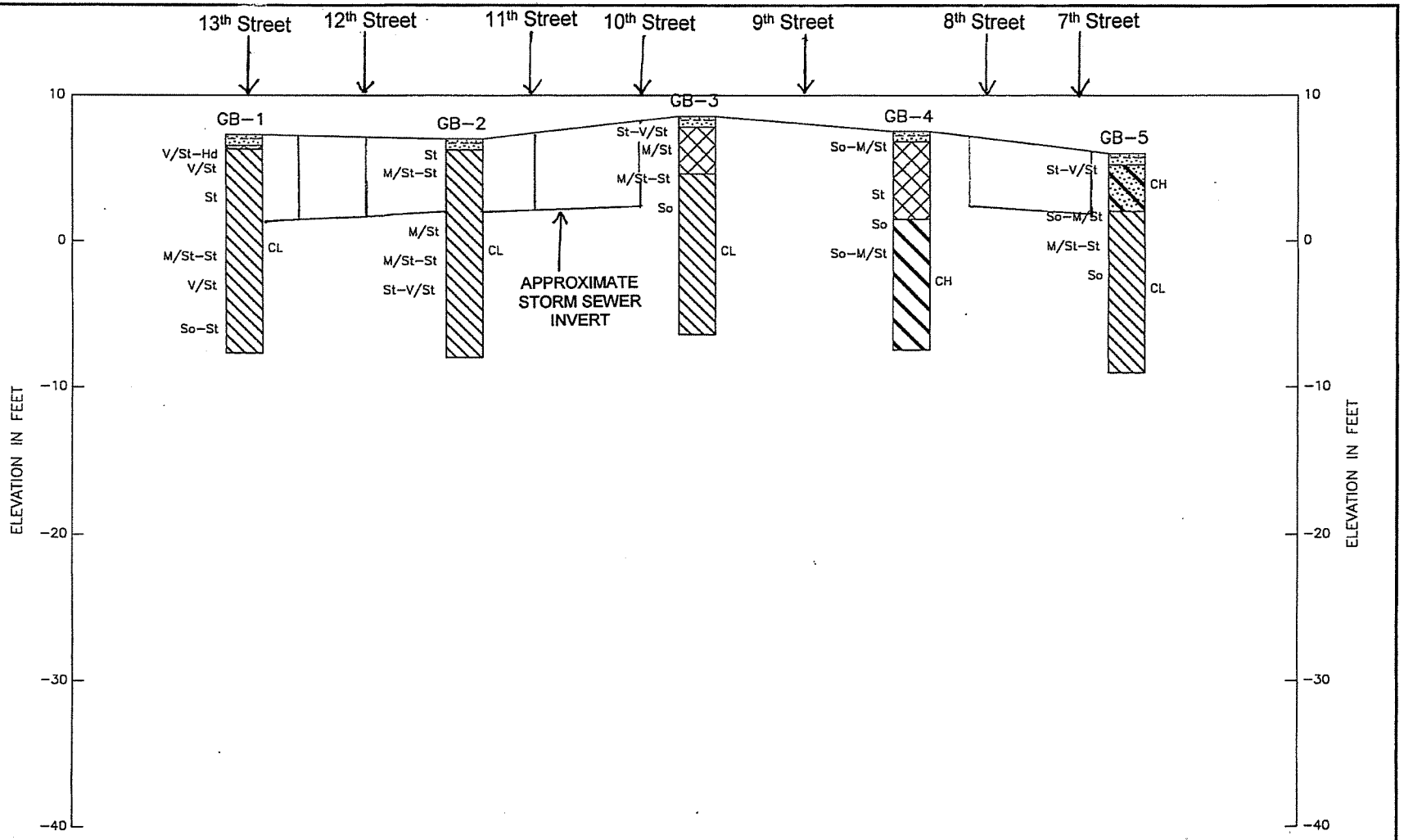
7322 Southwest Freeway, Suite 2040 • Houston, Texas 77074
(713) 609 3750 • www.arkkengineers.com • TBPE Firm No. 13872

Galveston County,Texas

Texas Avenue Reconstruction

Overall Layout Plan

Job No.: 18-015	Scale: HORZ.: 1" = 160'
Date: April, 2019	VERT:
Dwn By: D. Fattig	FIGURE 2
Chkd By: J. Rudloff	



GENERAL NOTES:

1. See Figure 2 for approximate location of borings.
2. Data concerning subsurface conditions have been obtained at boring locations only. Actual conditions between borings may differ from the profile shown here.
3. See logs of boring for detailed description of soils encountered in each borehole.
4. See Figure 4 for symbols and abbreviations used on this profile.

BORING LOG PROFILE

TEXAS AVENUE RECONSTRUCTION
BORINGS GB–1 TO GB–5

0 250 500 750 1000

HORIZONTAL SCALE IN FEET

Job No. 1140243301

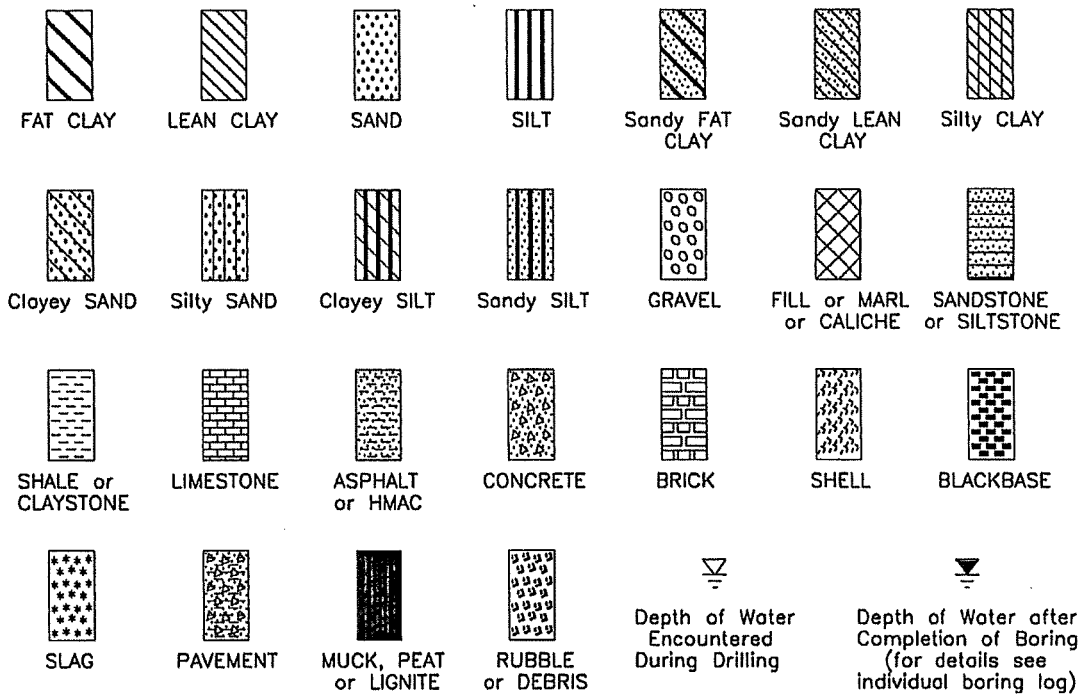
Geotest Engineering, Inc.

FIGURE 3

Job No. 1140243301

SYMBOLS AND ABBREVIATIONS USED ON BORING LOG PROFILE

LEGEND



ABBREVIATIONS USED FOR CONSISTENCY/DENSITY

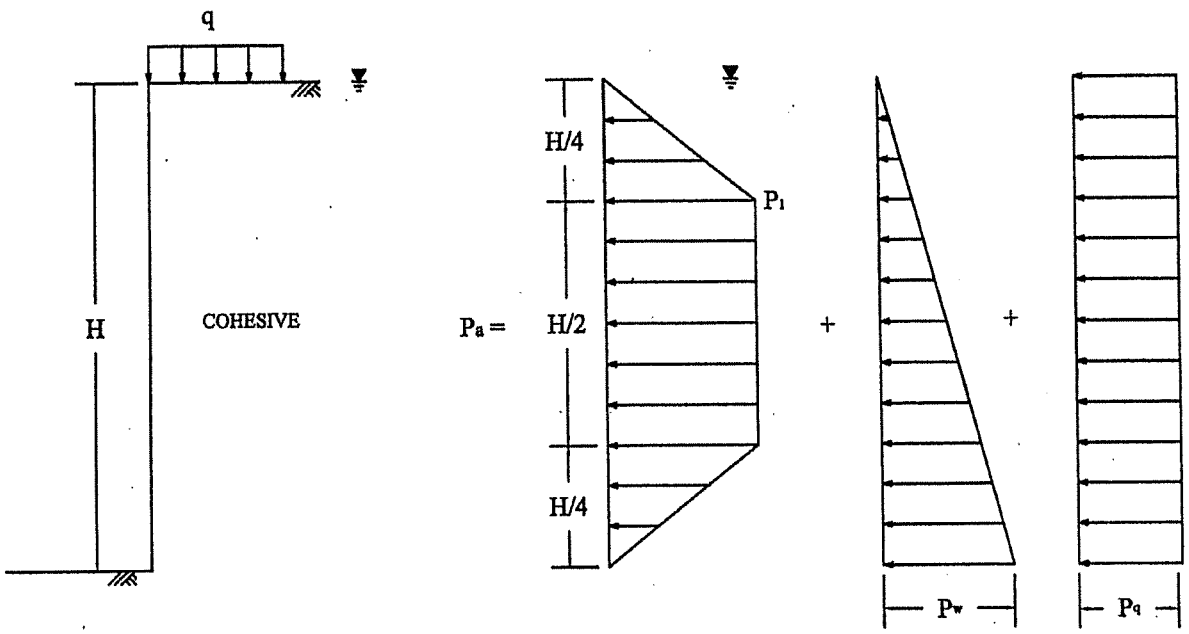
COHESIVE SOILS

V/So	:	Very Soft
So	:	Soft
Fm	:	Firm
M/St	:	Medium Stiff
St	:	Stiff
V/St	:	Very Stiff
Hd	:	Hard
V/Hd	:	Very Hard

COHESIONLESS SOILS

V/Lo	:	Very Loose
Lo	:	Loose
S/Co	:	Slightly Compact
Co	:	Compact
M/De	:	Medium Dense
De	:	Dense
V/De	:	Very Dense

Job No. 1140243301



TYPICAL SOIL PARAMETERS

See Table 1 for typical values of soil parameters

BRACED WALL

For $\gamma H/c \leq 4$

$P_1 = 0.3\ \gamma_o' H$
$P_w = \gamma_w H = 62.4\ H$
$P_q = 0.5\ q$

Where:

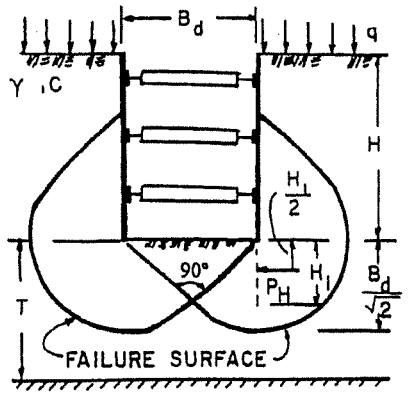
γ_o' = Submerged unit weight of cohesive soil, pcf;
γ_w = Unit weight of water, pcf;
q = Surcharge load at surface, psf;
P_a = Lateral pressure, psf;
P_1 = Active earth pressure, psf;
P_q = Horizontal pressure due to surcharge, psf;
P_w = Hydrostatic pressure due to groundwater, psf;
H = Depth of braced excavation, feet
c = Shear strength of cohesion soil, psf;

TRENCH SUPPORT EARTH PRESSURE

SUBMERGED COHESIVE SOIL

Job No. 1140243301

CUT IN COHESIVE SOIL,
DEPTH OF COHESIVE SOIL UNLIMITED (T>0.7 B_d)
L = LENGTH OF CUT



If sheeting terminates at base of cut:

$$\text{Safety factor, } F_S = \frac{N_C C}{\gamma H + q}$$

N_C = Bearing capacity factor, which depends on dimensions of the excavation : B_d, L and H (use N_C from graph below)

C = Undrained shear strength of clay in failure zone beneath and surrounding base of cut

γ = Unit weight of soil (see Table 1)

q = Surface surcharge (assumed q = 500 psf)

If safety factor is less than 1.5, sheeting or soldier piles must be carried below the base of cut to insure stability - (see note)

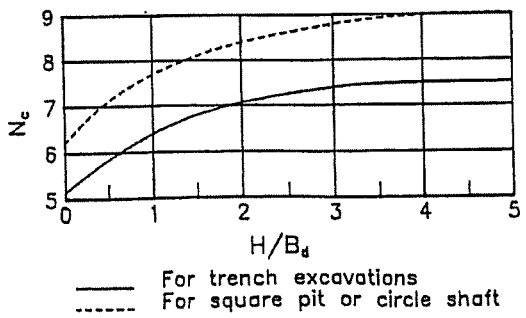
H_1 = Buried length = $\frac{B_d}{2} \geq 5$ feet

Note : If soldier piles are used, the center to center spacing should not exceed 3 times the width or diameter of soldier pile .

Force on buried length, P_H:

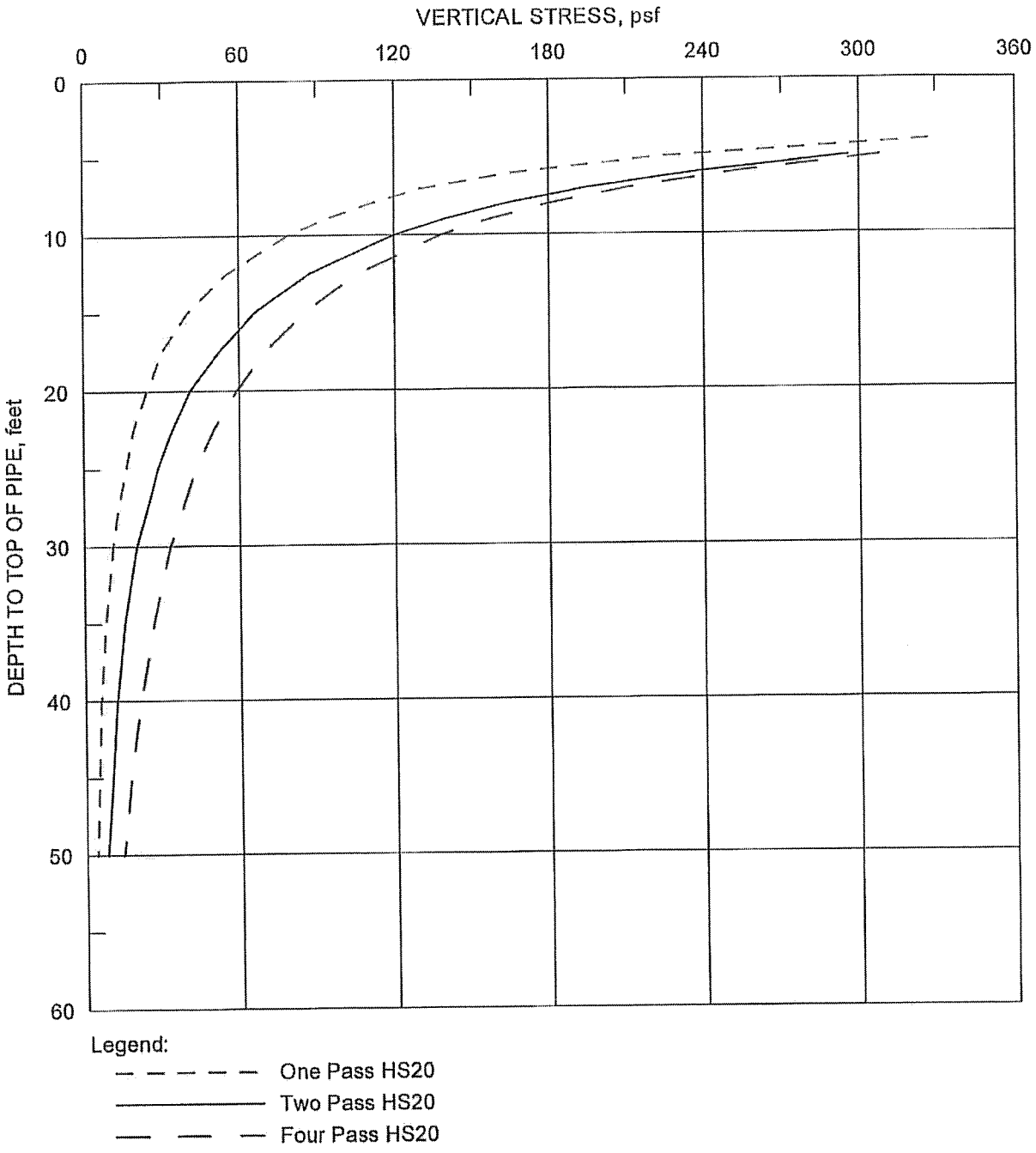
If $H_1 \geq \frac{2}{3}\frac{B_d}{\sqrt{2}}$, $P_H = 0.7\,(\gamma H B_d - 1.4CH - \pi C B_d)$ in lbs/ linear foot

If $H_1 < \frac{2}{3}\frac{B_d}{\sqrt{2}}$, $P_H = 1.5H_1\,(\gamma H - \frac{1.4CH}{B_d} - \pi C)$ in lbs/ linear foot



STABILITY OF BOTTOM FOR BRACED CUT

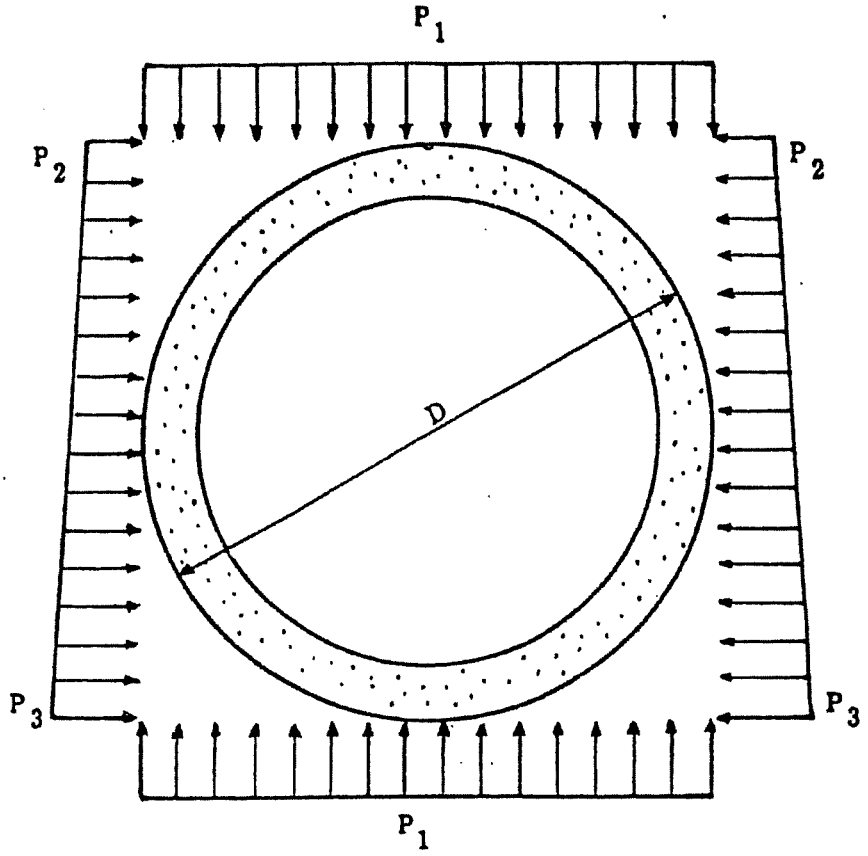
Job No. 1140243301



Notes:
1. Based on standard AASHTO H20 or HS20 dual wheel truck axle loadings
2. The vertical stress was estimated by using Westergaard solution

VERTICAL STRESS ON PIPE
DUE TO TRAFFIC LOAD

Job No. 1140243301



$$P_1 = [(H + \frac{D}{2}) \times (\gamma - \gamma_w) + D_w \times \gamma_w] + q_s \text{ , for } D_w < H + \frac{D}{2}$$

$$P_1 = [(H + \frac{D}{2}) \times \gamma] + q_s \text{ , for } D_w \geq H + \frac{D}{2}$$

$$P_2 = (H \times \gamma) + q_s$$

$$P_3 = [(H + D) \times \gamma] + q_s$$

Where: P_1, P_2, P_3 = Tunnel liner load, psf.

D = Tunnel outside diameter, ft.

H = Depth to top of tunnel; ft.

D_w = Depth to ground water level; ft.

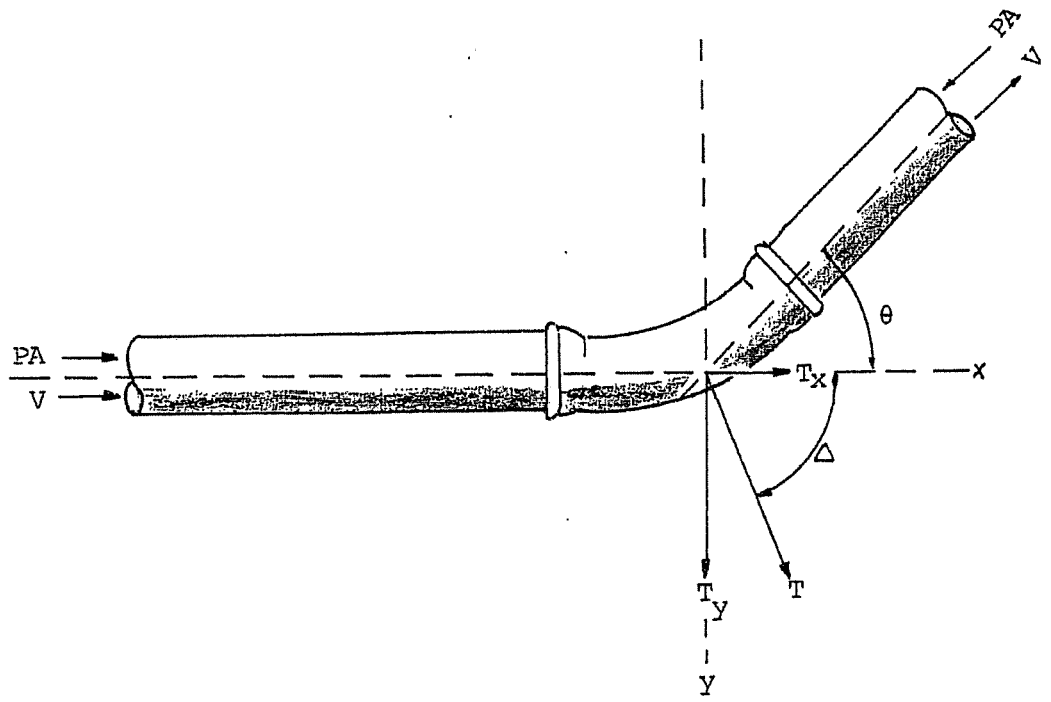
γ = Wet unit weight of soil, pcf (see Table 2)

γ_w = Unit weight of water, 62.4 pcf

q_s = Surcharge load, psf.

EARTH PRESSURE
ON AUGERING

Job No. 1140243301



$T_x = PA\ (1 - COS\ \theta)$

$T_y = PA\ SIN\ \theta$

$T = 2\ PA\ SIN\ \frac{\theta}{2}$

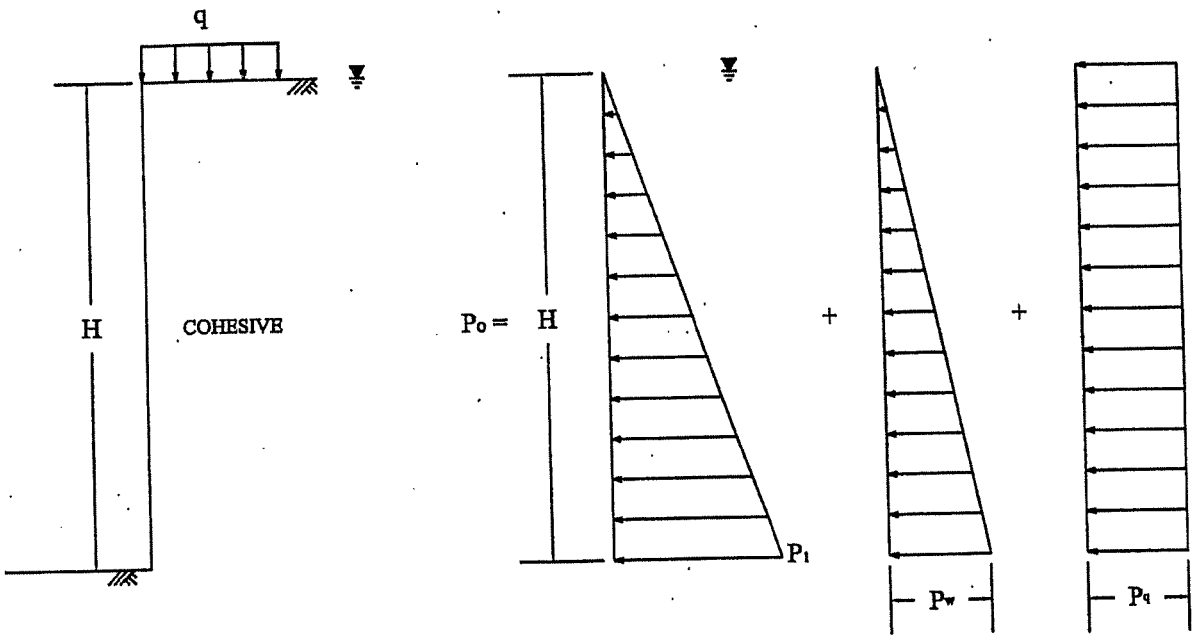
$\Delta = (90 - \frac{\theta}{2})$

Where:

T	is the resultant force on the bend
T_x	is the component of thrust force in x-direction
T_y	is the component of thrust force in y-direction
P	is the maximum sustained pressure
A	is the pipe cross-sectional area
θ	is the bend deflection angle
Δ	is the angle between T and X-axis
V	is the fluid velocity

THRUST FORCES ACTING ON A BEND

Job No. 1140243301



TYPICAL SOIL PARAMETERS

See Table 1 for typical values of soil parameters

$K_{oc} = 1.0$

PERMANENT WALL

$P_1 = K_{oc}\,\gamma_c'\,H$
$P_w = \gamma_w\,H = 62.4\,H$
$P_q = 0.5\,q$

Where:

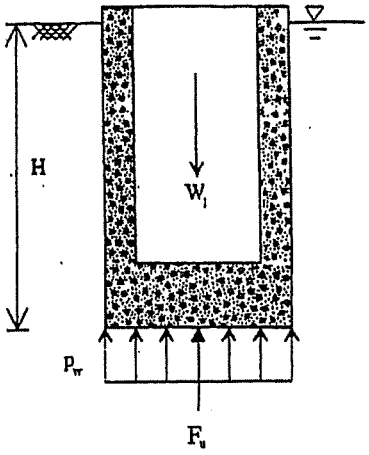
γ_c' = Submerged unit weight of cohesive soil, pcf;
K_{oc} = Coefficient of at-rest earth pressure in cohesive soil;
γ_w = Unit weight of water, pcf;
q = Surcharge load at surface, psf;
P_o = Lateral pressure, psf;
P_1 = At-rest earth pressure, psf;
P_q = Horizontal pressure due to surcharge, psf;
P_w = Hydrostatic pressure due to groundwater, psf;
H = Depth of excavation, feet

LATERAL EARTH PRESSURE DIAGRAM FOR PERMANENT WALL

SUBMERGED COHESIVE SOIL

Job No. 1140243301

(a) DEAD WEIGHT OF STRUCTURE

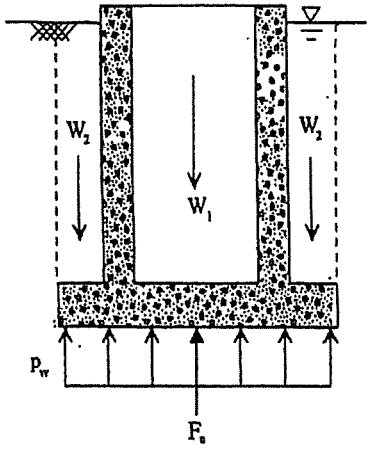


$P_w = H\gamma_w$

$F_u = A_b P_w$

$\frac{W_1}{Sf_1} = F_u$

(b) WEIGHT OF SOIL ABOVE BASE EXTENSION PLUS DEAD WEIGHT OF STRUCTURE

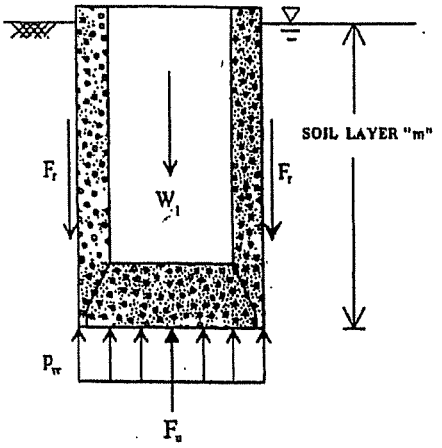


$P_w = H\gamma_w$

$F_u = A_b P_w$

$\frac{W_1}{Sf_1} + \frac{W_2}{Sf_2} = F_u$

(c) SOIL-WALL FRICTION PLUS DEAD WEIGHT OF STRUCTURE



$P_w = H\gamma_w$

$F_u = A_b P_w$

$\frac{W_1}{Sf_1} + \frac{F_r}{Sf_3} = F_u$

Predominantly Cohesive Soils, $F_r = \alpha\, c_m\, A_m$

Predominantly Cohesionless Soils, $F_r = p_m A_m K \tan \delta_m$

See Table 1 for typical values of soil parameters

Where:

A_b	=	area of base, sq. ft.
A_m	=	cylindrical surface area of layer "m" , sq. ft.
c_m	=	undrained cohesion of soil layer "m", psf.
F_u	=	hydrostatic uplift force, lbs.
F_r	=	frictional resistance, lbs.
H	=	height of buried structure, ft.
K	=	coefficient of lateral pressure = 0.5.
p_m	=	average overburden pressure for layer "m," psf.
P_w	=	hydrostatic uplift pressure, psf.
$Sf_{1,\,2,\,3}$	=	factor of safety.
W_1	=	dead weight of concrete structure, lbs.
W_2	=	weight of backfill above base extension, lbs.
α	=	cohesion reduction factor = 0.5.
δ_m	=	friction angle between soil layer "m" and concrete wall, degrees = 0.75 ϕ_m
ϕ_m	=	internal angle of friction of soil layer "m", degrees.
γ_w	=	unit weight of water = 62.4 pcf.

UPLIFT PRESSURE AND RESISTANCE

TABLES

TABLE 1

GEOTECHNICAL DESIGN PARAMETER SUMMARY
OPEN-CUT EXCAVATION

Boring Nos.	Stratigraphic Unit	Range of Depths, ft	Wet Unit Weight, γ, pcf	Submerged Unit Weight, γ', pcf	Undrained Cohesion, psf	Internal Friction Angle, φ, degree
GB-1 thru GB-5	FILL/Cohesive Cohesive	0-4 4-6 6-10 10-15	129 133 133 132	65 67 67 66	750 1,000 500 250	-- -- -- --

Notes:

1. Cohesive soils include fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand.
2. Fill soils include fat clay, lean clay, and lean clay with sand and shell fragments.

TABLE 2

GEOTECHNICAL DESIGN PARAMETER SUMMARY
TRENCHLESS INSTALLATION ALONG TEXAS AVENUE (FM 1765)
(GB-1 THROUGH GB-5)

PROPERTY		COHESIVE SOILS [1]
Wet Unit Weight, γ, pcf	0-4 ft.	129
	4-6 ft.	133
	6-10 ft.	133
	10-15 ft.	132
Submerged Unit Weight, γ', pcf	0-4 ft.	65
	4-6 ft.	67
	6-10 ft.	67
	10-15 ft.	66
Moisture Content (%)	0-4 ft.	20
	4-6 ft.	20
	6-10 ft.	25
	10-15 ft.	23
UNDRAINED PROPERTIES *		
Undrained Cohesion, C_u, psf	0-4 ft.	750
	4-6 ft.	1,500
	6-10 ft.	500
	10-12 ft.	250
Angle of Internal, ϕ, degrees	0-4 ft.	0
	4-6 ft.	0
	6-10 ft.	0
	10-12 ft.	0
Elastic Modulus, E, psf	0-4 ft.	225,000
	4-6 ft.	450,000
	6-10 ft.	200,000
	10-12 ft.	100,000
Coefficient of Lateral Earth Pressure at Rest, K_o	0-4 ft.	1.2
	4-6 ft.	1.2
	6-10 ft.	1.2
	10-12 ft.	1.2
Poisson's Ratio		0.45
DRAINED PROPERTIES *		
Drained Cohesion, C', psf	0-4 ft.	0
	4-6 ft.	0
	6-10 ft.	0
	10-12 ft.	0
Angle of Internal Friction, ϕ', degrees	0-4 ft.	25
	4-6 ft.	25
	6-10 ft.	27
	10-12 ft.	27
Elastic Modulus, E, psf	0-4 ft.	135,000
	4-6 ft.	270,000
	6-10 ft.	120,000
	10-12 ft.	60,000

Notes:

1. Cohesive soils include fat clay, fat clay with sand, sandy fat clay, lean clay, and lean clay with sand.

* Tunnel zone which includes depth plus 6 feet above invert plus 6 feet below invert.

APPENDIX A

LOG OF BORING NO. GB-1

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street
City of Texas City, Galveston County, Texas

PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)

COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade

DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon
DRY AUGER : 0.0 TO 15.0 FT.
WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			0.5" Asphalt over 8.5" Concrete				14.1			
				FILL: gray lean clay w/calcareous and ferrous nodules		95.7		20.4	49	21	28
	5			Very stiff to hard gray LEAN CLAY (CL) w/calcareous and ferrous nodules and ferrous stains			105	24.8			
				-very stiff 2'-4'				20.3			
				-stiff 4'-8'							
				-w/silt seams 6'-10'							
	10			-medium stiff to stiff 8'-10'		94.6	104	26.1	48	21	27
				-very stiff 10'-12'							
				-reddish brown and gray 10'-15'				24.0			
				-medium stiff to stiff w/silt seams 13'-15'							
	15							26.4			
	20										
	25										
	30										
	35										

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

Geotest Engineering, Inc.

FIGURE A-1

LOG OF BORING NO. GB-2

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street
City of Texas City, Galveston County, Texas

PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)

COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade

DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon
DRY AUGER : 0.0 TO 15.0 FT.
WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			0.5" Asphalt over 8.5" Concrete				18.2			
				Stiff gray and brown LEAN CLAY WITH SAND (CL) w/ferrous stains				19.4			
	5			-medium stiff to stiff 2'-4'							
				-gray and yellowish brown 2'-15'		78.8	113	18.9	38	19	19
				-medium stiff 6'-8'				22.7			
				-medium stiff to stiff 8'-10'							
	10			-stiff to very stiff 10'-12'		75.8	110	21.9	35	17	18
								19.5			
	15							19.8			
	20										
	25										
	30										
	35										

UNDRAINED SHEAR STRENGTH, TSF
- ○ HAND PENETROMETER
- ● UNCONFINED COMPRESSION
- ■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
- △ TORVANE

0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

Geotest Engineering, Inc.

FIGURE A-2

LOG OF BORING NO. GB-3

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street City of Texas City, Galveston County, Texas

PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)

COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade

DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon
DRY AUGER : 0.0 TO 15.0 FT.
WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			0.5" Asphalt over 8.75" Concrete				17.6			
				FILL: stiff to very stiff gray lean clay with sand and ferrous stains		75.6		26.0	49	21	28
	5			-w/shell fragments 9.25"-2'							
				-medium stiff 2'-4'			112	22.6			
				Medium stiff to stiff yellowish brown LEAN CLAY WITH SAND (CL) w/ferrous nodules and ferrous stains				27.5			
				-soft 6'-10'							
	10			-w/silt seams 8'-12'				24.8			
				-soft to medium stiff 10'-12'		74.3	103	24.7	33	17	16
				-w/silty sand layer 13'-15'							
	15							20.9			
	20										
	25										
	30										
	35										

UNDRAINED SHEAR STRENGTH, TSF
- ○ HAND PENETROMETER
- ● UNCONFINED COMPRESSION
- ■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
- △ TORVANE

0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

Geotest Engineering, Inc.

FIGURE A-3

LOG OF BORING NO. GB-4

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street City of Texas City, Galveston County, Texas
PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)
COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade
DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon
DRY AUGER : 0.0 TO 15.0 FT.
WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, TSF (○ HAND PENETROMETER, ● UNCONFINED COMPRESSION, ■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION, △ TORVANE; 0.5 1.0 1.5 2.0 2.5)
	0			0.5" Asphalt over 8" Concrete				20.1				
				FILL: soft to medium stiff dark gray fat clay w/limestone and shell fragments		96.9		32.3	50	20	30	
	5			-stiff gray and brown 4'-6'			109	14.4				
				Soft yellowish brown and gray FAT CLAY WITH SAND (CH) w/ferrous nodules and ferrous stains		75.6		29.5	53	22	31	
	10			-soft to medium stiff 8'-10'			109	22.1				
				-w/sand seams 13'-15'				23.1				
	15							22.7				
	20											
	25											
	30											
	35											

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

Geotest Engineering, Inc.

FIGURE A-4

LOG OF BORING NO. GB-5

PROJECT : Paving Improvements along Texas Avenue (FM 1765) from 14th Street to 6th Street City of Texas City, Galveston County, Texas

PROJECT NO. : 1140243301

LOCATION : See Plan of Borings (Figure 2)

COMPLETION DEPTH : 15.0 FT.

SURFACE ELEVATION : Existing Grade

DATE : 04-10-19

SAMPLER : Shelby Tube/Split Spoon
DRY AUGER : 0.0 TO 15.0 FT.
WET ROTARY : -- TO -- FT.

ELEVATION, FEET	DEPTH, FEET	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			0.5" Asphalt over 9" Concrete				17.0			
				Stiff to very stiff gray and brown SANDY FAT CLAY (CH)		60.7	113	17.6	52	21	31
	5			-w/shell fragments 9.5"-2' -w/calcareous and ferrous nodules 2'-4'				20.0			
				Soft to medium stiff brown LEAN CLAY WITH SAND (CL) w/ferrous nodules and ferrous stains -medium stiff to stiff 6'-8' -soft 8'-12'		82.7	112	24.2	30	17	13
	10							26.1			
								22.9			
				-w/silty sand seams 13'-15'							
	15							29.7			
	20										
	25										
	30										
	35										

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING :
NO GROUNDWATER ENCOUNTERED DURING DRILLING.
HOLE OPEN TO 15.0 FT. AT END OF DRILLING.

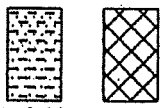
Geotest Engineering, Inc.

FIGURE A-5

Job No. 1140243301

SYMBOLS AND TERMS USED ON BORING LOGS

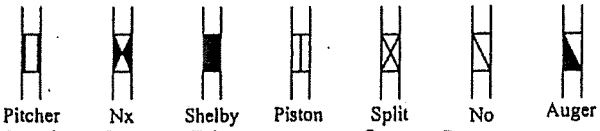
SOIL TYPES
(SHOWN IN SYMBOL COLUMN)



Asphaltic Concrete | Fill | Gravel | Sand | SILT | FAT CLAY | LEAN CLAY | Sandy LEAN CLAY

Predominant type shown heavy

SAMPLER TYPES
(SHOWN IN SAMPLES COLUMN)



Pitcher Barrel | Nx Core | Shelby Tube | Piston | Split Spoon | No Recovery | Auger

TERMS DESCRIBING CONSISTENCY OR CONDITION

Basic Soil Type	Density or Consistency	Standard Penetration Resistance, [1] Blows/ft.	Unconfined Compressive Strength (q_u), [2] Tons/sq. ft.
Cohesionless	Very loose	Less than 4	Not applicable
	Loose	4 to <10	Not applicable
	Medium dense	10 to <30	Not applicable
	Dense	30 to <50	Not applicable
	Very dense	50 or greater	Not applicable
Cohesive	Very soft	Less than 2	Less than 0.25
	Soft	2 to <4	0.25 to <0.5
	Firm/Medium stiff	4 to <8	0.5 to <1.0
	Stiff	8 to <15	1.0 to <2.0
	Very stiff	15 to <30	2.0 to <4.0
	Hard	30 or greater	4 or greater

(1) Number of blows from 140-lb. weight falling 30-in. to drive 2-in. OD, 1-3/8-in. ID, split barrel sampler (ASTM D1586)

(2) q_u may also be approximated using a pocket penetrometer

TERMS CHARACTERIZING SOIL STRUCTURE

Parting: -paper thin in size Seam: -1/8" to 3" thick Layer: -greater than 3"

Slickensided	- having inclined planes of weakness that are slick and glossy in appearance.
Fissured	- containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.
Laminated	- composed of thin layers of varying color and texture.
Interbedded	- composed of alternate layers of different soil types.
Calcareous	- containing appreciable quantities of calcium carbonate.
Well graded	- having wide range in grain sizes and substantial amounts of all intermediate particle sizes.
Poorly graded	- predominantly of one grain size, or having a range of sizes with some intermediate size missing.
Flocculated	- pertaining to cohesive soils that exhibit a loose knit or flakey structure.

Bid #B201007
DATE: 10/28/2019
TIME: 10:00 A.M.

PRE-BID CONFERENCE
TEXAS AVENUE RECONSTRUCTION
GALVESTON COUNTY, TEXAS

Pre-bid Conference for Bid #B201007 will be held on Monday, October 28, 2019 at Galveston County Courthouse, Purchasing Department, 722 Moody, 5th Floor, Galveston, TX

PRINTED NAME	SIGNATURE	COMPANY NAME	E-MAIL ADDRESS	PHONE
Rufus Crowder		Galveston County	rufus.crowder@co.galveston.tx.us	409.770.5372
Lili Thoreson		Texas Sterling Construction	lili.thoreson@ strlco.com	832-364-8145
JACK HARALSON		CITY OF TEXAS CITY	jharalson@texascitytx.gov	409-643-5810
John Ruthoff		ARKK Engineers	John.Ruthoff @ ARKK Engineers.Com	713-400-2755
Madhu Kilambi		ARKK ENGINEERS	Madhu.Kilambi@arkkengineers.com	713-400-2755
NANCY BAHER		GALVESTON COUNTY	NANCY.BAHER@CO.GALVESTON.TX.US	409 770-5556
Amber Forrest		R.G. Miller Engineers	aforrest@rgmiller.com	281-921-8756
Taylor Becerril		Spaw Glass	Taylor.Becerril@Spawglass.com	281-889-0195