Plotted on: 9/21/2023

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INDEX OF SHEETS

LUENSMANN PROPERTIES

PLANS OF PROPOSED
FM 1346 IMPROVEMENTS

BEXAR COUNTY

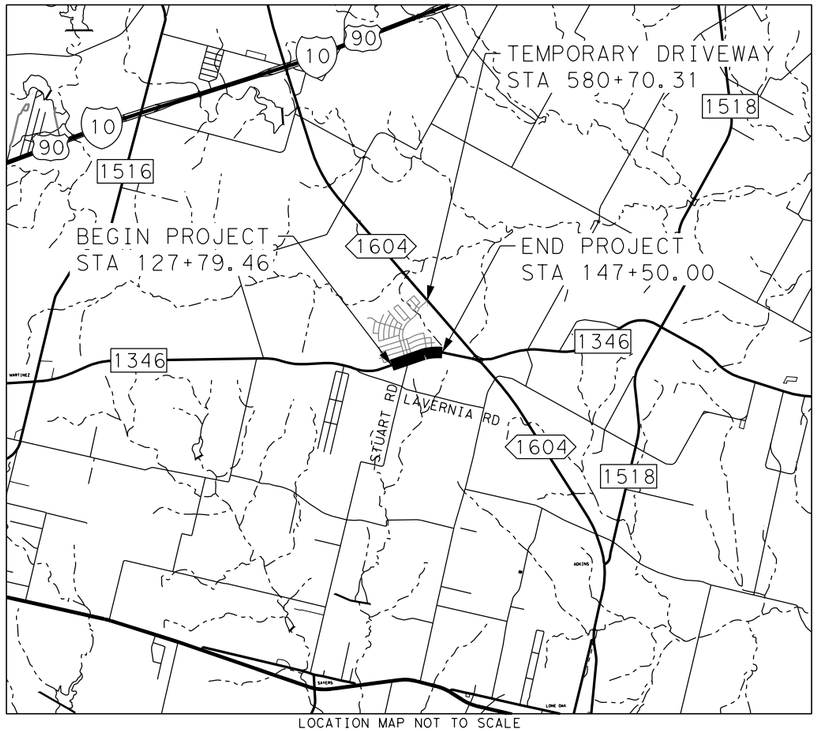
POSTED SPEED = 55 MPH
DESIGN SPEED = 40 MPH

ADT (2021) = 2,203

TOTAL DISTURBED SOIL = 1.72 ACRES
DESIGN CRITERIA: 3R
FUNCTIONAL CLASS: MAJOR COLLECTOR

TOTAL PROJECT LENGTH = 0.37 MILES (1,970.54 FEET)

LIMITS(FM 1346): FROM 728' WEST OF STUART RD TO 1150' EAST OF STUART RD
LIMIST(SL 1604): FROM 1703' SOUTH OF MARTINEZ CREEK TO 1813' SOUTH OF MARTINEZ CREEK
CONSISISTING OF: PAVEMENT WIDENING, TURN LANES, GRADING, AND DRAINAGE



LOCATION MAP NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RR X-ING'S: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT.

TDLR INSPECTION NOT REQUIRED

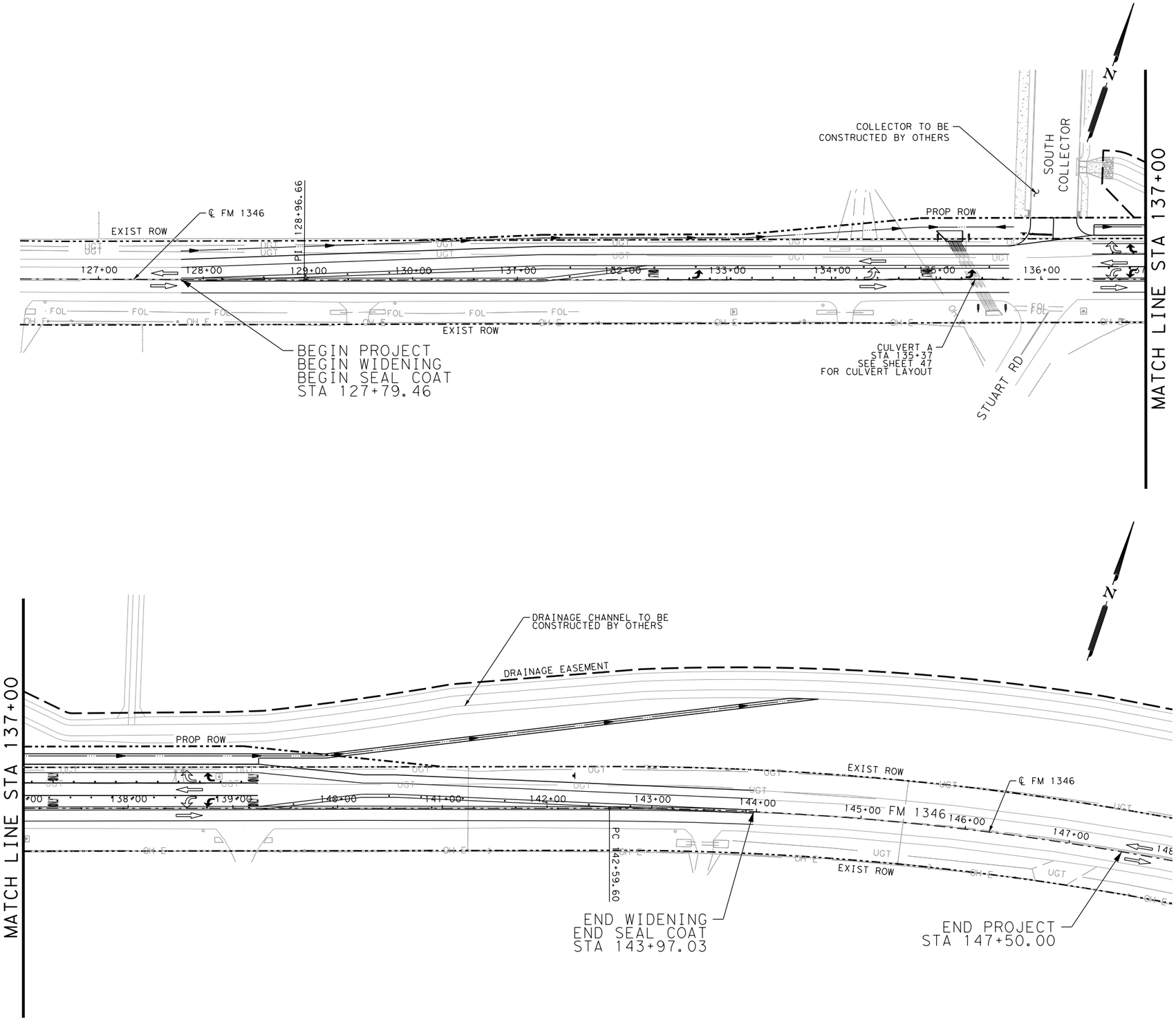
PREPARED FOR:

STARLIGHT HOMES TEXAS, LLC
17319 SAN PEDRO AVE, SUITE 100
SAN ANTONIO, TEXAS 78232

STATE OF TEXAS
DAN THOMA
98622
LICENSED
PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800



LEGEND

- EXIST ROW
- PROP ROW
- DRAINAGE EASEMENT
- DITCH FLOWLINE
- TRAFFIC FLOW ARROW

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

0 50 100 150

SCALE: 1"= 100'

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LUENSMANN PROPERTIES
FM 1346

PROJECT LAYOUT

SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 2

Plotted on: 9/21/2023

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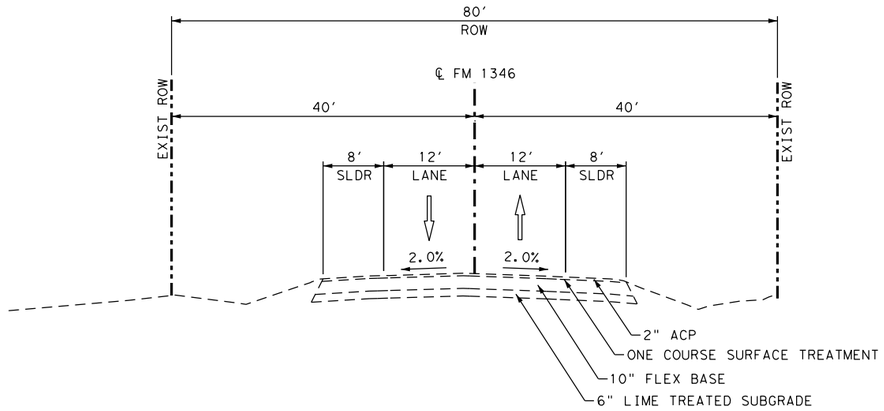

FM 1346 EXISTING TYPICAL SECTION

NTS

BEGIN PROJECT TO END PROJECT

DESIGN

STATE OF TEXAS
STEVEN J. TATE
131443
LICENSED
PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS
DAN THOMA
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NOT TO SCALE

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LUENSMANN PROPERTIES
FM 1346
EXISTING TYPICAL SECTIONS

SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 3

Plotted on: 9/21/2023

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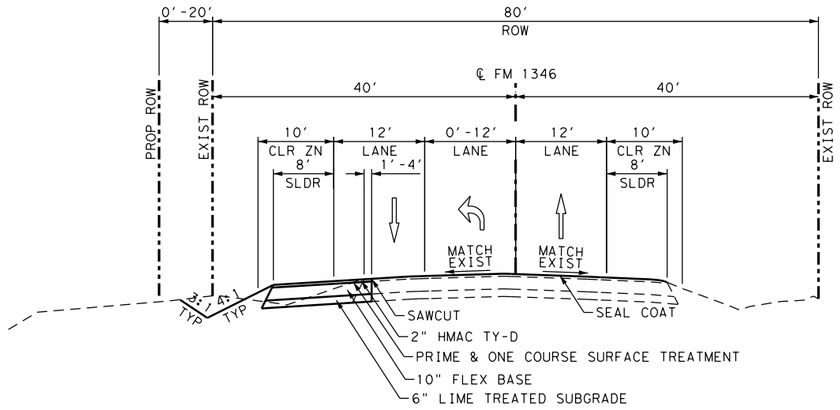
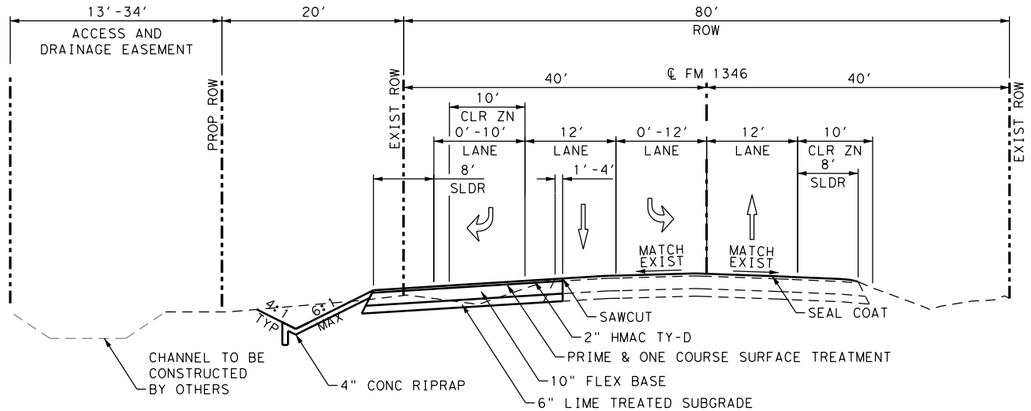


FM 1346 PROPOSED TYPICAL SECTION

NTS

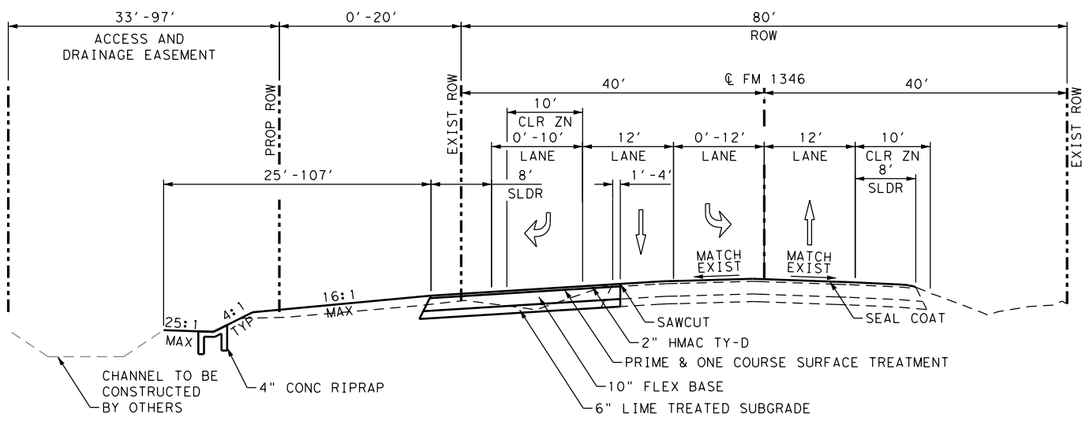
BEGIN PROJECT TO STA 136+00.00



FM 1346 PROPOSED TYPICAL SECTION

NTS

STA 136+00.00 TO 140+00.00



FM 1346 PROPOSED TYPICAL SECTION

NTS

STA 140+00.00 TO STA 143+97.03

DESIGN

STATE OF TEXAS
STEVEN J. TATE
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LICENSED
PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

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LUENSMANN PROPERTIES
FM 1346

PROPOSED TYPICAL SECTIONS

SHEET 1 OF 2

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 4

Plotted on: 9/21/2023

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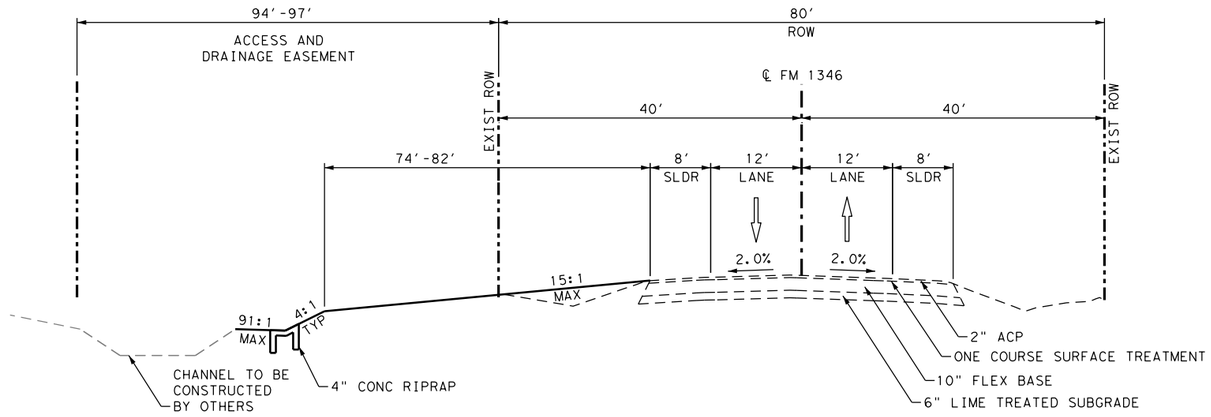
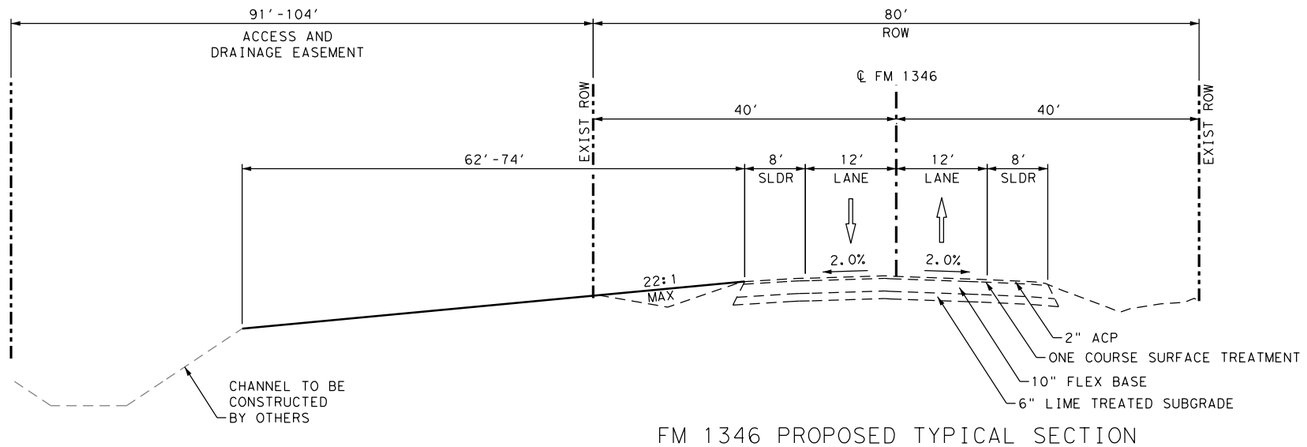


FM 1346 PROPOSED TYPICAL SECTION

NTS

STA 143+97.03 TO STA 144+36.36



FM 1346 PROPOSED TYPICAL SECTION

NTS

STA 144+36.36 TO END PROJECT

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

NOT TO SCALE

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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
PROPOSED TYPICAL SECTIONS

SHEET 2 OF 2

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 5

Control: N/A

County: BEXAR

Highway: FM 1346

**********GENERAL NOTES**********
2014 Specification Book (Revised March 15, 2022)

========== **Basis of Estimate** ==========

Item	Description	Rate/Area	Quant-Unit
168	Vegetative Watering	15.6 gal/sy / 8,378 sy	130.7 MG
260	Lime (5%)	5.25 lb/cf /12,285 cf	33 Tons
316	AGGR(TY-PD GR-3 SAC-B)	85 sy/cy/3,316 sy	40 CY
316	AGGR(TY-PD GR-4 SAC-B)	130 sy/cy/9,232 sy	72 CY

========== **Asphalt Concrete Pavement** ==========

Type	Location	Depth	Rate/Area	Quant-Tons
D-GR HMA TY-B PG64-22	FM 1346	4”	440lbs/sy/306 sy	68 Tons
D-GR HMA TY-D PG70-22	FM 1346	2”	220lbs/sy /2,819 sy	311 Tons

========== **Asphalt Data** ==========

Type	Location	Depth	Rate/Area	Quant-Gal
Seal Coat	FM 1346	N/A	0.34gal/sy /9,232 sy	3,139 Gal
One Course Surface Treatment	FM 1346	N/A	0.40 gal/sy/3,316 sy	1,327 Gal
Prime Coat	FM 1346	N/A	0.10 gal/sy/2,822 sy	284 Gal
Tack Coat	FM 1346	N/A	0.10 gal/sy/2,817 sy	282 Gal

--General--

G-4 Remove existing raised pavement markings as the work progresses or as approved. This work is subsidiary to the various bid items. Properly dispose materials removed.

G-5 To better fit field conditions, the cross sections may be varied when approved.

G-6 If there are waste areas or material source areas, follow the Texas Aggregate Quarry and Pit Safety Act requirements.

G-7 Any materials removed and not reused and determined to be salvageable shall be stored within the project limits at an approved location or delivered undamaged to the storage yard as directed. Properly dispose unsalvageable materials in accordance with local, state, and federal regulations. Deface traffic signs so that they will not reappear in public as signs.

Control: N/A

County: BEXAR

Highway: FM 1346

G-8 Any sign panels that are adjusted or removed and replaced, shall be done the same workday unless otherwise approved. This work shall be considered subsidiary to Item 502.

G-10 Locate and reference all manholes and valves within the construction area with station and offset. Each manhole and valve shall be identified by its owner (SAWS, CPS, etc.). No roadwork will begin until this list has been submitted. All valves and manhole covers have to be accessible at all times, therefore; temp. CTB, material stock piles, etc. cannot be placed over these valves or covers.

G-11 Adjust or construct all manholes and valves to final pavement elevations prior to the final mat of ACP. If, between the final elevation adjustment and the final mat of ACP, the manholes and valves are going to be exposed to traffic, place temporary asphalt around the manhole and valve to provide a +/- 50:1 taper. The cost of elevation adjustment and the concrete apron around the manhole and valve will be part of the manhole and valve work. The asphalt tapers are part of the ACP work.

G-12 Hurricane Evacuation

Hurricane Season is from June 1 thru November 30. As the closest metropolitan city inland from the Texas Coast, the City of San Antonio is a major shelter destination during mandatory hurricane evacuations. As such, planned work zone lane or road closures may be restricted and/or suspended during mandatory hurricane evacuation operations. The District will coordinate these restrictions at a minimum H-120 from any projected impact to the Texas Coast.

No time charges will be made if the Engineer determines that work on the project was impacted by the hurricane.

The Engineer may order changes in the Traffic Control Plan to accommodate evacuation traffic, and may suspend the work, all or in part, to ensure timely completion of this work. All work to implement changes in the Traffic Control Plan will be paid through existing bid prices or through Item 9.5, Force Account. However, the Department will not entertain any request for delay damages, loss of efficiency that may be attributed to the restriction or suspension of road or lane closures, or to changes in the Traffic Control Plan.

G-13 The Contractor should be aware that the "City Public Service" (CPS) will be consulted by the Engineer in matters concerning the execution of the work, materials and testing related to the CPS work. As such; a CPS employee may be observing the construction and related operations as they progress.

G-14 If a sanitary sewer overflow (SSO) occurs:

1. Attempt to eliminate the source of the SSO.

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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
GENERAL NOTES

SHEET 1 OF 5

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2. Contain sewage from the SSO to the extent possible to prevent contamination of waterways.
3. Call SAWS at (210) 233-2015.

G-16 Submit locate request for SAWS water and sewer to TXDOTlocates@saws.org.

--Item 5--

5-1 Reference all existing striping and other pavement markings to allow these markings to be re-established. Ensure the markings (lane lines, edge lines, ramp gores, etc.) are in line with signs, TMS arrows, etc. located on overhead sign supports.

5-5 When working near aerial electrical lines or utility poles, comply with Federal, State and local regulations. A horizontal boom or equivalent equipment is required for construction in the vicinity of the CPS Energy electric lines in order to provide vertical clearance of equipment during construction. Contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of pole bracing. The estimated duration for pole bracing is 6 to 10 weeks (or longer if temporary construction easements are required) after invoice is paid. For de-energizing or sleeving of the overhead electrical lines depicted on the plans, please contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of needed de-energization. The estimated duration for de-energizing is approximately 4 to 6 weeks (after invoice is paid) but could vary on system scenario and backfeed requirements. De-energizing may not be possible in all instances or may be restricted during specific periods of time due to load demand. Contractor will be reimbursed for the invoice cost for pole bracing and/or de-energizing or sleeving through force account.

5-6 Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, nests containing migratory birds must be avoided and no work will be performed in the nesting areas until the young birds have fledged.

Structures

Bridge and culvert construction operations cannot begin until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can

Control: N/A

County: BEXAR

Highway: FM 1346

interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows. This work is subsidiary to the various bid items.

5-8 When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

--Item 6--

6-1 Show the stockpile lot and/or sub lot numbers on all tickets for all materials.

--Item 7--

7-1A The project's total disturbed area is 1.47 acres. The disturbed area in all project locations and Contractor project specific locations (PSL's), within 1/4 mile of the project limits, will further establish the authorization requirements for storm water discharges. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. Obtain any required authorization from the TCEQ for any PSL's on or off the ROW. When the total area disturbed on the project and PSL's within 1/4 mile of the project exceeds 5 acres, provide a copy of the Contractor NOI for PSL's to the Engineer (to the appropriate MS4 operator when the project is on an off-state system route).

7-3A No significant traffic generators events identified.

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LUENSMANN PROPERTIES
FM 1346
GENERAL NOTES

SHEET 2 OF 5

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DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 6B

Control: N/A

County: BEXAR

Highway: FM 1346

--Item 8--

8-1 Working days will be computed and charged in accordance with Article 8.3.1.2: 6-Day work week.

8-3 Create and maintain a CPM schedule.

8-3A The CPM schedule shall be created and maintained using software fully compatible with version 6.1 of Primavera Project Planner.

--Item 100--

100-1 Begin clearing operations after trees and other areas of vegetation to be protected have been identified and approved. Install fencing around features to be protected as shown in the plans or directed. Coordinate all right of way clearing operations with the SW3P.

100-2 Trim and remove brush and trees within the stations noted in the plans and as needed for construction operations. Unless shown otherwise in the plans or a designated non-mow area, perform trimming or removal for areas to the ROW limits. Trim or remove to provide minimum of 5 ft. of horizontal clearance and 7 ft. of vertical clearance for the following: sidewalks, paths, guard fence, rails, signs, object markers, and structures. Trim to provide a minimum of 12 ft. vertical clearance under all trees. This work is subsidiary.

Obtain approval for proposed method of tree and brush trimming and removal. Vertical flailing equipment is not allowed. Treat damaged or cut branches, roots and/or stumps of all oak trees with a commercial tree wound dressing. Disinfect all pruning tools with a solution of 70% alcohol before moving from one tree to another. Unless otherwise approved remove all resulting vegetative debris from the ROW within 24 hours. The Engineer can stop all construction operations if the dressing, cut and removal requirements are not followed.

--Item 164--

164-1 Drill seeding of permanent grasses requires the use of approved grass seeding equipment capable of properly storing and metering the release of small seeds (such as Bermuda grass) separately from fluffy type seeds (such as bluestems). Equipment manufactured for planting grain crops is acceptable for planting temporary cool season seeds, but not for planting the permanent seed mix.

If performing a permanent seeding in an area with established temporary grass cover and mowing is performed instead of tilling, seed and fertilizer may be distributed simultaneously during “Broadcast Seeding” operations, provided each component is applied at the specified rate.

Control: N/A

County: BEXAR

Highway: FM 1346

--Item 168--

168-1 Apply vegetative watering as needed to supplement natural rainfall during the vegetation establishment period. Plan quantity of irrigation water is based on the application of a total of 1.3 gal of water each week for each sq. yd. of area that is sodded or seeded. Establishment time is estimated to be 12 weeks for both sod and permanent seed mixes. Temporary seeding will require less time for establishment. Provide a schedule and coordinate watering cycles and rates per cycle with the Engineer. Obtain approval if the quantity of water to be applied is expected to exceed the plan quantity. Adjust the amount of water applied with each cycle and the number of cycles each wk. according to actual site conditions. Drought or other conditions, as determined by the Engineer, may require the application of supplemental irrigation during hours other than normal working hours.

--Item 247--

247-1 There is no minimum PI requirement for this project.

--Item 3076, 3077, 3079, 3080, 3081, & 3082 --

1. Table 10 in Item 3076 and Table 11in Item 3077, Hamburg Wheel Test Requirements tested in accordance with Tex-242-F are changed for PG 64-22 or lower and PG 70-22. Minimum number of passes at 12.55 mm Rut Depth, Tested at 50 degrees C will be 5,000 and 10,000 respectively.

2. Submit a copy of the Tex 233-F production charts on a weekly basis. At the end of the ACP work, provide all originals.

3. Crushing of aggregate for hot mix and immediate use for production of the mix is not allowed. Stockpile the aggregate until enough material is available for five days of production unless prior approval is provided

4. Hold a pre-paving meeting one month prior to the placement of the hot mix. The date and time of pre-paving meeting should be coordinated with the Engineer prior to scheduling.

5. Do not use diesel or solvents as asphalt release agents in production, transportation, or construction. A list of approved asphalt release agents is available from the District Laboratory.

6. No more than one hot mix lot will be open for any specific type of hot mix, unless authorized. After a lot is open and the Contractor gets approval to change plants, the previous lot will be closed and a new lot will be opened. The numbering for the lots produced at the new plant will start with No. 1. If allowed to switch back to the original or previous plant, the next lot from that plant will resume numbering sequentially from the last lot produced by that plant.

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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

GENERAL NOTES

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100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 6C

Control: N/A

County: BEXAR

Highway: FM 1346

--Item 401--

401-1 A shrinkage compensator is not required for when used for backfilling pipes. Strength of the Flowable Backfill will be verified by the District Laboratory. Field testing is not required, unless deemed necessary.

--Item 462--

462-2 The following structures shall be cast-in-place:
2'x2' South Collector direct traffic culvert.

--Item 502--

502-2 When advanced warning flashing arrow panels and/or changeable message sign is specified, have one standby unit in good condition at the job site. Standby time shall be considered subsidiary to the bid item.

502-3 Treat the pavement drop-offs as shown in the TCP.

502-4 After written notification, the time frame is provided on the Form 599 to provide properly maintained signs and barricades before considered in non-compliance. Failure to make corrections as noted may result in payment for this item being withheld.

502-5 There are traffic signals at the intersection of SL 1604, and FM 1346. Keep the signals in operation at all times.

502-6 Moving an existing sign to a temporary location is subsidiary to this Item. Installations with permanent supports at permanent locations will be paid for under the applicable bid item (s).

502-8 Notify the Engineer in writing 10 business days in advance of any temporary or permanent lane, ramp, connector, etc. closures/detours, restrictions to lane widths, alterations to vertical clearances, or modifications to radii. Any other modifications to the roadway that may adversely affect the mobility of oversized/overweight trucks also require 10 business days advance written notice to the Engineer. Unless shown in the TCP, no lane, ramp, connector, etc. closures are allowed during special events. At least one lane has to remain open at all times. Lane closures will not be allowed if this reporting requirement is not met.

502-8A For closures not listed in the TCP; the lane closures are limited to between the hours of 9:00 PM to 5:00 AM, and at least one lane has to remain open at all times.

502-9 Avoid placing stockpiles within the roadway's horizontal clear zone. If a stockpile is placed within the clear zone, address in accordance with the TMUTCD.

Control: N/A

County: BEXAR

Highway: FM 1346

502-10 Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets.

502-11 In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee available to respond on the project for emergencies and for taking corrective measures within 2 hours or within a reasonable time frame as specified by the Engineer.

502-13 If Nighttime work is required and work is not behind positive barrier then full TY 3 reflective gear is required to be worn by all workers, hard hat halos are required to be worn by the flaggers at flagging stations, TY III barricades are required to be spaced at 500 ft, and a mandatory night work meeting is required.

--Item 506—

506-1 An Inspector will perform a regularly scheduled SWP3 inspection every 7 calendar days.

--Item 512--

512-2 Portable traffic barrier manufactured after December 31, 2019 must have been successfully tested to the 2016 edition of MASH and will be manufactured in accordance with the Standard Sheets in the plans. Portable traffic barrier manufactured on or before this date, and successfully tested to NCHRP Report 350 or the 2009 edition of MASH may continue to be used throughout their normal service lives, but must be the same shape type as shown in the plans.

--Item 545--

See the Crash Cushion Summary Sheet.

--Item 585--

585-1B Ride quality requirements are waived.

--Item 644--

644-1 The wedge anchor system shown on State Standard Sheet SMD (TWT) is not allowed.

644-2 The set screw type for Triangular Slipbase Systems is not allowed. Use the following products for the Triangular Slipbase System.

Triangular Slip Base Systems
(For use with 10 BWG and Schedule 80 Round Posts)

Southern Plains Fabrication	SPF Triangular Slipbase Housing	Info@SouthernPlainsFabrication.com http://SouthernPlainsFabrication.com (806) 241-0060

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

GENERAL NOTES

SHEET 4 OF 5

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 6D

Control: N/A

County: BEXAR

Highway: FM 1346

Structural and Steel Products	Triangular Slipbase Breakaway Support	CustServ@s-steel.com http://s-steelcom (800) 782-5804

--Item 658--

658-1 CTB reflectors will not be paid for directly but will be considered subsidiary to the barrier.

--Item 662--

662-1 Raised reflective pavement markings are required when using work zone reflective pavement markings for lane lines as shown in the standards. The raised reflective pavement markings must be placed during the same operation for installation of the work zone reflective pavement markings and placed before the roadway is open to traffic. These raised reflective pavement markings will be subsidiary to work zone pavement markings.

--Item 666--

666-1 Use TY II material (vs. an acrylic or epoxy) as the sealer for the TY I markings, place the TY II a minimum of 14 calendar days (to provide adequate curing) before placing the TY I markings.

666-2 Provide the retroreflectometer testing data within the time specified in the specifications.

--Item 672--

672-1 Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.

--Item 677--

677-1 Obtain approval before using the mechanical method for the elimination of existing thermoplastic pavement markings.

--Item 6185--

6185-1 3 shadow vehicles with TMA will be required for this project. The TMA's will be measured and paid for by the DAY for each TMA/TA set up and operational on the worksite. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA's needed for the project.

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

GENERAL NOTES

SHEET 5 OF 5

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 6E

ITEM	DESCRIPTION	UNIT	QTY
0100-6002	PREPARING ROW	STA	19.72
0104-6009	REMOVING CONC (RIPRAP)	SY	20
0105-6041	REMOVING STAB BASE AND ASPH PAV(8")	SY	31
0110-6001	EXCAVATION (ROADWAY)	CY	2754
0132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	537
0160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	8378
0164-6035	DRILL SEEDING (PERM) (RURAL) (CLAY)	SY	8378
0164-6041	DRILL SEEDING (TEMP) (WARM)	SY	2095
0164-6043	DRILL SEEDING (TEMP) (COOL)	SY	2095
0168-6001	VEGETATIVE WATERING	MG	130.7
0247-6053	FL BS (CMP IN PLC)(TYD GR1&2)(FNAL POS)	CY	763
0260-6016	LIME (HYD, COM, OR QK(SLURRY))	TON	33
0260-6079	LIME TRT (SUBGRADE)(6")	SY	2718
0310-6009	PRIME COAT (MC-30)	GAL	284
0316-6238	AGGR(TY-PD GR-3 SAC-B)	CY	40
0316-6240	AGGR(TY-PD GR-4 SAC-B)	CY	72
0316-6419	(AC-15P, AC-20-5TR OR AC-20XP)	GAL	4466
0432-6001	RIPRAP (CONC)(4 IN)	CY	99
0460-6002	CMP (GAL STL 18 IN)	LF	64
0460-6010	CMP AR (GAL STL DES 3)	LF	27
0466-6078	HEADWALL (CH - FW - A - 30) (DES= 3)	EA	1
0467-6348	SET (TY II) (18 IN) (CMP) (6: 1) (P)	EA	2
0496-6004	REMOV STR (SET)	EA	2
0496-6006	REMOV STR (HEADWALL)	EA	1
0496-6007	REMOV STR (PIPE)	LF	32
0502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4
0506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	55
0506-6011	ROCK FILTER DAMS (REMOVE)	LF	55
0506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	112
0506-6024	CONSTRUCTION EXITS (REMOVE)	SY	112
0506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	122
0506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	122
0512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF	270
0512-6049	PORT CTB (REMOVE)(SGL SLP)(TY 1)	LF	270
0545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2
0545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	2
0644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1
0644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
0644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1
0644-6076	REMOVE SM RD SN SUP&AM	EA	1
0658-6048	INSTL OM ASSM (OM-2Z)(FLX)GND	EA	6
0666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	895
0666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	22
0666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	6
0666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	6
0666-6225	PAVEMENT SEALER 6"	LF	7966
0666-6226	PAVEMENT SEALER 8"	LF	895
0666-6230	PAVEMENT SEALER 24"	LF	22
0666-6231	PAVEMENT SEALER (ARROW)	EA	6
0666-6232	PAVEMENT SEALER (WORD)	EA	6
0666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	3078
0666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	4888
0672-6007	REFL PAV MRKR TY I-C	EA	45
0672-6009	REFL PAV MRKR TY II-A-A	EA	62
0678-6002	PAV SURF PREP FOR MRK (6")	LF	7966
0678-6004	PAV SURF PREP FOR MRK (8")	LF	895
0678-6008	PAV SURF PREP FOR MRK (24")	LF	22
0678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	6
0678-6016	PAV SURF PREP FOR MRK (WORD)	EA	6
3076-6001	D-GR HMA TY-B PG64-22	TON	68
3076-6040	D-GR HMA TY-D PG70-22	TON	311
3076-6066	TACK COAT	GAL	282
6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2
6185-6002	TMA (STATIONARY)	DAY	55

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

SUMMARY OF QUANTITIES

SHEET 1 OF 1

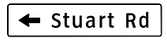
100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/25/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 7

Plotted on: 9/25/2023

Design Filename: P:\124\73\13\Design\Civil\Summaries\FM 1346\1247313summ01_1346.dgn

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
53	1-1	R1-1		36x36			10BWG	1	SA	P		
53	1-2	D1-1		18x84			10BWG	1	SA	T		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
4-16 8-16	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		8

18

DATE: 9/21/2023 5:53:39 PM
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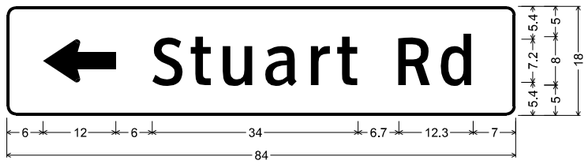
1-2



D1-1 8in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 12.0" X 7.1" 180°; "Stuart Rd", ClearviewHwy-3-W;

LEGEND

SYMBOL	DESCRIPTION
1-2	SMALL SIGN NUMBER SIGN # SHEET #

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

SIGN DETAIL SHEET

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 9

Plotted on: 9/21/2023
Design Filename: P:\124\73\13\Design\Civil\Traffic\FM 1346\1247313_FM1346_SignDetail.dgn

DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

1. GENERAL
(1) TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR AND PEDESTRIAN TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED/APPROVED BY THE ENGINEER.

(2) THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.

(3) DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC.

(4) THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING / UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND / OR PERMANENT LANE, RAMP, CONNECTOR, FRONTAGE, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.

(5) ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.

(6) TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.

(7) AT NO TIME SHALL TWO CONSECUTIVE INTERSECTING ROADWAYS BE CLOSED AT ONE TIME DURING CONSTRUCTION.

(8) AT NO TIME SHALL TWO CONSECUTIVE RAMPS BE CLOSED AT ONE TIME DURING CONSTRUCTION OR OVERLAY OPERATIONS.

(9) UNLESS OTHERWISE NOTED IN THE PLANS AND/OR AS DIRECTED BY THE ENGINEER, DAILY LANE CLOSURES SHALL BE LIMITED ACCORDING TO THE FOLLOWING RESTRICTIONS: NIGHTTIME : ASK AREA ENGINEER AND CONSTRUCTION ENGINEER. (WITH UNIFORMED OFF DUTY LAW ENFORCEMENT OFFICERS) WEEKEND CLOSURES WHEN APPROVED BY THE ENGINEER: ASK AREA ENGINEER AND CONSTRUCTION ENGINEER. NO LANE CLOSURES WILL BE PERMITTED FOR THE FOLLOWING DATES AND/OR SPECIAL EVENTS:

BETWEEN DECEMBER 15 AND JANUARY 1.
FIESTA WEEK AND TAX FREE WEEKEND. (BEXAR COUNTY ONLY)
WEDNESDAY BEFORE THANKSGIVING THRU THE SUNDAY AFTER THANKSGIVING
SATURDAY AND SUNDAY BEFORE MEMORIAL DAY AND LABOR DAY.
SATURDAY OR SUNDAY WHEN JULY 4 FALLS ON A FRIDAY OR MONDAY.
ELECTION DAYS (BEXAR COUNTY ONLY)
DURING MAJOR EVENTS AT THE AT&T CENTER (SPURS HOME GAMES, RODEO, CONCERTS, ETC.), ALAMODOME AND OR CONVENTION CENTER (BEXAR COUNTY ONLY)
EASTER WEEKEND APRIL 8 AND 9, 2023.

(10) REMOVAL AND DISPOSAL OF EXISTING ABANDONED UTILITIES (EITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION SHALL BE PERFORMED UNDER THE OVERALL PREPARE RIGHT-OF-WAY ITEM (ITEM 100).

(11) COORDINATE WITH ADJACENT PROJECTS.

(12) COVER PERMANENT SIGNS IF NOT USED. THIS IS SUBSIDIARY TO ITEM 502.

(13) EXCAVATION WITHIN 5 FEET OF AN EXISTING CPS ENERGY POLE WILL REQUIRE POLE BRACING. CONTACT CPS ENERGY UTILTY COORDINATION TO REQUEST POLE BRACING (JOHN OFFER, JEOFFER@CPSENERGY.COM). THE ESTIMATED DURATION FOR THE POLE BRACING PROCESS IS APPROXIMATELY 6 TO 8 WEEKS.

(14) COORDINATE WITH THE CITY OF SAN ANTONIO OR TXDOT FOR SIGNAL TIMING REVISIONS, AS NECESSARY.

(15) CONTRACTOR TO COVER EXISTING RUMBLE STRIPS IN CONFLICT WITH TRAFFIC DURING PHASING/CONSTRUCTION.

2. SEQUENCE OF WORK
(1) THIS PROJECT WILL BE CONSTRUCTED IN 3 PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DAILY LANE CLOSURES WILL BE USED IN ACCORDANCE WITH STATE TCP STANDARDS. DROP OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY, AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE STREETS.

(2) PREPARING ROW / REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURING, AS PER THE PHASES NOTED BELOW.

(3) PLANING, SURFACE TREATMENTS AND OVERLAYS SHALL BE PERFORMED IN THE DIRECTION OF TRAFFIC. BEGIN SURFACE CONSTRUCTION ON HIGH SIDE OF ROAD TO AVOID WATER PONDING ISSUES.

(4) A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:

PHASE I

THE INTENT OF THIS PHASE IS TO CONSTRUCT ALL PAVEMENT WIDENING ON THE WESTBOUND SHOULDER OF FM 1346, AND CONSTRUCT ALL DRAINAGE STRUCTURES AND GRADING.

a. INSTALL TEMPORARY EROSION CONTROL MEASURES, ADVANCED AND WORK ZONE SIGNAGE. INSTALL CHANNELIZING DEVICES AND LPCB, CLOSE AND MAINTAIN TRAFFIC AS SHOWN IN THE PLANS.

b. CONSTRUCT CULVERT A EXTENSION.

c. CONSTRUCT PAVEMENT WIDENING, SOUTH COLLECTOR, CONCRETE FLUME, AND ALL REMAINING GRADING.

d. PLACE PERMANENT SEEDING.

PHASE II

THE INTENT OF THIS PHASE IS TO PLACE SEAL COAT TO EXISTING AND PROPOSED PAVEMENT, AND INSTALL PERMANENT SIGNING AND PAVEMENT MARKINGS.

a. USING MOBILE OPERATIONS, APPLY SEAL COAT, AND INSTALL SHORT TERM TABS IN THE PERMANENT TRAFFIC CONFIGUIRATION AS SHOWN IN THE PLANS.

b. INSTALL PROPOSED SIGNING AND PAVEMENT MARKINGS.

PHASE III

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE DRIVEWAY ADJACENT TO SL 1604 AND ASSOCIATED DRIVEWAY CULVERT.

a. CLOSE 1604 SBML SHOULDER PER TCP (2-1)-18, INSTALL DRIVEWAY CULVERT AND CONSTRUCT DRIVEWAY.

b. PERFORM FINAL CLEAN UP OPERATIONS.

3. SAFETY
(1) THE CONTRACTOR WILL PROVIDE, CONSTRUCT AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS. ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS SHALL BE IN CONFORMANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" AND THE "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS."

(2) BARRICADES AND WARNING SIGNS SHALL BE PLACED AS INDICATED ON THE PLANS. THIS SHALL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE ENGINEER OR AS DIRECTED BY FIELD CONDITIONS, TO PROVIDE FOR THE PASSAGE OF TRAFFIC IN SAFETY AT ALL TIMES.

(3) THE CONTRACTOR SHALL PROVIDE AND MAINTAIN FLAGGERS AS DIRECTED/APPROVED BY THE ENGINEER, AT SUCH POINTS, AND FOR SUCH PERIODS OF TIME AS MAY BE REQUIRED, TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC AND THE CONTRACTOR'S PERSONNEL.

(4) THE CONTRACTOR SHALL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER MATERIALS DURING HAULING OPERATIONS. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, THEY SHALL CEASE ALL CONSTRUCTION OPERATIONS, WHEN DIRECTED BY THE ENGINEER, TO CLEAN THE ROADWAY TO THE SATISFACTION OF THE ENGINEER.

4. HAULING EQUIPMENT
(1) THE USE OF RUBBER-TIRED EQUIPMENT WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVEMENTED SURFACES. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS, ON OR ACROSS PAVEMENT. THEY SHALL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED / APPROVED BY THE ENGINEER.

(2) THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR WILL BE REQUIRED TO CONDUCT THEIR HAULING OPERATIONS IN A MANNER SUCH THAT VEHICLES WILL NOT HAUL OVER PREVIOUSLY RECOMPACTED SUBGRADE OR COMPACTED BASE MATERIAL, EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

5. FINAL CLEAN UP
UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT AND SIGHTLY CONDITION.

6. PAYMENT
ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS AND TRAFFIC HANDLING. ALL EROSION AND SEDIMENT CONTROL DEVICES WILL BE PAID FOR UNDER ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS. ALL WORK ZONE PAVEMENT MARKINGS WILL BE PAID FOR UNDER ITEM 662 WORK ZONE PAVEMENT MARKINGS. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

DESIGN

STATE OF TEXAS
STEVEN J. TATE
131443
LICENSED
PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS
DAN THOMA
98622
LICENSED
PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

TRAFFIC CONTROL PLAN NARRATIVE

SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 10

Plotted on: 9/21/2023

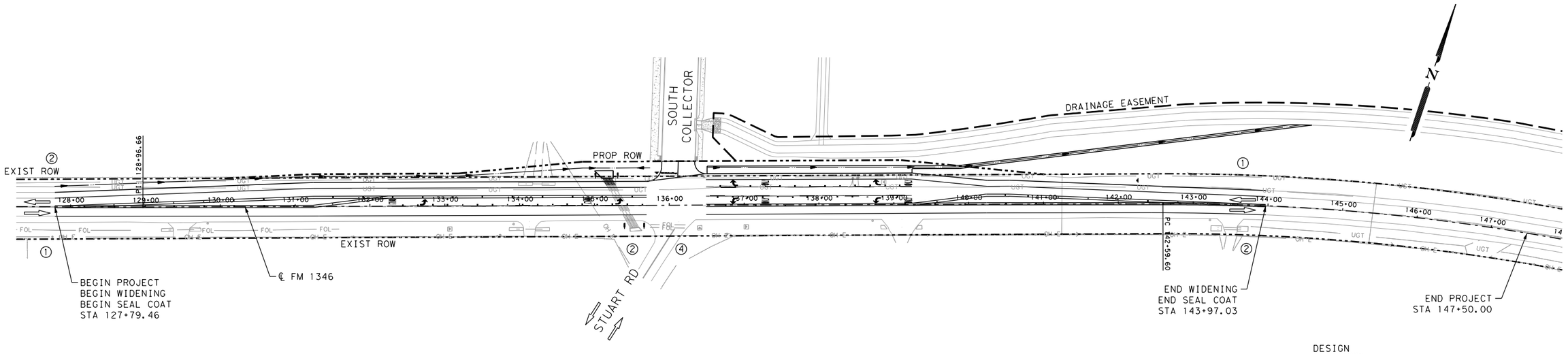
Design Filename: P:\124\73\13\Design\Civil\TCP\FM 1346\1247313_FM1346_TCP_NARR.dgn

Plotted on: 9/21/2023

Design Filename: P:\124\73\13\Design\Civil\TCP\FM 1346\1247313_FM1346_TCP_SCH_BARR.dgn

TRAFFIC CONTROL PLAN ITEMS

LOCATION	PROJECT LIMIT SIGNING										PHASE SIGNING				
	ROAD WORK AHEAD	END ROAD WORK	ROAD WORK ⇦ NEXT X MILES NEXT X MILES ⇨	BEGIN ROAD WORK NEXT X MILES	NAME ADDRESS CITY STATE CONTRACTOR	BEGIN WORK ZONE	STAY ALERT TALK OR TEXT LATER	OBEY WARNING SIGNS STATE LAW	TRAFFIC FINES DOUBLE	WHEN WORKERS ARE PRESENT	SPEED LIMIT XX	XXX FT	ROAD WORK 1/2 MILE	RIGHT SHOULDER CLOSED	SHOULDER DROP OFF
	CW20-1D	G20-2bT	G20-1aT	G20-5T	G20-6T	G20-9TP	G20-10T	R20-3T	R20-5T	R20-5aTP	R2-1	CW16-3aP	CW20-1E	CW21-5a L OR R	CW8-9a
①	X			X	X	X	X	X	X	X					
②		X													
③	X		X								X	X	X	X	X
④	X		X												



LOCATION	P.C.M.S.	TY III BARRICADE	BARRELS
①	X		
②			
③		X	X
④			

PHASE DEVICES

GENERAL NOTES:

LOCATION NO. 1 TO BE USED AT BEGINNING OF THE PROJECT.

LOCATION NO. 2 TO BE USED AT THE END OF THE PROJECT.

LOCATION NO. 3 TO BE USED THROUGHOUT THE COURSE OF THE PROJECT AS DIRECTED BY THE ENGINEER.

LOCATION NO. 4 TO BE USED AT SIDE STREETS.

NOTE:

1. BARRICADES AND WARNING SIGNS ON THIS SHEET ARE THE MINIMUM CONSTRUCTION ZONE, SIGNING. ADDITIONAL BARRICADES, WARNING SIGNS, ARROW PANELS, CONES, ETC. REQUIRED IN ACCORDANCE WITH CURRENT BC STANDARDS AND THE TEXAS MUTCD MAY BE REQUIRED IN AREAS OF ACTUAL CONSTRUCTION.
2. A DISTANCE PLAQUE IN FEET OR MILES MAY BE REQUIRED TO USE IN CONJUNCTION WITH WARNING SIGNS.
3. CONTRACTOR TO FOLLOW BARRICADE AND CONSTRUCTION, AND TCP STANDARDS.

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000

TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

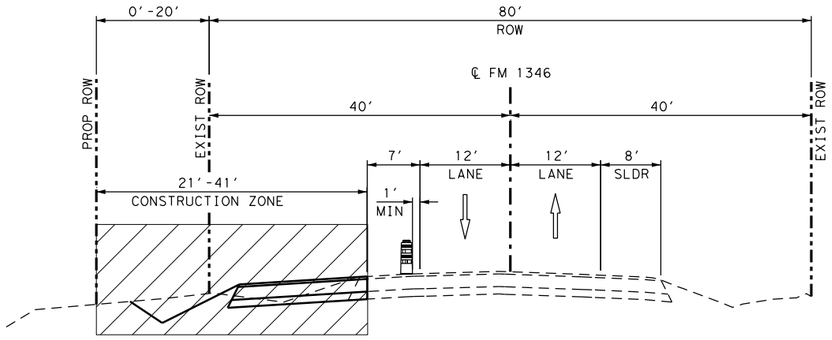
LUENSMANN PROPERTIES

FM 1346

SCHEDULE OF BARRICADES AND ADVANCE WARNING SIGNS

SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 11

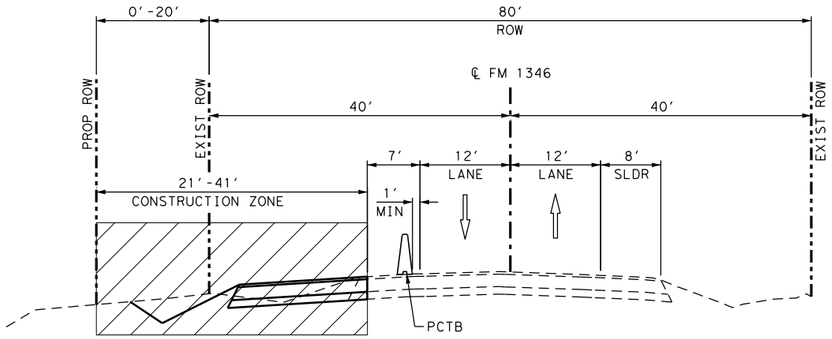


TRAFFIC CONTROL PLAN TYPICAL SECTION

PHASE I

NTS

BEGIN PROJECT TO STA 134+73

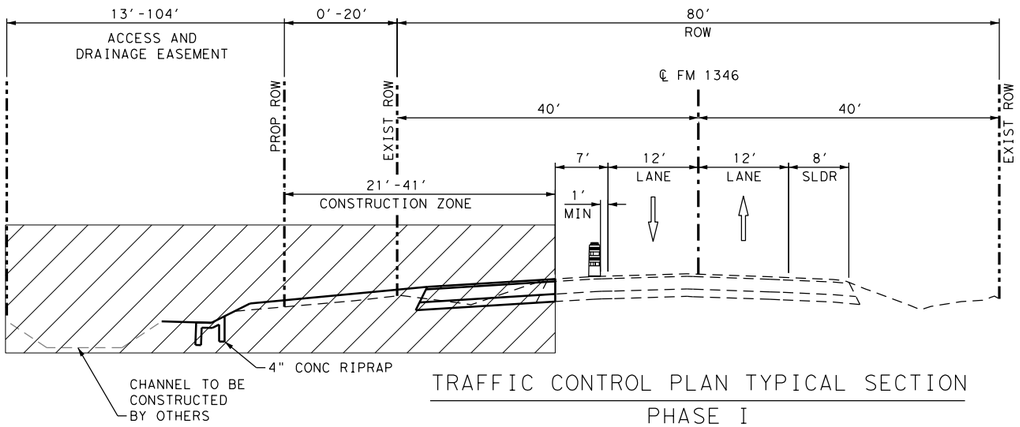


TRAFFIC CONTROL PLAN TYPICAL SECTION

PHASE I

NTS

STA 134+73 TO STA 137+43



TRAFFIC CONTROL PLAN TYPICAL SECTION

PHASE I

NTS

STA 137+43 TO END PROJECT

DESIGN

STATE OF TEXAS
STEVEN J. TATE
131443
LICENSED
PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS
DAN THOMA
98622
LICENSED
PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

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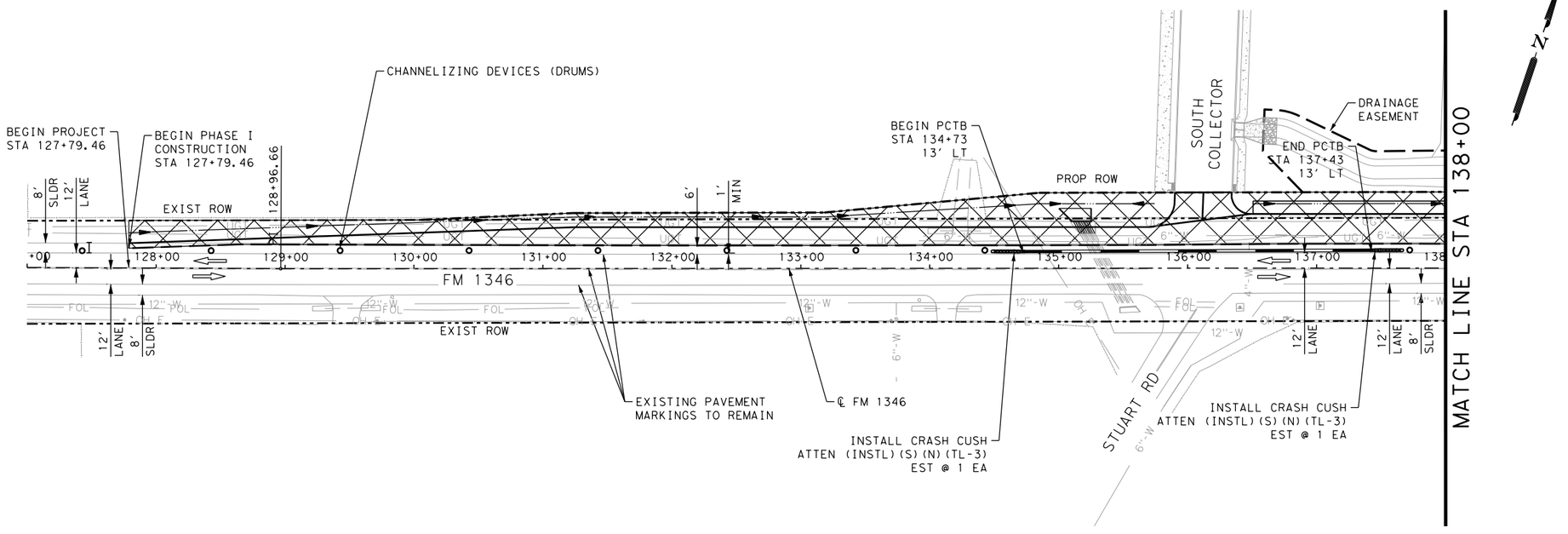
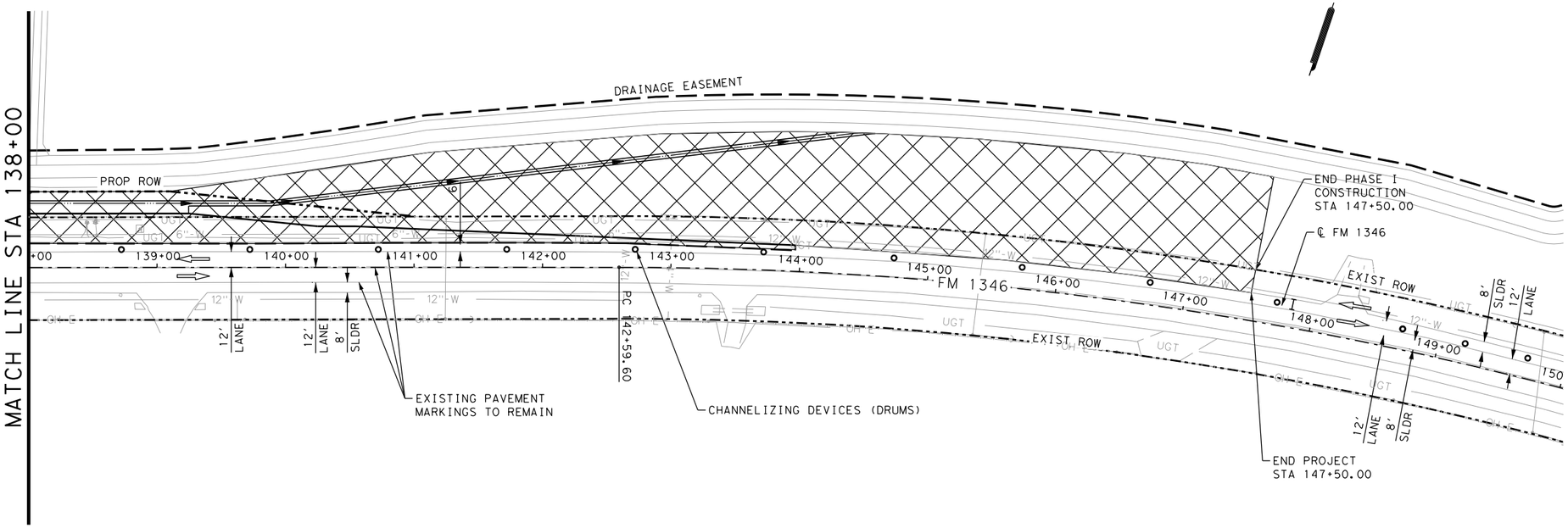
FM 1346

TCP TYPICAL SECTIONS PHASE I

SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 12





LEGEND

- CONSTRUCTION AREA
- TYPE III BARRICADE
- PLASTIC DRUMS
- SIGN
- TRAFFIC FLOW ARROWS

NOTES:

1. FOR ADDITIONAL DETAILS SEE TXDOT BC, WZ AND TCP STANDARD SHEETS.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK, IE. FADED.
3. A 3:1 TRAVERSABLE SAFETY SLOPE MUST BE ADDED TO ALL DROP OFFS GREATER THAN 2" IN AREAS NOT PROTECTED BY BARRIER AT THE END OF THE WORK DAY.

DESIGN

STATE OF TEXAS — STEVEN J. TATE — 131443 — LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS — DAN THOMA — 98622 — LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

0 50 100 150

SCALE: 1"= 100'

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

TRAFFIC CONTROL PLAN PHASE I

SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 13

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13				FM 1346
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	SAT	BEXAR		14

DATE: 9/21/2023 5:53:49 PM
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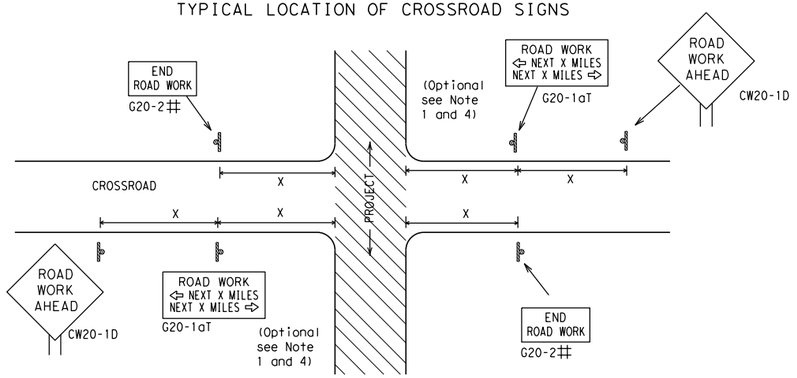
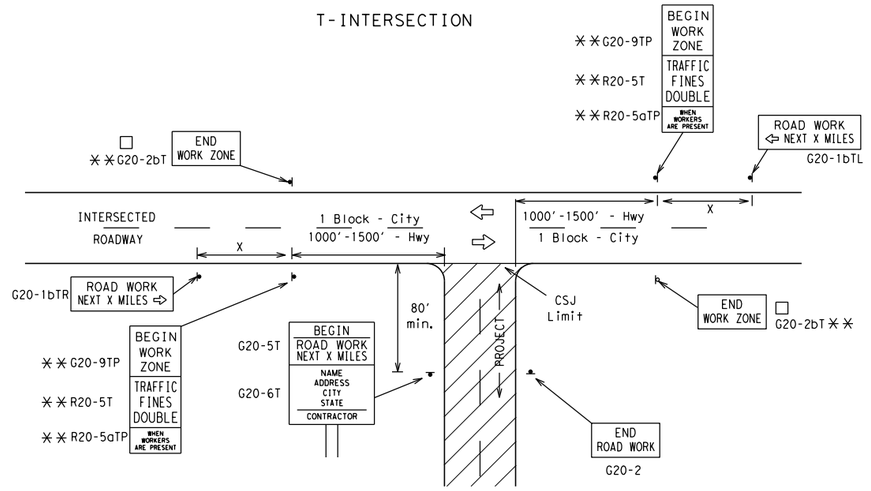
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
✳	✳[3]

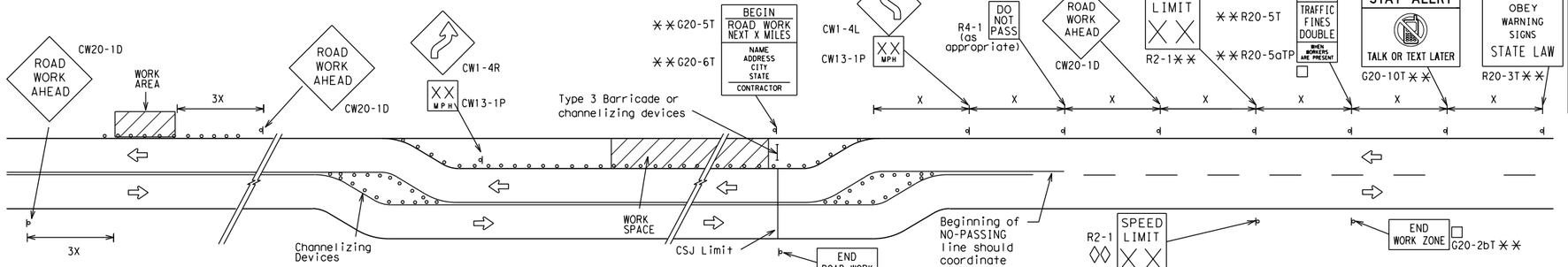
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

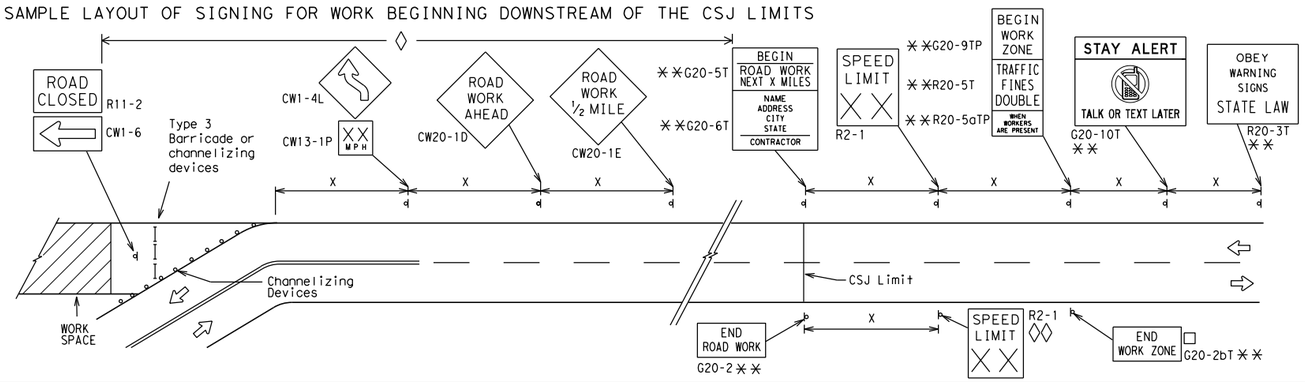
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

✳✳ CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◊◊ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND	
⊢⊣	Type 3 Barricade
○ ○ ○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		15

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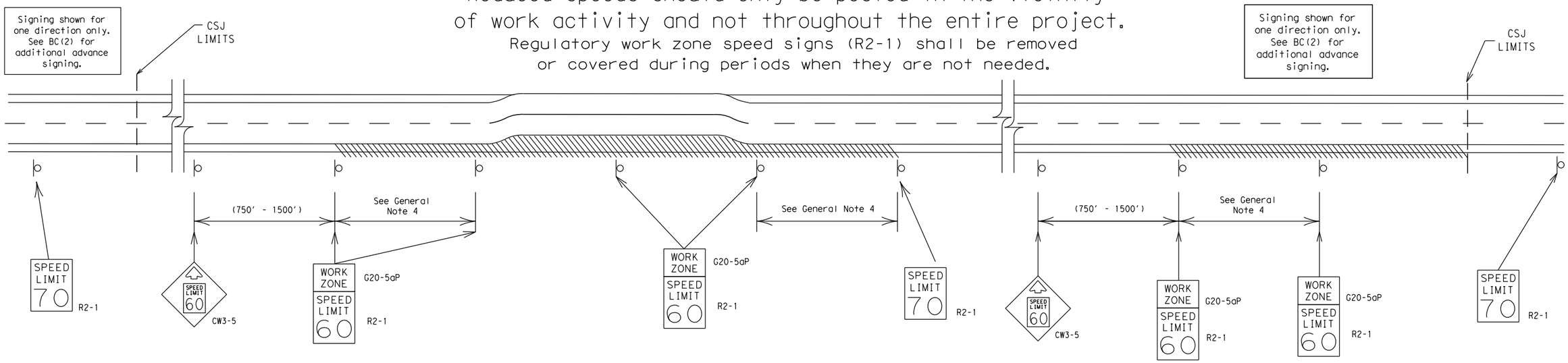
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		16

DATE: 9/21/2023 5:53:49 PM
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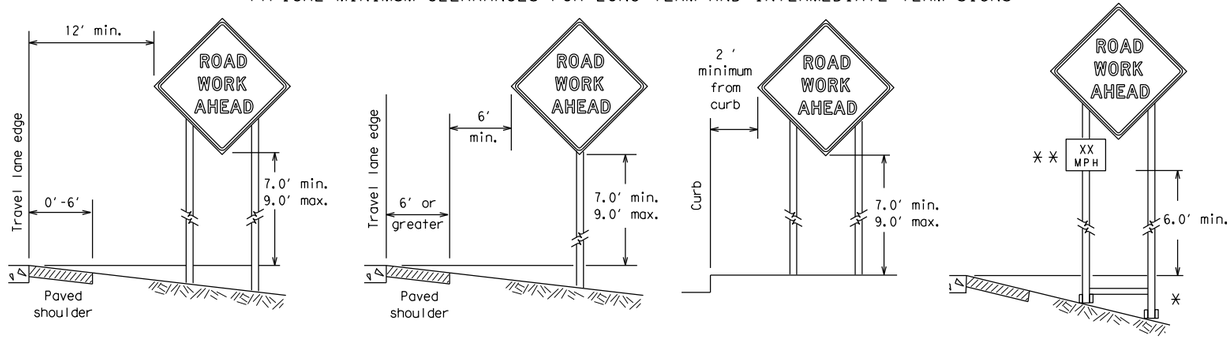
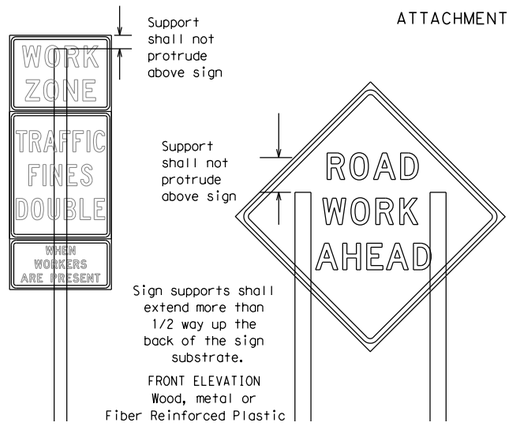
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

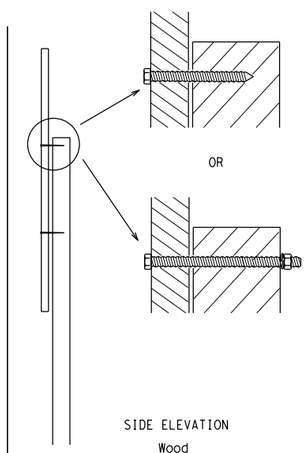


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS





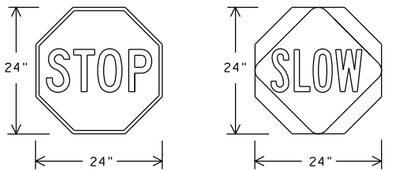
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflectorized when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6′ to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets.The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height,the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		17

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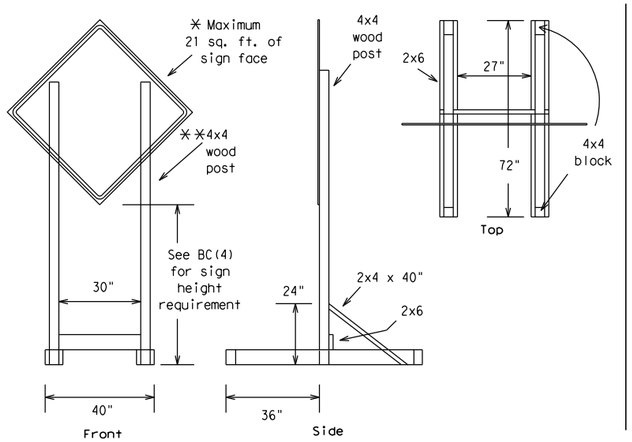
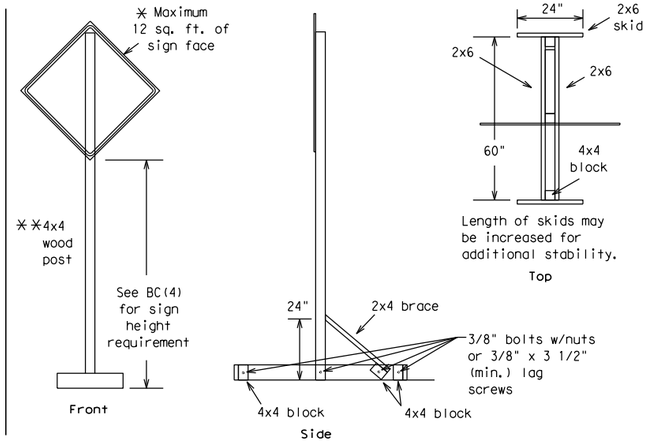
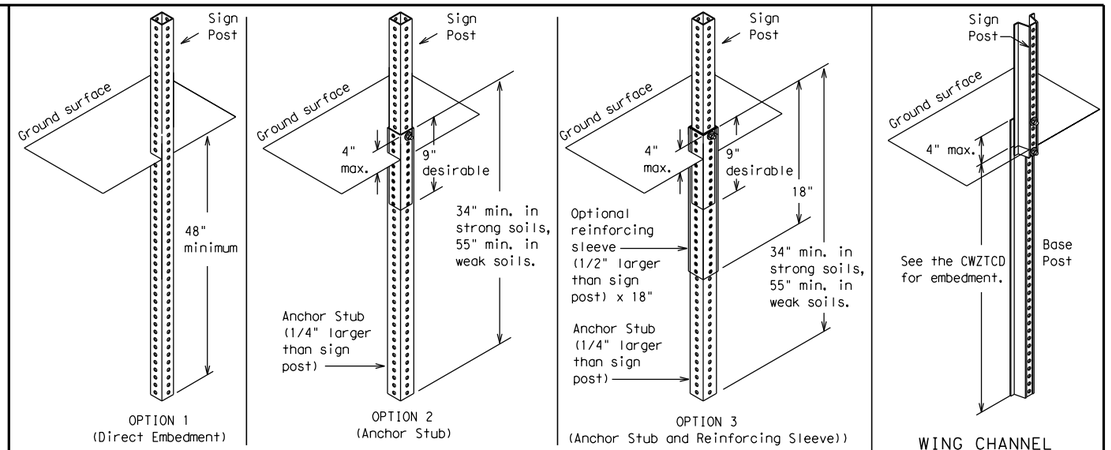




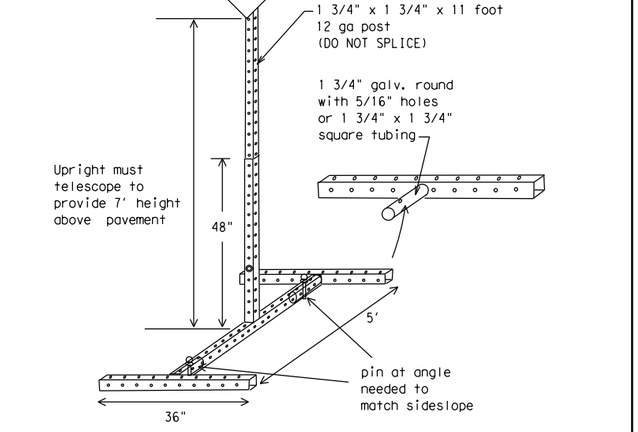
SKID MOUNTED WOOD SIGN SUPPORTS

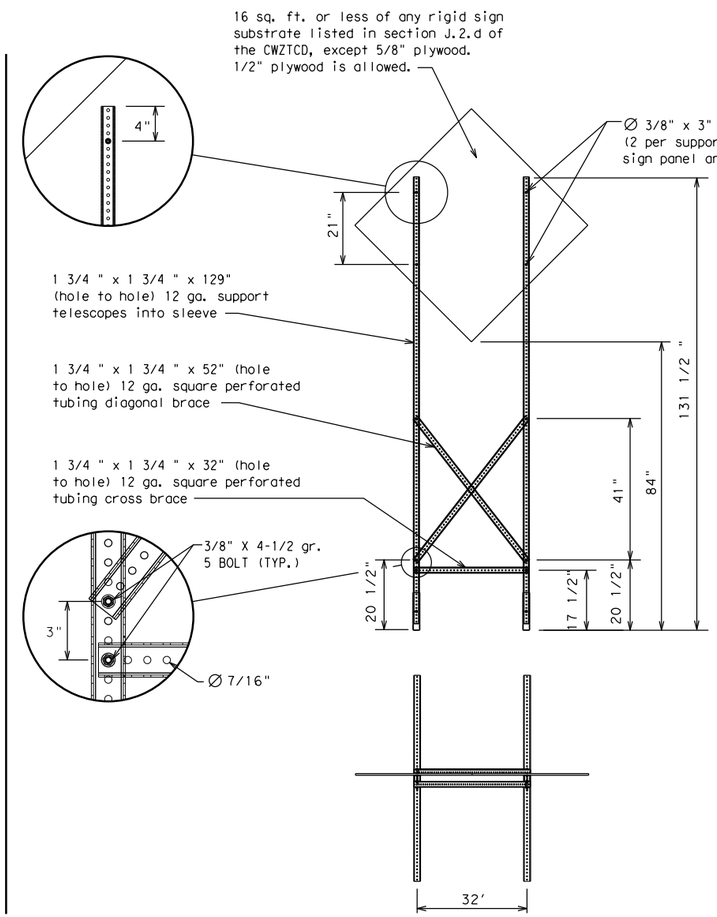
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

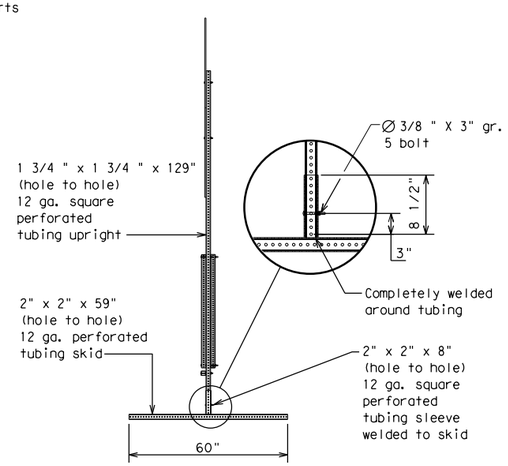


GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

* See BC(4) for definition of "Work Duration."

** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

☐ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	BEXAR		18

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation # IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE *

Location List

- AT FM XXXX
- BEFORE RAILROAD CROSSING
- NEXT X MILES
- PAST US XXX EXIT
- XXXXXXX TO XXXXXXX
- US XXX TO FM XXXX

Warning List

- SPEED LIMIT XX MPH
- MAXIMUM SPEED XX MPH
- MINIMUM SPEED XX MPH
- ADVISORY SPEED XX MPH
- RIGHT LANE EXIT
- USE CAUTION
- DRIVE SAFELY
- DRIVE WITH CARE

** Advance Notice List

- TUE-FRI XX AM- X PM
- APR XX-XX X PM-X AM
- BEGINS MONDAY
- BEGINS MAY XX
- MAY X-X XX PM - XX AM
- NEXT FRI-SUN
- XX AM TO XX PM
- NEXT TUE AUG XX
- TONIGHT XX PM- XX AM

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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DATE: 9/21/2023 5:53:51 PM
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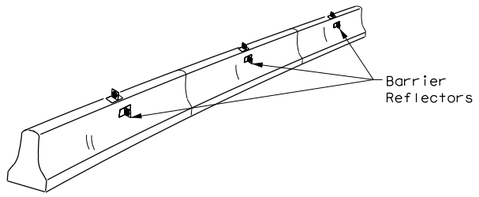
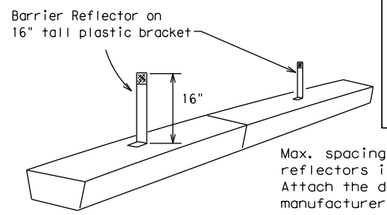
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.

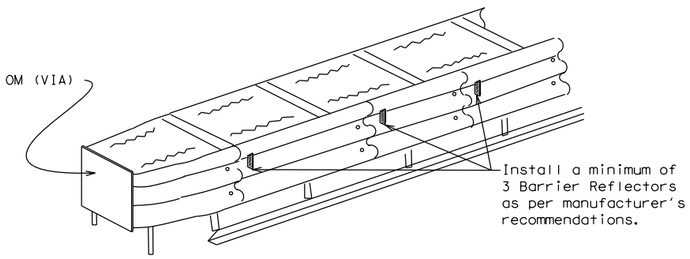


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

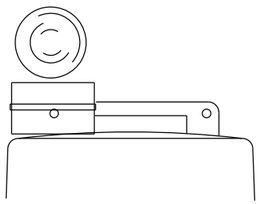


DELINEATION OF END TREATMENTS

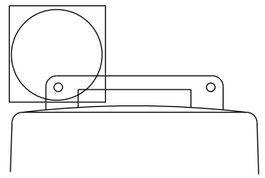
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

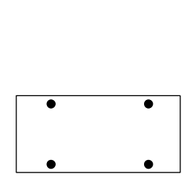
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

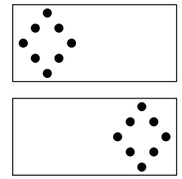
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:

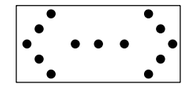


4 CORNER CAUTION

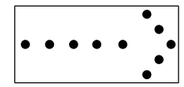
OR



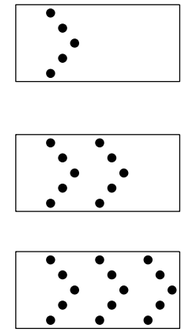
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



RIGHT/LEFT ARROW
(right arrow shown; left is similar)



RIGHT/LEFT SEQUENTIAL CHEVRON
(right chevron shown; left is similar)

5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
9-07 8-14	DIST	COUNTY		SHEET NO.
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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

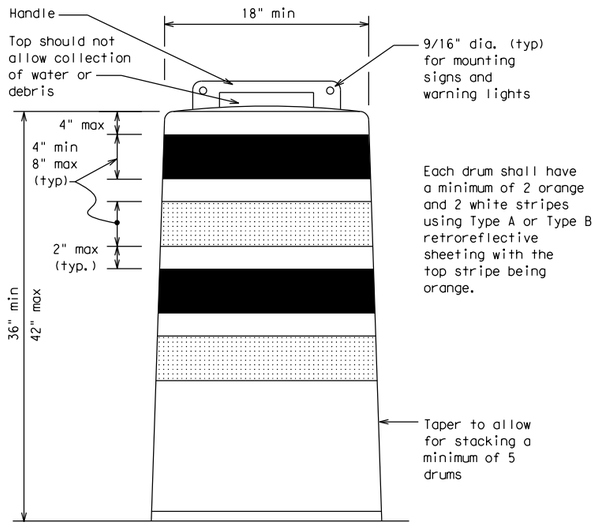
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

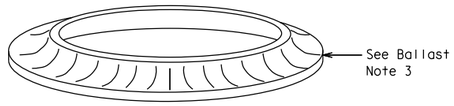
RETROREFLECTIVE SHEETING

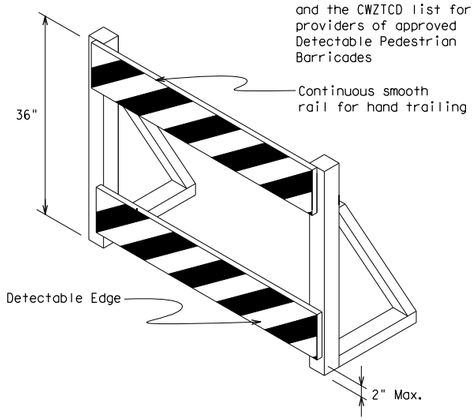
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

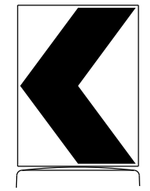




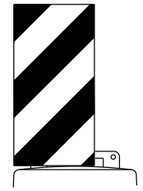


DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

.

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
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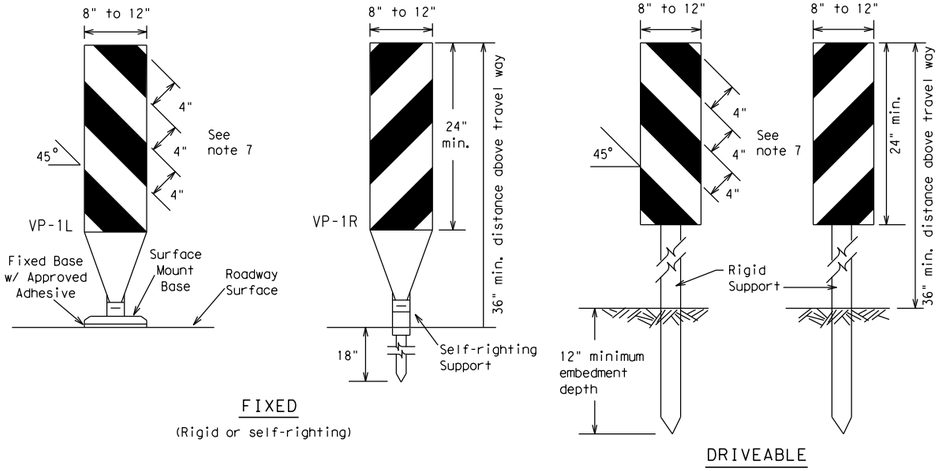
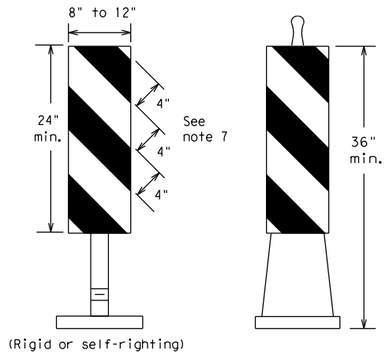


FIXED
(Rigid or self-righting)

DRIVEABLE

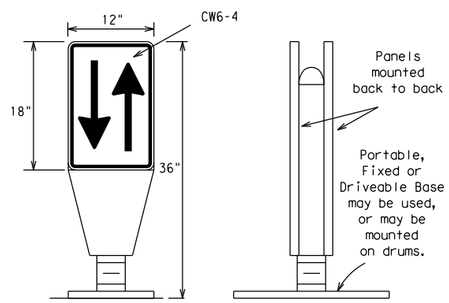


(Rigid or self-righting)

PORTABLE

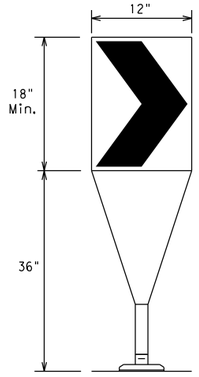
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

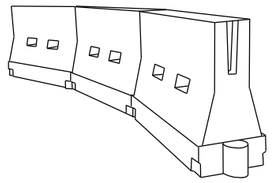
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



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

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 approaching 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 nonreflective legend. Sheeting for the chevron shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

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
30	$L = \frac{WS^2}{60}$	150′	165′	180′	30′	60′
35		205′	225′	245′	35′	70′
40		265′	295′	320′	40′	80′
45	L = WS	450′	495′	540′	45′	90′
50		500′	550′	600′	50′	100′
55		550′	605′	660′	55′	110′
60		600′	660′	720′	60′	120′
65		650′	715′	780′	65′	130′
70		700′	770′	840′	70′	140′
75		750′	825′	900′	75′	150′
80		800′	880′	960′	80′	160′

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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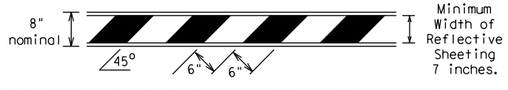
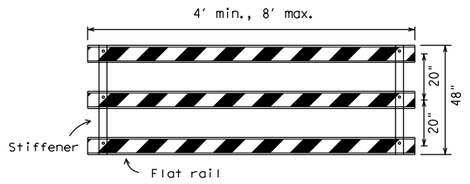
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



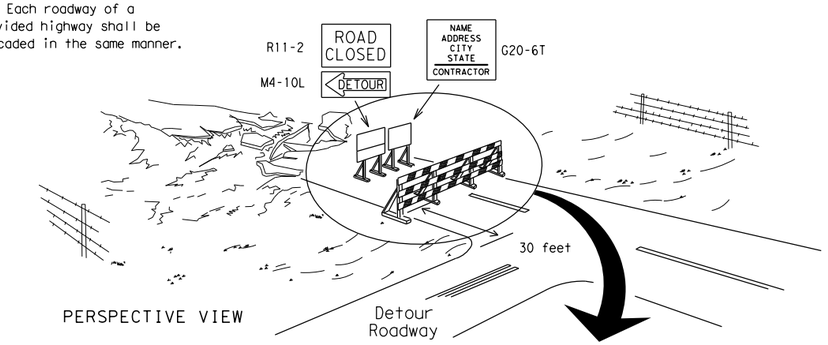
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

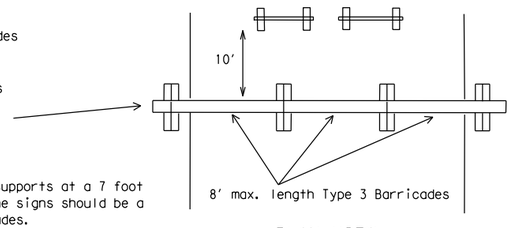
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

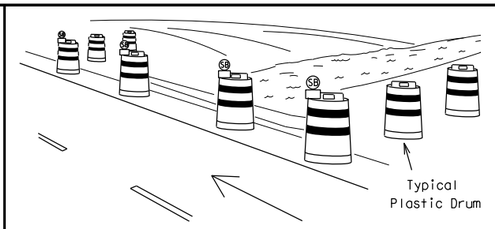
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

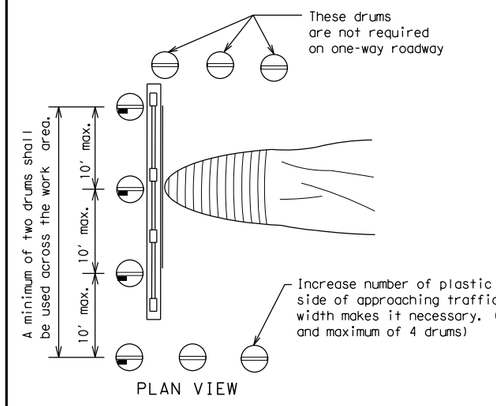
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

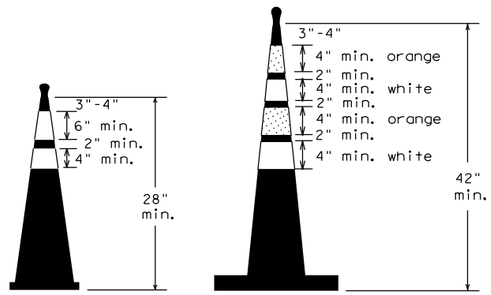
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



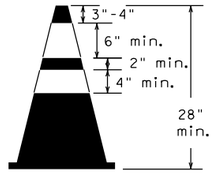
PLAN VIEW

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

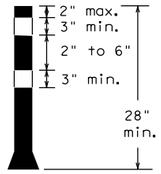
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

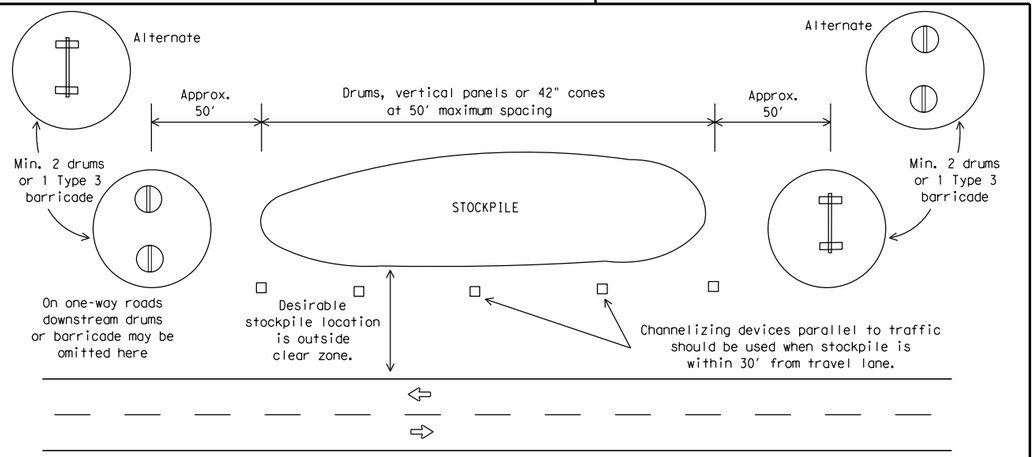


Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

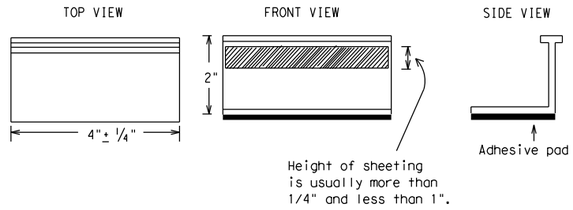
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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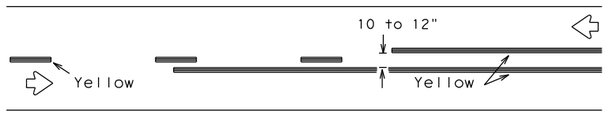
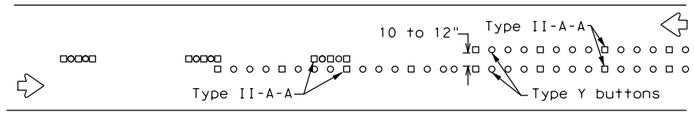
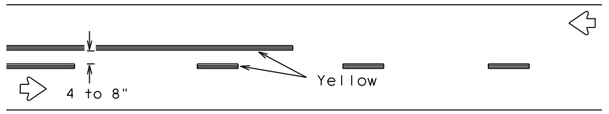
PAVEMENT MARKING PATTERNS



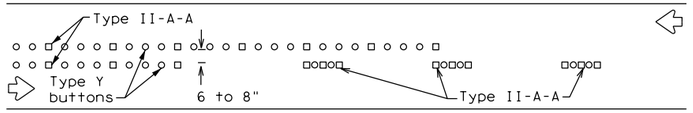
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



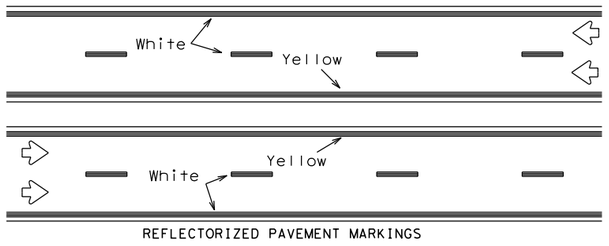
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



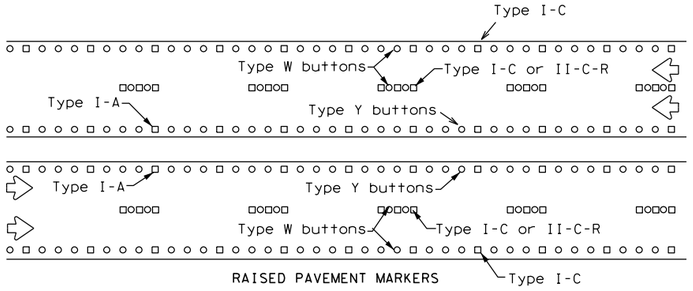
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



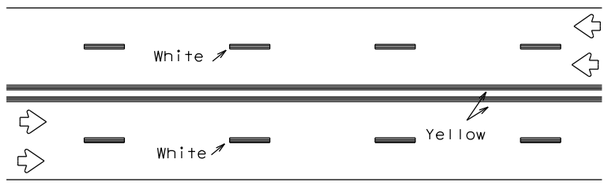
REFLECTORIZED PAVEMENT MARKINGS



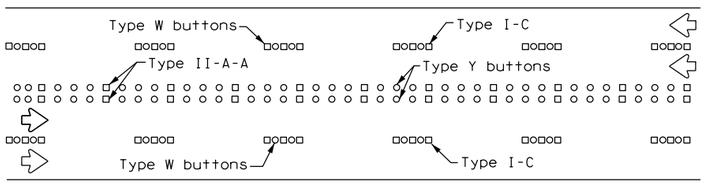
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



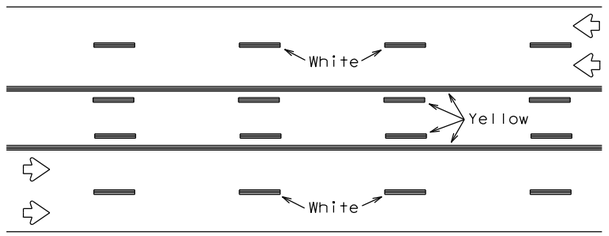
REFLECTORIZED PAVEMENT MARKINGS



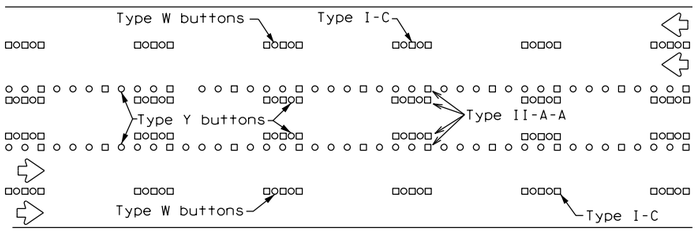
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

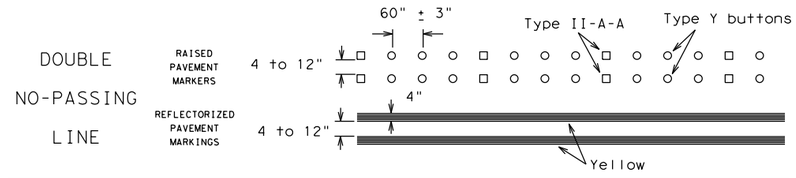
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

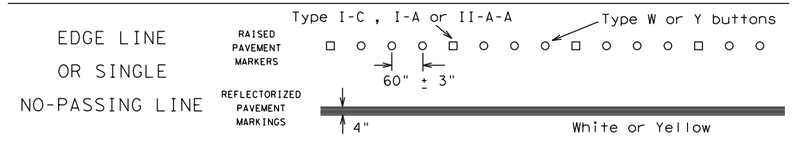
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

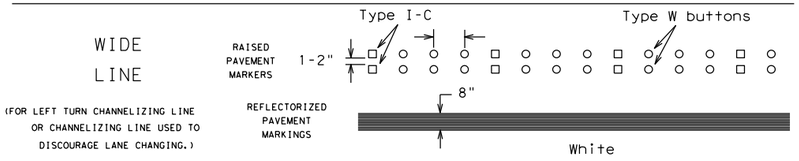


EDGE LINE OR SINGLE NO-PASSING LINE



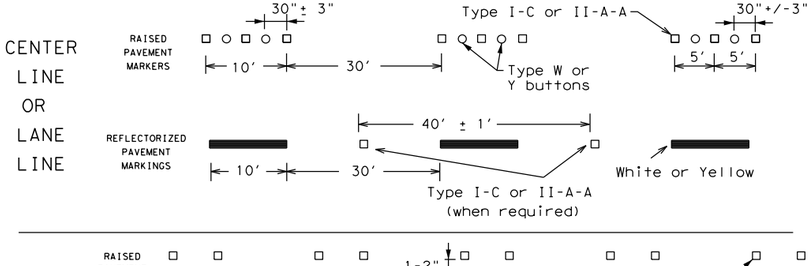
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

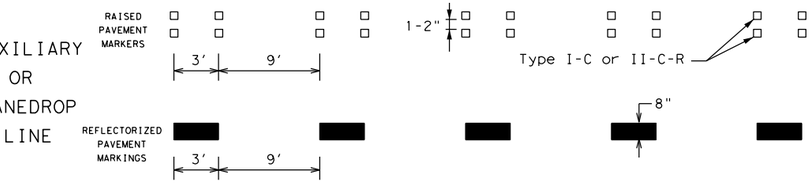


BROKEN LINES

CENTER LINE OR LANE LINE

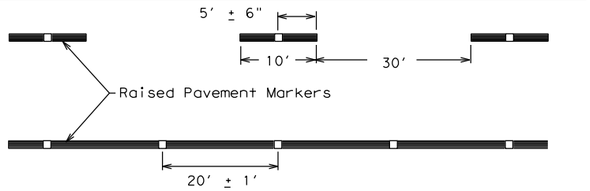


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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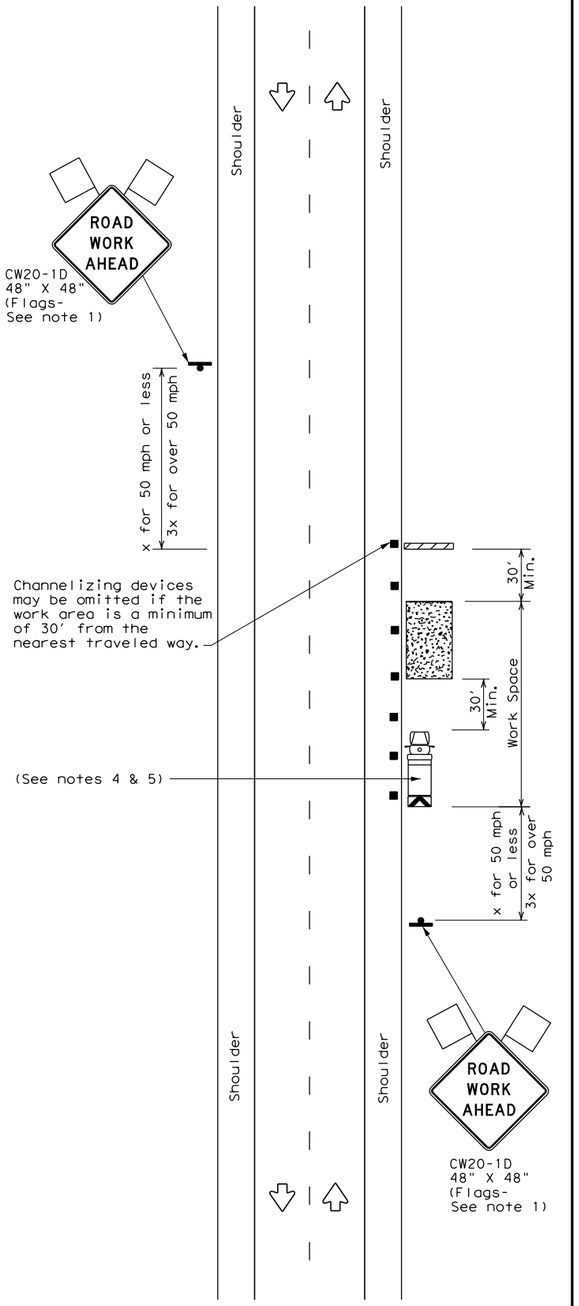
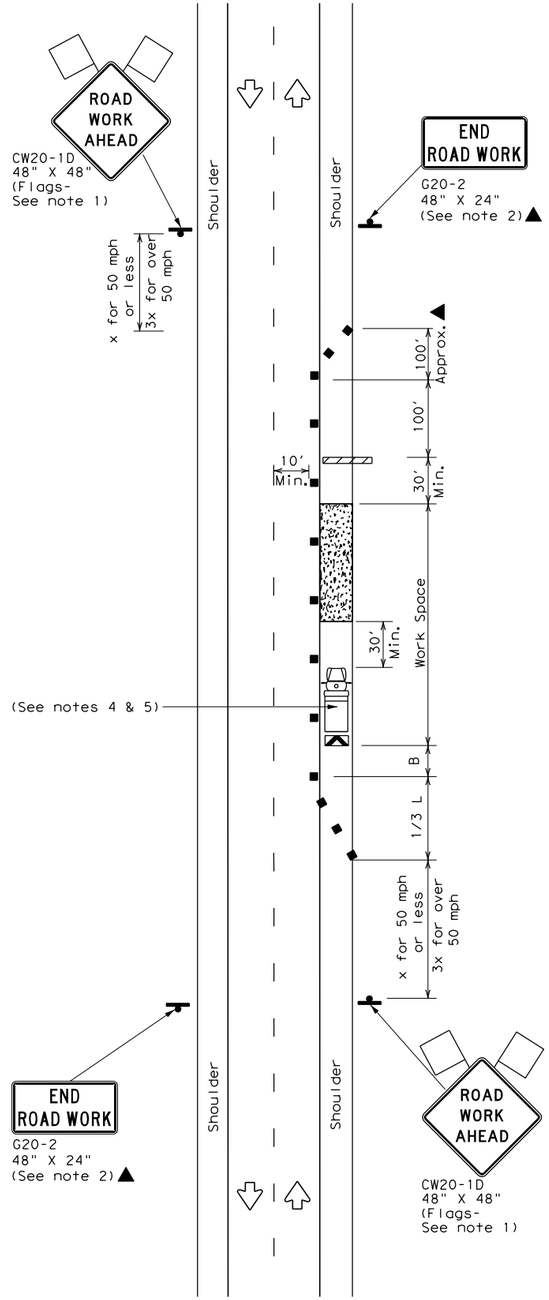


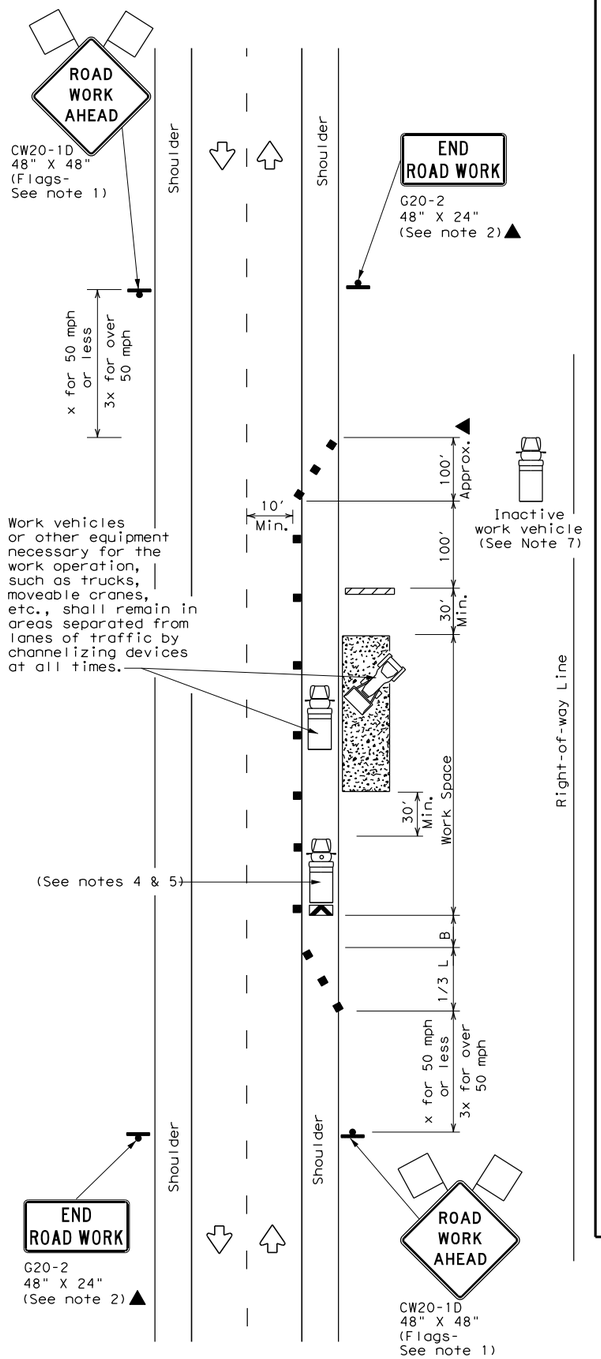
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

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)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	SAT	BEXAR		26
1-97 2-18				

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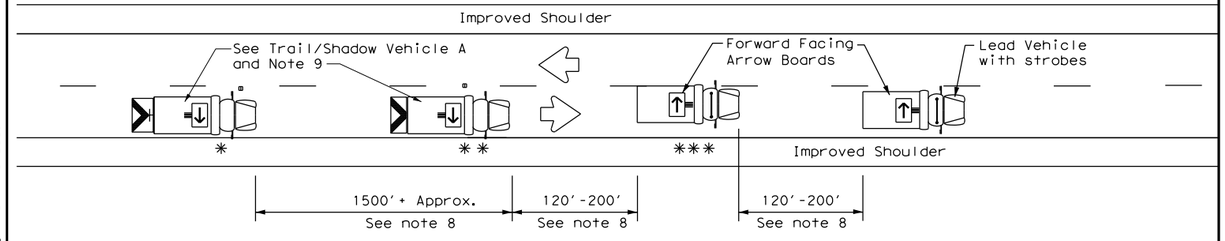
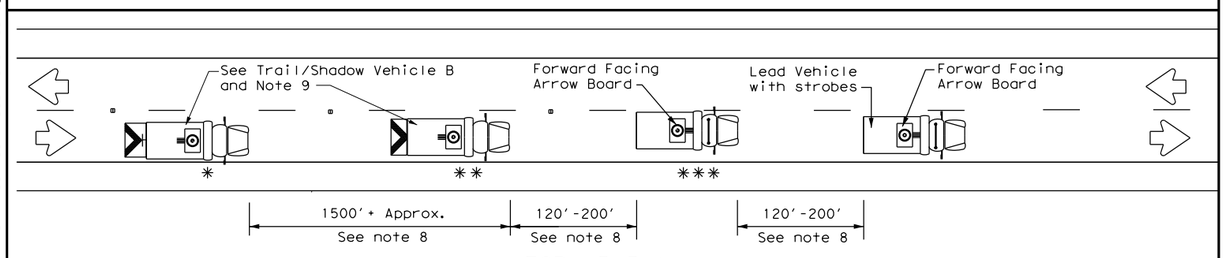


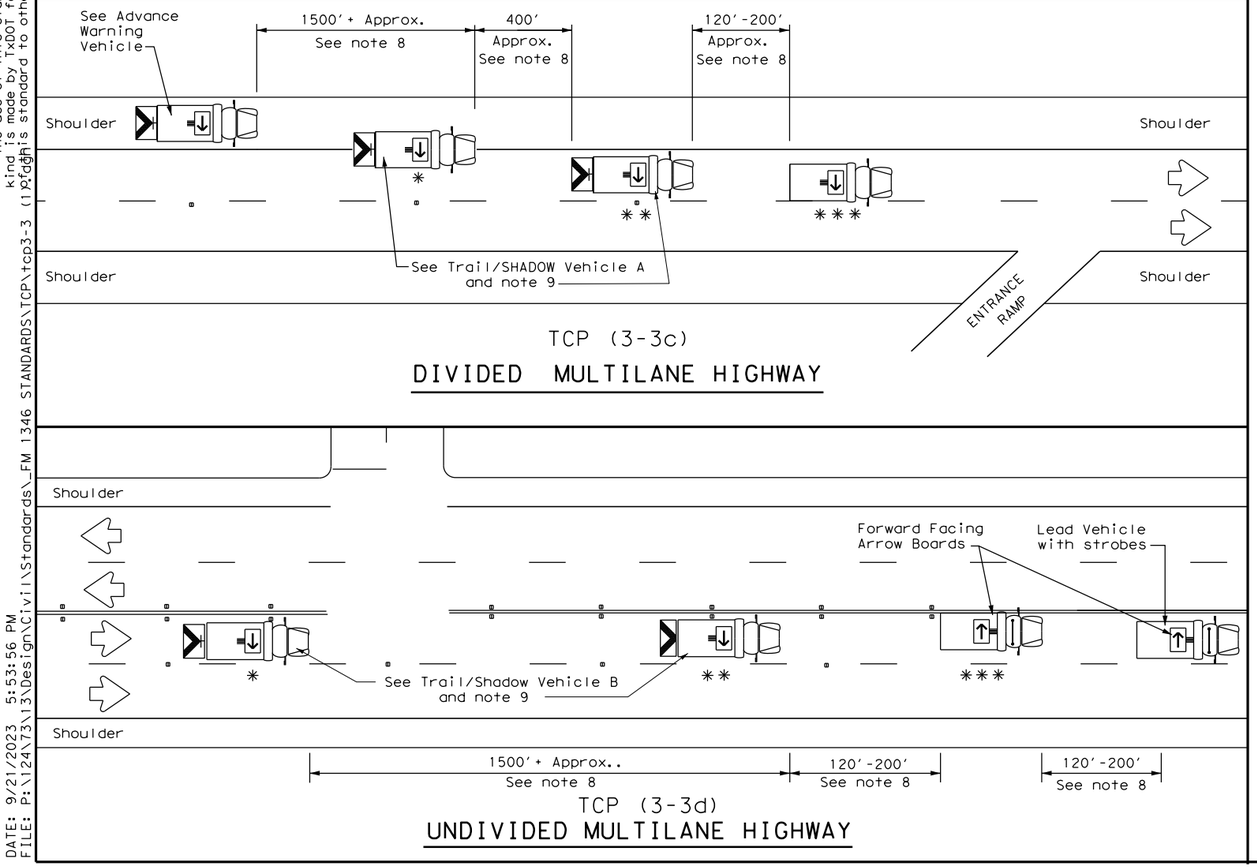
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS (WORK ON TRAVEL LANE)



TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)

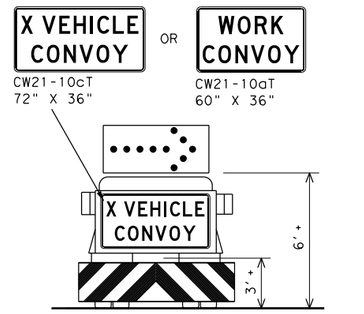


TCP (3-3c)

DIVIDED MULTILANE HIGHWAY

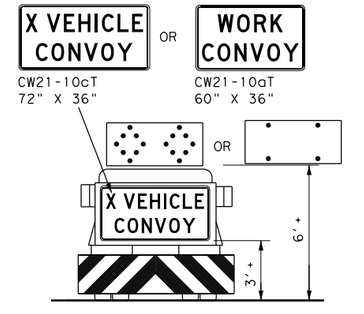
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



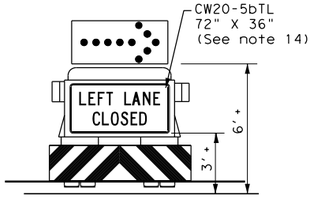
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

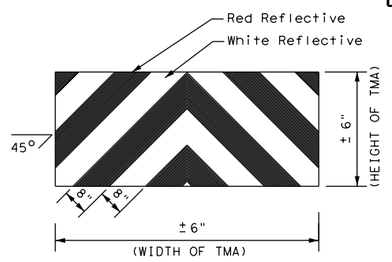


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
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8-95 7-13				
1-97 7-14	SAT	BEXAR		27

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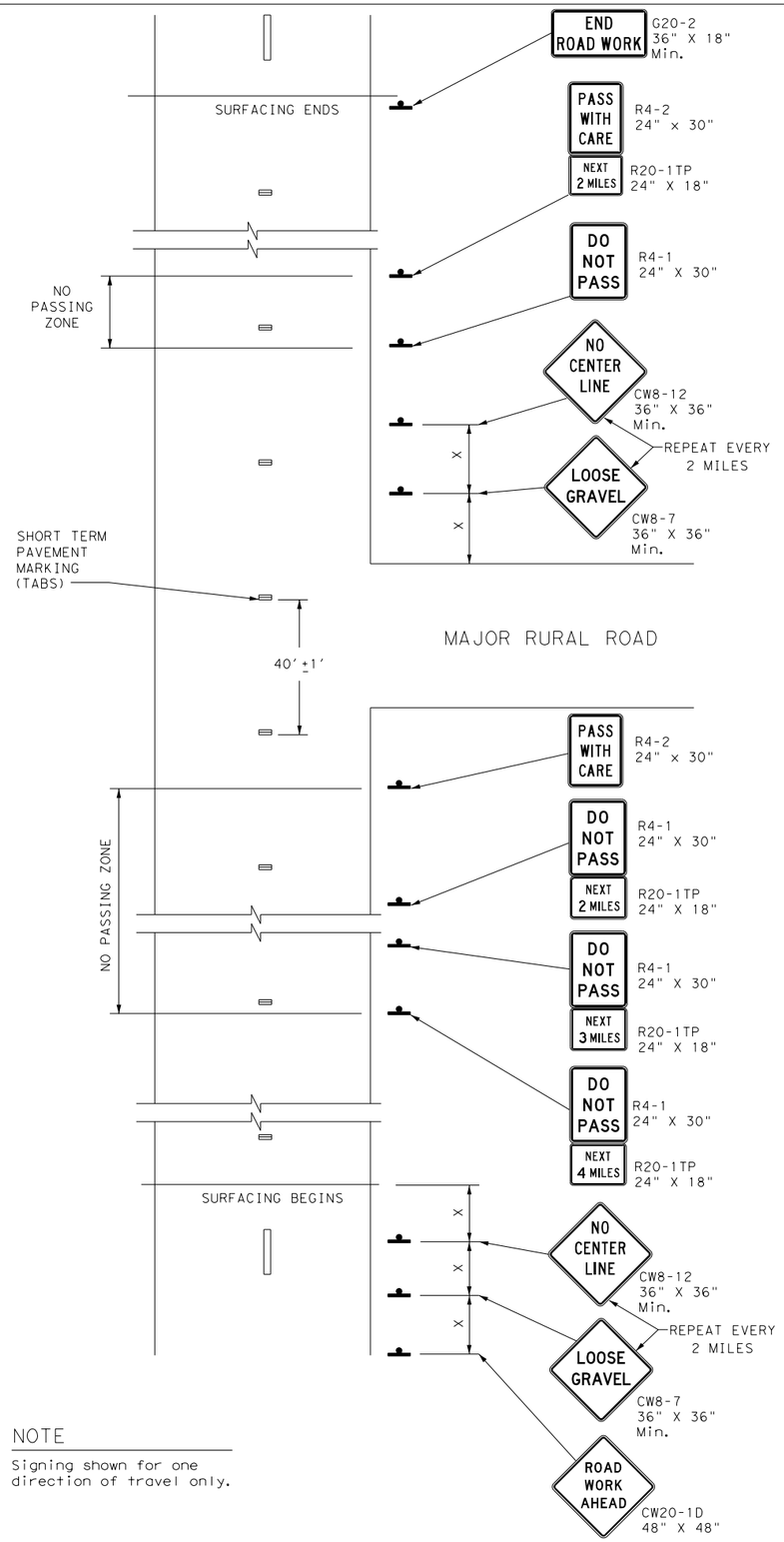
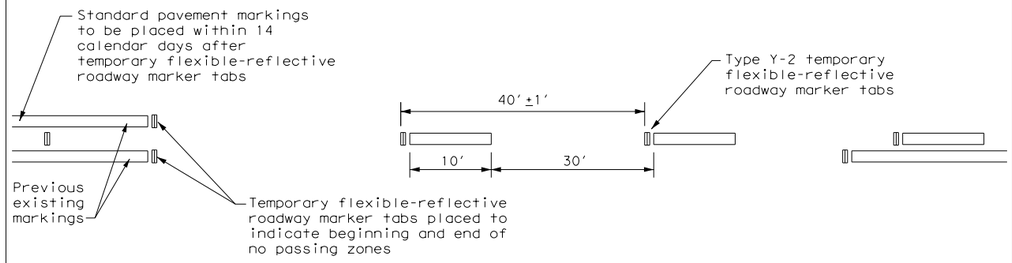


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

* Conventional Roads Only

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Short Duration / Short Term Stantionary Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC CONTROL DETAILS FOR SEAL COAT OPERATIONS

TCP(SC-7)-21

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©TxDOT April 2021	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		28

DATE: 9/21/2023
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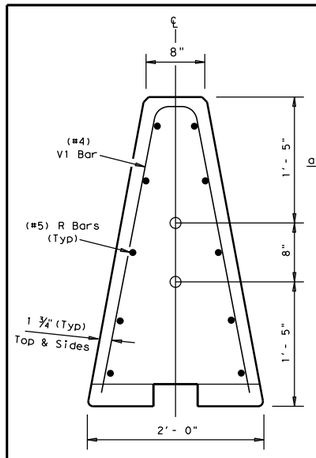
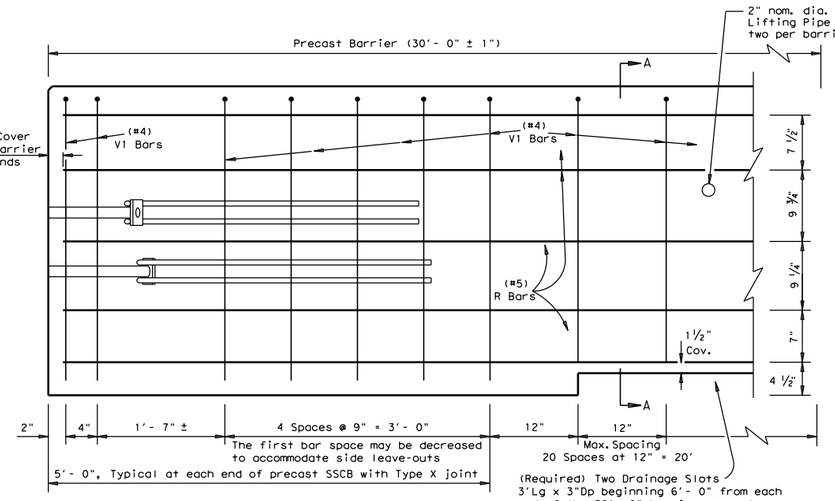


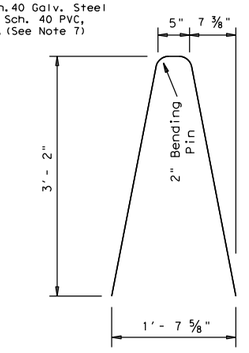
End View
Precast Barrier

Pipe locations for Joint Type X connection



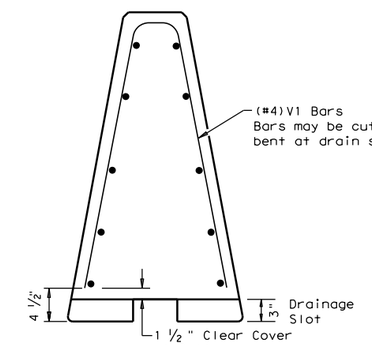
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)

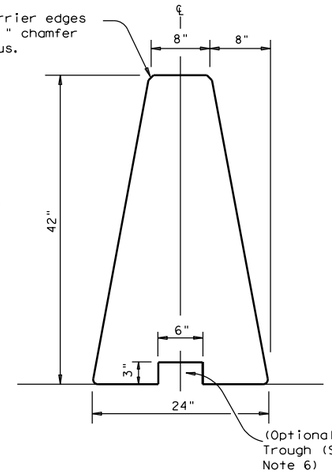


V1 Bar
#4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomadate 1 ½" clear cover as directed by the Engineer.

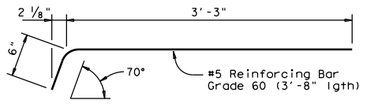


Section A-A
Steel Placement at (Required) Drainage Slots



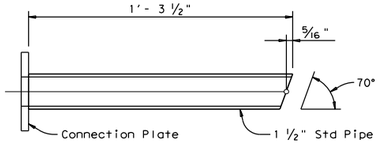
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



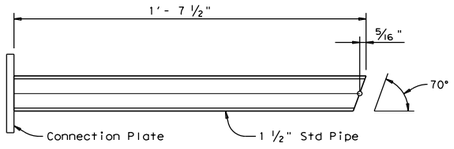
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



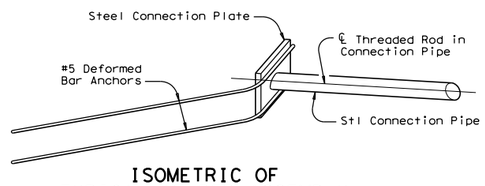
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.

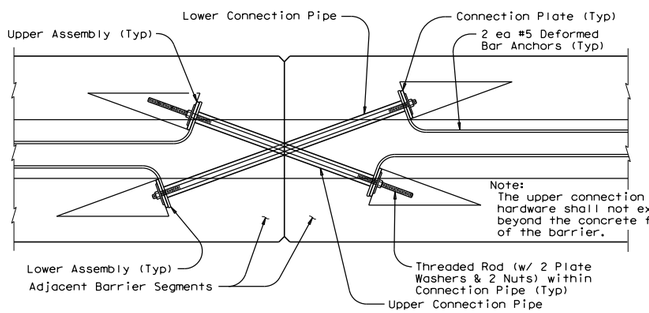


ISOMETRIC OF
TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

General Notes

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

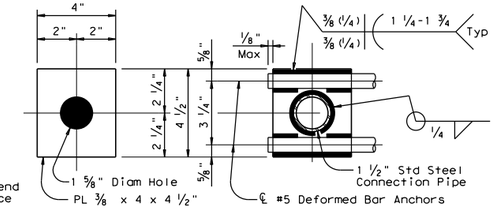
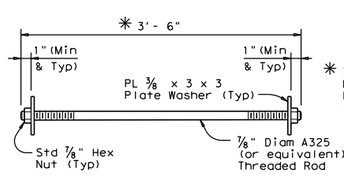


PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.

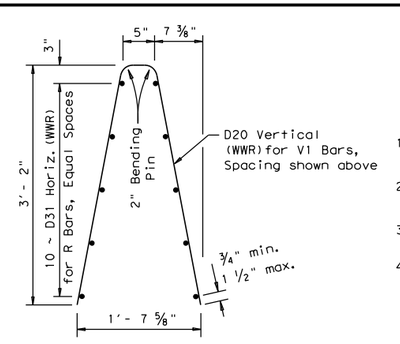


✳ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.

CONNECTION BOLT OR
THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

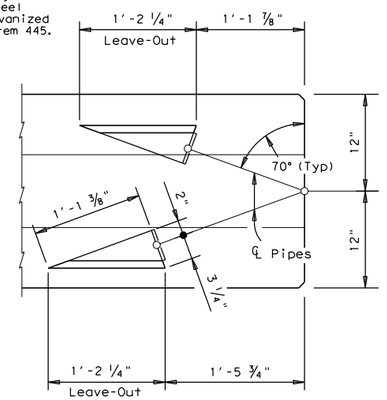
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



Welded Wire Reinforcement
(WWR) Option for Bars R and V1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

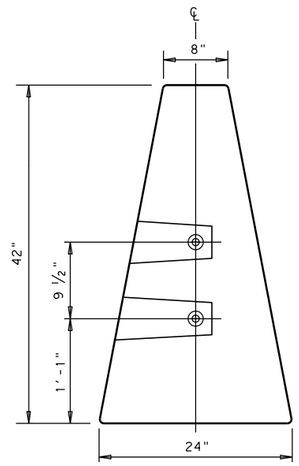
SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

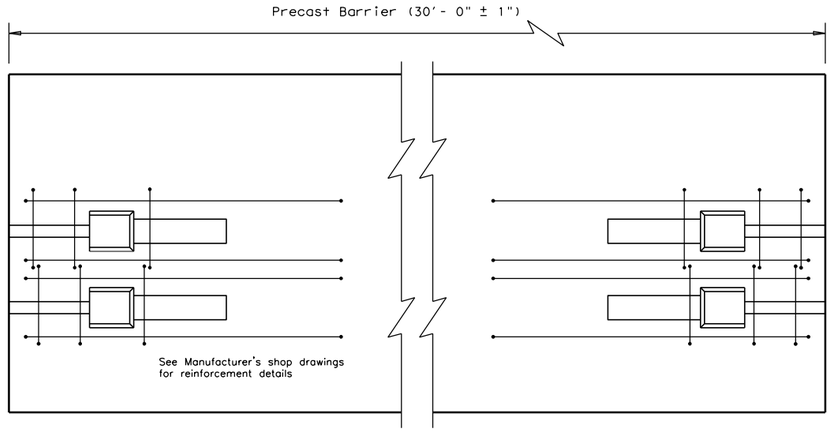
SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		29

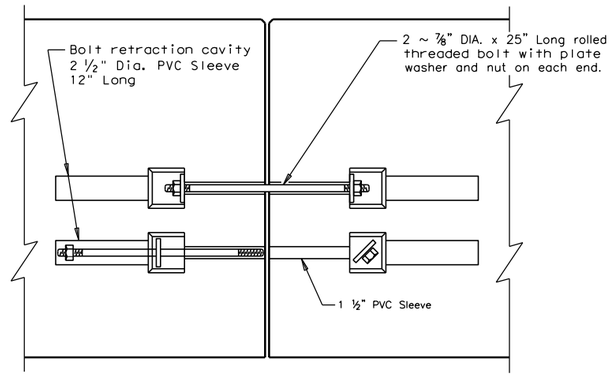
DATE: 9/21/2023
FILE: P:\124773\13\Design\Civil\Standards_FM 1346 STANDARDS\TCP\sscb210.dgn



END VIEW
"QUICK-BOLT" POCKET LOCATIONS

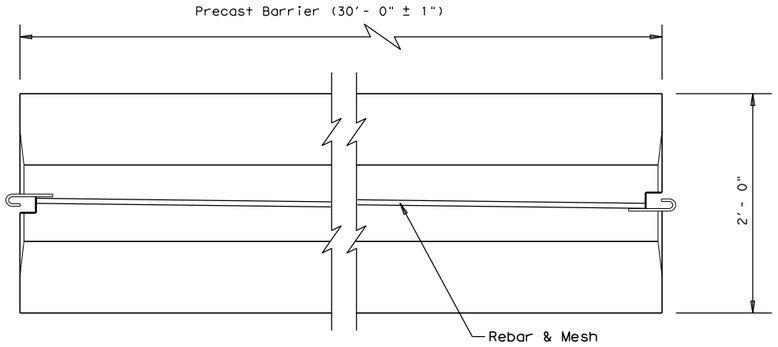


ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details

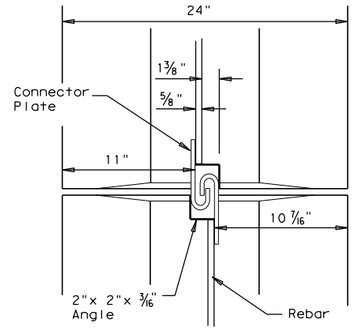


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

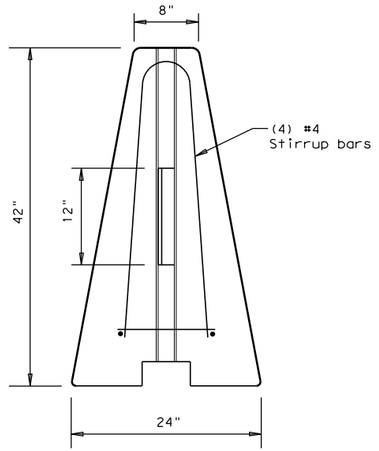
Joint Connection (Type Q)



TOP VIEW
PRECAST (SSCB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION



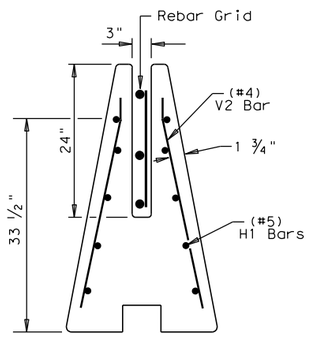
END VIEW

Proprietary Joint Connections (SSCB)

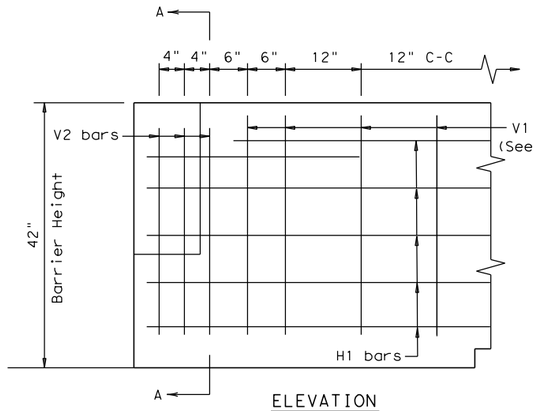
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

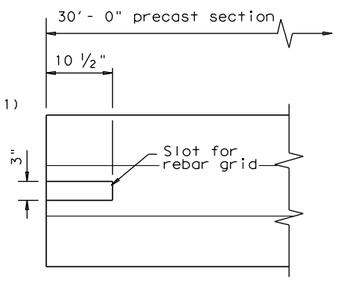
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



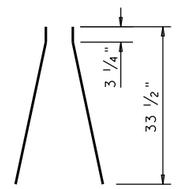
SECTION A-A
Showing (Type R) Rebar Grid



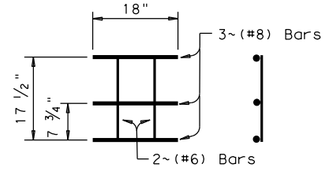
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



(#4) V2 BARS
6 ~ two piece bars per barrier segment



WELDED REBAR GRID

Joint Connection (Type R)

Texas Department of Transportation — Design Division Standard

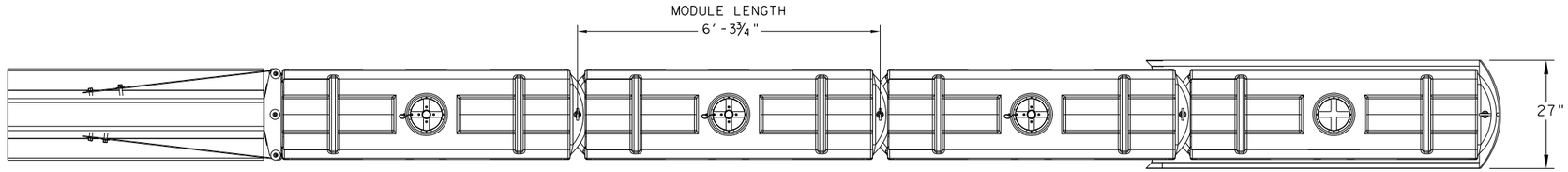
SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

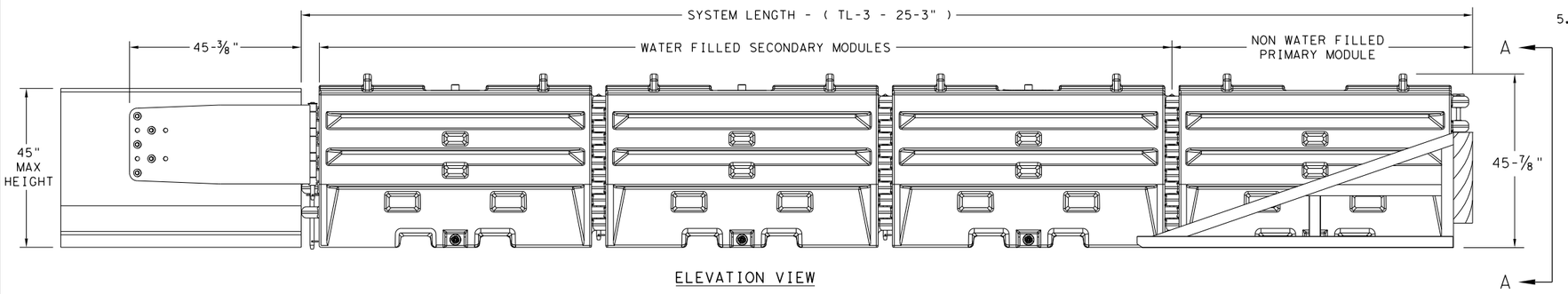
SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		30

DATE: 9/21/2023
FILE: P:\124\73\13\Design\Civil\Standards_FM 1346 STANDARDS\TCP\sled19.dgn



PLAN VIEW



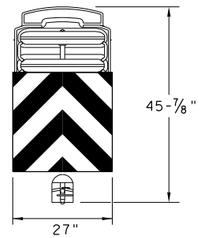
ELEVATION VIEW

GENERAL NOTES

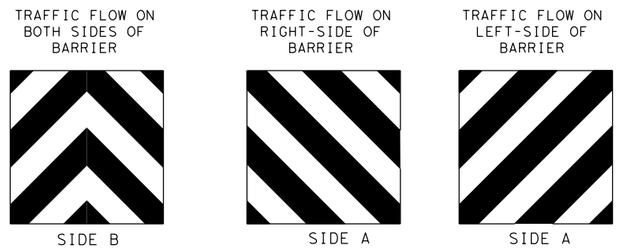
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
3. MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
4. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. THE SLED SYSTEM CAN BE ATTACHED TO:

- CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
- STEEL BARRIER
- PLASTIC BARRIER
- CONCRETE BRIDGE ABUTMENTS
- W-BEAM GUARD RAIL
- THRIE BEAM GUARD RAIL

TEST LEVEL	NUMBER OF SECONDARY MODULES	SYSTEM LENGTH
TL-3	3	25′ 3"



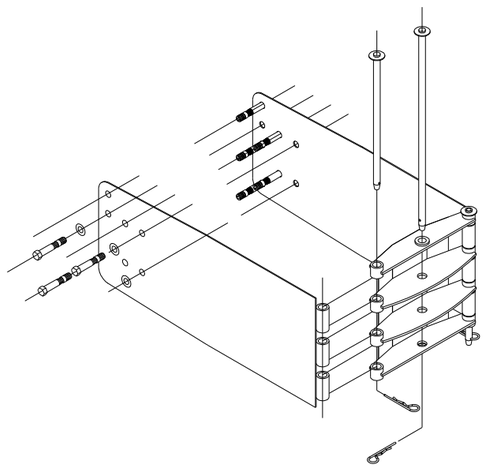
SECTION A-A



NOSE SHEETING PANEL DELINEATION

NOTE:
SEE INSTALLATION MANUAL FOR CUSTOMIZED DELINEATION NOSE SHEETING FOR DECAL PLACEMENT.

BILL OF MATERIAL		
PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW WATER FILLED MODULE	3
45044-YH	SLED YELLOW "NO FILL" MODULE	1
45044-S	CIS (CONTAINMENT IMPACT SLED), GALVANIZED	1
45043-CP	T-PIN W/ KEEPER PIN	4
18009-B-I	FILL CAP W/ "DRIVE BY" FLOAT INDICATOR	3
45033-RC-B	DRAIN PLUG	3
45032-DPT	DRAIN PLUG REMOVAL TOOL	1



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

NOTE:
SEE MANUFACTURER'S INSTALLATION MANUAL FOR FURTHER DETAILS.

TRANSITION OPTIONS
SLED TRANSITION TO CONCRETE TRAFFIC BARRIER (TEMPORARY OR PERMANENT)
SLED TRANSITION TO STEEL TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO PLASTIC TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO W-BEAM OR THRIE BEAM GUARD RAIL (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO CONCRETE BRIDGE ABUTMENT

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SLED, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation

Design Division Standard

SLED
CRASH CUSHION
TL-3 MASH COMPLIANT
(TEMPORARY, WORK ZONE)
SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		31

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC. #	N	W	N	W	N	W
1	I	13	FM 1346 WESTBOUND	STA 137+43	TL-3	UNI	EXISTING PAVEMENT		PCTB	24"	42"	50'	X	X							X	
1	I	13	FM 1346 EASTBOUND	STA 134+73	TL-3	UNI	EXISTING PAVEMENT		PCTB	24"	42"	50'	X	X							X	
												TOTALS										

LEGEND:

L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

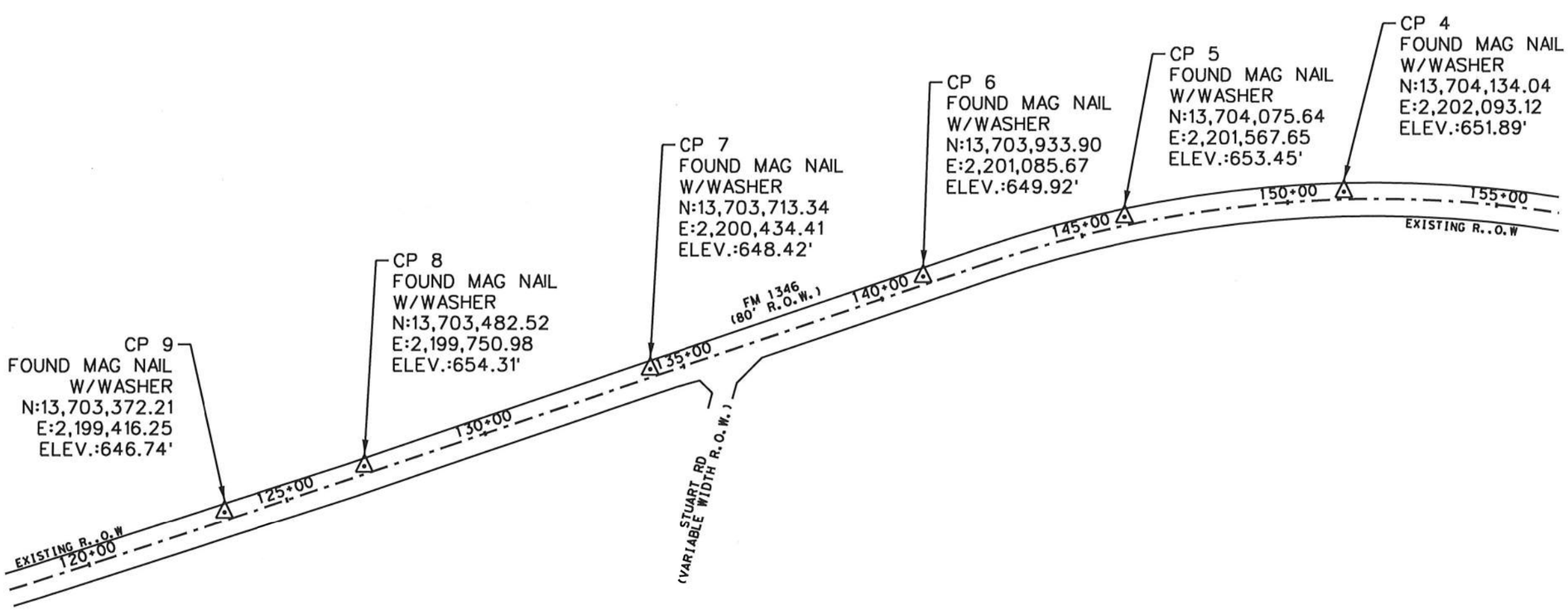
FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
	DIST	COUNTY		
	SAT	BEXAR		
	FEDERAL AID PROJECT			SHEET NO.
				32

Plotted on: 7/1/2022

11X17 SCALE: 1"=300'



NOTES:

1. COORDINATES SHOWN ARE DISPLAYED AS SURFACE VALUES IN US SURVEY FEET, BASED ON THE NORTH AMERICAN DATUM OF 1983 (2011) EPOCH 2010.00 FROM THE TEXAS COORDINATE SYSTEM ESTABLISHED FOR THE SOUTH CENTRAL ZONE, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00017 APPLIED, AS OBTAINED FROM RTK OBSERVATIONS USING THE TXDOT VRS NETWORK.

2. ELEVATIONS SHOWN ARE BASED ON NAVD88 (GEOID 12B), OBTAINED BY RTK METHODS USING THE TXDOT VRS NETWORK, AND FINALIZED BY BALANCING A CLOSED DOUBLE RUN DIGITAL LEVEL LOOP.

LEGEND

△	CONTROL POINT
CP	CONTROL POINT
R.O.W.	RIGHT-OF-WAY
N	NORTHING
E	EASTING
ELEV.	ELEVATION

SURVEYOR'S CERTIFICATION:

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

7-1-22

ERIC J SNELL — DATE
RPLS 6527

STATE OF TEXAS
REGISTERED
ERIC J. SNELL
6527
PROFESSIONAL
LAND SURVEYOR

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

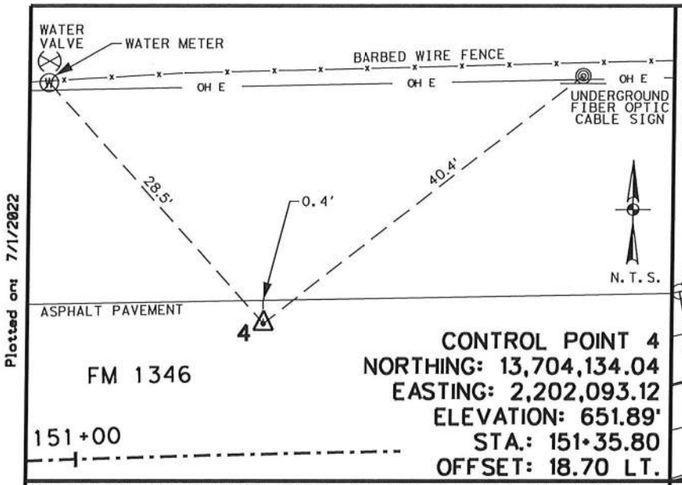
LUENSMANN PROPERTIES

HORIZONTAL & VERTICAL CONTROL

SHEET 1 OF 2

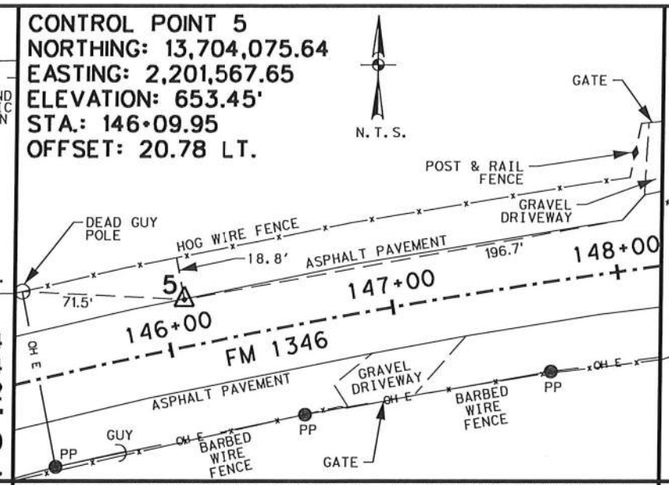
95% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 7/1/2022
DRWN. BY: JRM	DSGN. BY: JRM	CHKD.BY: EJS	SHEET NO. 33

Design Filename: N:\Transpo\Civil\12473-13\Control Sheets\CT12473-13_FM1346.dgn



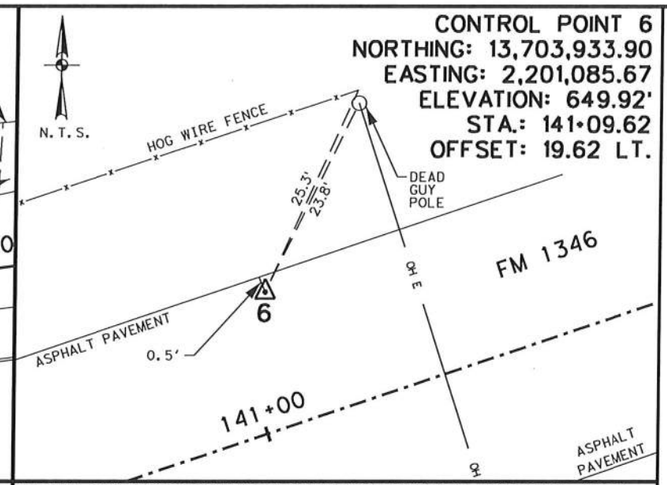
CONTROL POINT 4
NORTHING: 13,704,134.04
EASTING: 2,202,093.12
ELEVATION: 651.89'
STA.: 151+35.80
OFFSET: 18.70 LT.

MAG NAIL WITH WASHER LOCATED ON THE NORTH SIDE OF FM 1346, APPROXIMATELY 1,517 FEET NORTHEAST OF THE FM 1346 AND STUART ROAD INTERSECTION.



CONTROL POINT 5
NORTHING: 13,704,075.64
EASTING: 2,201,567.65
ELEVATION: 653.45'
STA.: 146+09.95
OFFSET: 20.78 LT.

MAG NAIL WITH WASHER LOCATED ON THE NORTH SIDE OF FM 1346, APPROXIMATELY 988 FEET NORTHEAST OF THE FM 1346 AND STUART ROAD INTERSECTION.



CONTROL POINT 6
NORTHING: 13,703,933.90
EASTING: 2,201,085.67
ELEVATION: 649.92'
STA.: 141+09.62
OFFSET: 19.62 LT.

MAG NAIL WITH WASHER LOCATED ON NORTH SIDE OF FM 1346, APPROXIMATELY 485 FEET NORTHEAST OF THE FM 1346 AND STUART ROAD INTERSECTION.

CONTROL POINT 7
NORTHING: 13,703,713.34
EASTING: 2,200,434.41
ELEVATION: 648.42'
STA.: 134+22.02
OFFSET: 19.30 LT.

MAG NAIL WITH WASHER LOCATED ON THE NORTH SIDE OF FM 1346, APPROXIMATELY 202 FEET SOUTHWEST OF THE FM 1346 AND STUART ROAD INTERSECTION.

CONTROL POINT 8
NORTHING: 13,703,482.52
EASTING: 2,199,750.98
ELEVATION: 654.31'
STA.: 127+00.57
OFFSET: 18.58 LT.

MAG NAIL WITH WASHER LOCATED ON THE NORTH SIDE OF FM 1346, APPROXIMATELY 924 FEET SOUTHWEST OF THE FM 1346 AND STUART ROAD INTERSECTION.

CONTROL POINT 9
NORTHING: 13,703,372.21
EASTING: 2,199,416.25
ELEVATION: 646.74'
STA.: 123+48.01
OFFSET: 19.48 LT.

MAG NAIL WITH WASHER LOCATED ON THE NORTH SIDE OF FM 1346, APPROXIMATELY 1,276 FEET SOUTHWEST OF THE FM 1346 AND STUART ROAD INTERSECTION.

NOTES:

1. COORDINATES SHOWN ARE DISPLAYED AS SURFACE VALUES IN US SURVEY FEET, BASED ON THE NORTH AMERICAN DATUM OF 1983 (2011) EPOCH 2010.00 FROM THE TEXAS COORDINATE SYSTEM ESTABLISHED FOR THE SOUTH CENTRAL ZONE, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00017 APPLIED, AS OBTAINED FROM RTK OBSERVATIONS USING THE TXDOT VRS NETWORK.
2. ELEVATIONS SHOWN ARE BASED ON NAVD88 (GEOID 12B), OBTAINED BY RTK METHODS USING THE TXDOT VRS NETWORK, AND FINALIZED BY BALANCING A CLOSED DOUBLE RUN DIGITAL LEVEL LOOP.

LEGEND

△	CONTROL POINT
N.T.S.	NOT TO SCALE
STA.	STATION
CMP	CORRUGATED METAL PIPE
— OHE —	OVERHEAD ELECTRIC
● PP	METAL POWER POLE

SURVEYOR'S CERTIFICATION:

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

7-1-22

ERIC J SNELL DATE
RPLS 6527

STATE OF TEXAS REGISTERED ERIC J. SNELL 6527 PROFESSIONAL LAND SURVEYOR

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES

HORIZONTAL & VERTICAL CONTROL

SHEET 2 OF 2

0%% SUBMITTAL	PROJECT NO.: 12473-13			DATE: 7/1/2022	
DRWN. BY: JRM	DSGN. BY: JRM	CHKD.BY: EJS		SHEET NO.	34

Plotted on: 7/1/2022

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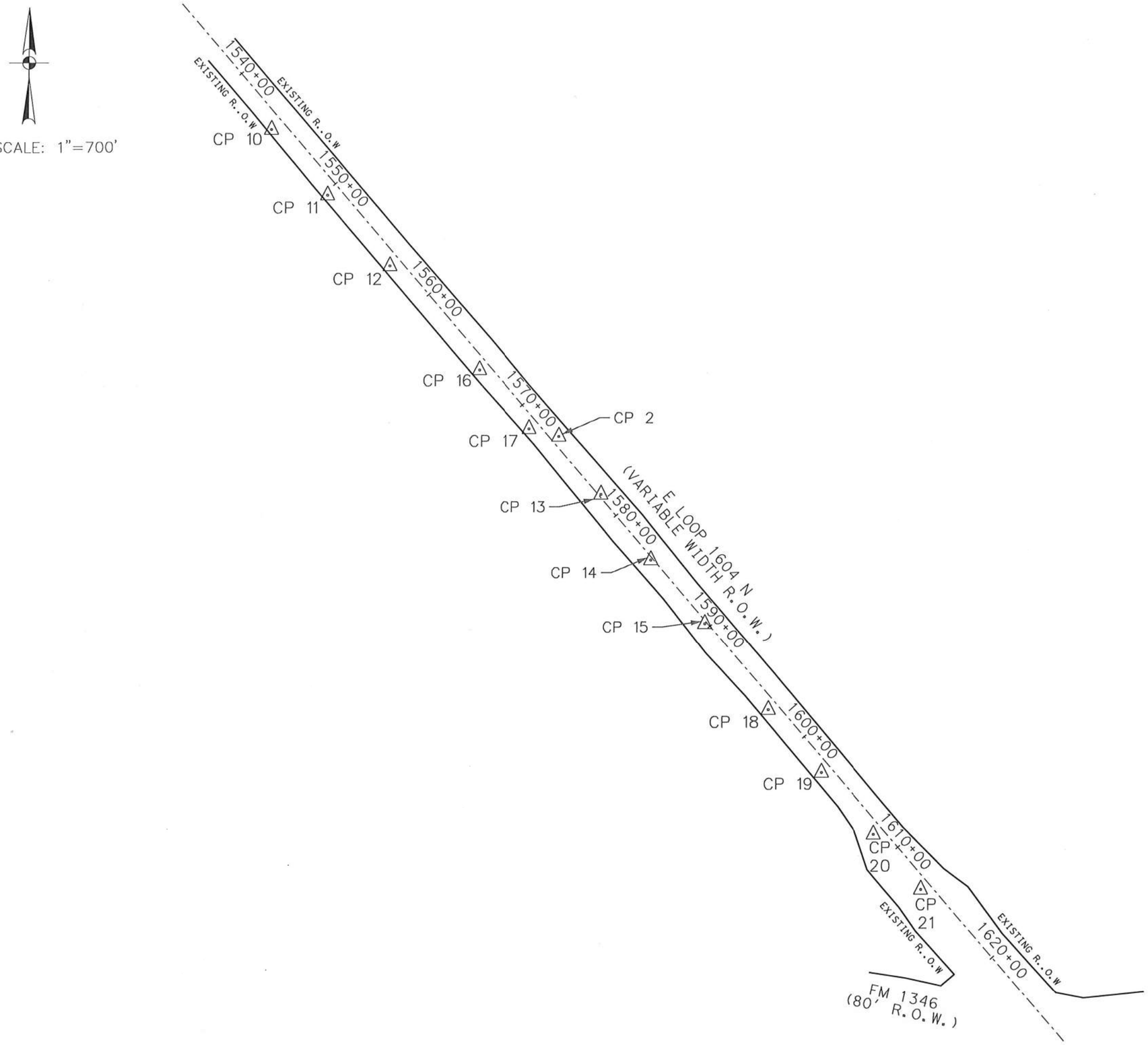

NOTES:

1. COORDINATES SHOWN ARE DISPLAYED AS SURFACE VALUES IN US SURVEY FEET, BASED ON THE NORTH AMERICAN DATUM OF 1983 (2011) EPOCH 2010.00 FROM THE TEXAS COORDINATE SYSTEM ESTABLISHED FOR THE SOUTH CENTRAL ZONE, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00017 APPLIED, AS OBTAINED FROM RTK OBSERVATIONS USING THE TXDOT VRS NETWORK.

2. ELEVATIONS SHOWN ARE BASED ON NAVD88 (GEOID 12B), OBTAINED BY RTK METHODS USING THE TXDOT VRS NETWORK, AND FINALIZED BY BALANCING A CLOSED DOUBLE RUN DIGITAL LEVEL LOOP.

LEGEND

CP	CONTROL POINT
CP	CONTROL POINT
R.O.W.	RIGHT-OF-WAY
⊗	REFLECTOR

SURVEYOR'S CERTIFICATION:

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

5-10-22

ERIC J SNELL — DATE
RPLS 6527

STATE OF TEXAS
REGISTERED
ERIC J. SNELL
6527
PROFESSIONAL
LAND SURVEYOR

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES

HORIZONTAL & VERTICAL CONTROL

SHEET 1 OF 3

%&% SUBMITTAL	PROJECT NO.:	12473-13			DATE:	5/10/2022
DRWN. BY: JRM	DSGN. BY:	JRM	CHKD.BY:	EJS	SHEET NO.	35

Plotted on: 5/10/2022

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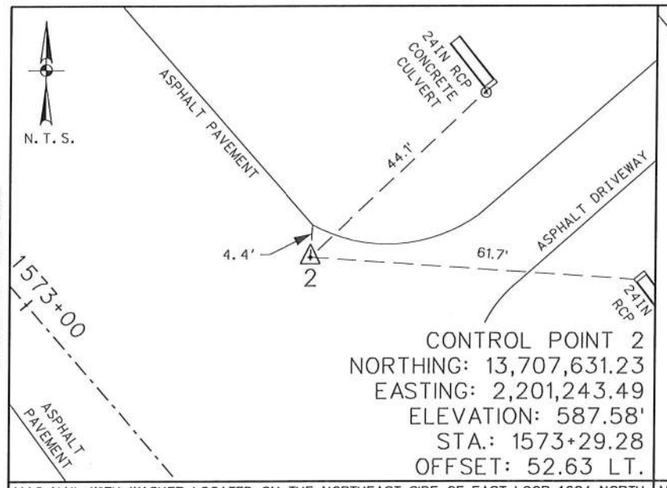
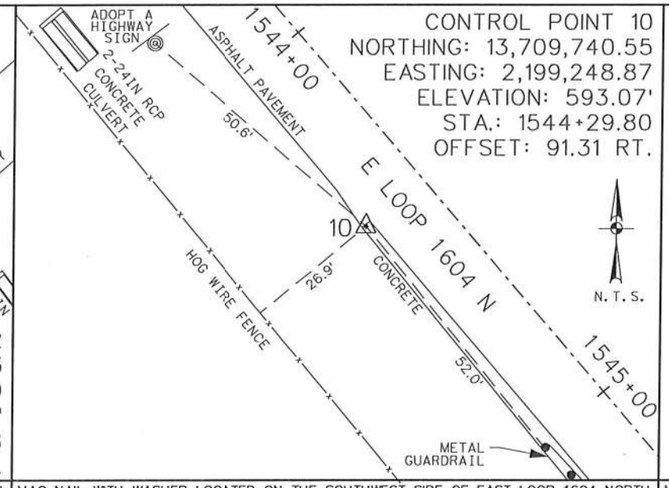


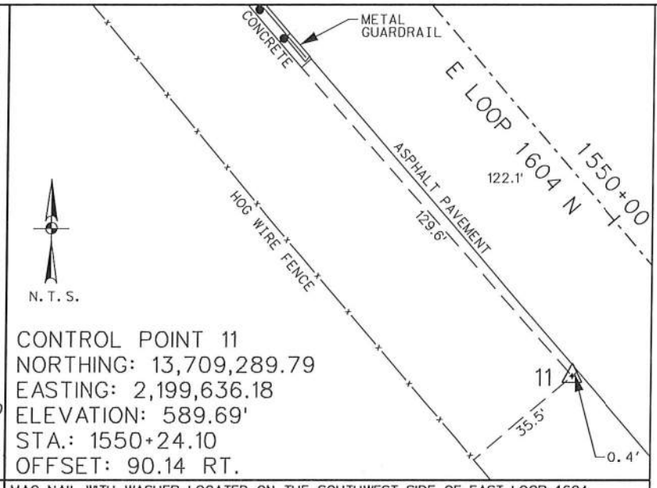
CONTROL POINT 2
NORTHING: 13,707,631.23
EASTING: 2,201,243.49
ELEVATION: 587.58'
STA.: 1573+29.28
OFFSET: 52.63 LT.

MAG NAIL WITH WASHER LOCATED ON THE NORTHEAST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 896 FEET SOUTHEAST OF THE SOUTHERN END OF THE EAST LOOP 1604 NORTH BRIDGE CROSSING OVER THE MARTINEZ CREEK.



CONTROL POINT 10
NORTHING: 13,709,740.55
EASTING: 2,199,248.87
ELEVATION: 593.07'
STA.: 1544+29.80
OFFSET: 91.31 RT.

MAG NAIL WITH WASHER LOCATED ON THE SOUTHWEST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 3,300 FEET SOUTHEAST OF THE EAST LOOP 1604 NORTH & SCHUWIRTH ROAD INTERSECTION.



CONTROL POINT 11
NORTHING: 13,709,289.79
EASTING: 2,199,636.18
ELEVATION: 589.69'
STA.: 1550+24.10
OFFSET: 90.14 RT.

MAG NAIL WITH WASHER LOCATED ON THE SOUTHWEST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 1,267 FEET NORTHWEST OF THE NORTHERN END OF THE EAST LOOP 1604 NORTH BRIDGE CROSSING OVER THE MARTINEZ CREEK.

NOTES:

1. COORDINATES SHOWN ARE DISPLAYED AS SURFACE VALUES IN US SURVEY FEET, BASED ON THE NORTH AMERICAN DATUM OF 1983 (2011) EPOCH 2010.00 FROM THE TEXAS COORDINATE SYSTEM ESTABLISHED FOR THE SOUTH CENTRAL ZONE, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00017 APPLIED, AS OBTAINED FROM RTK OBSERVATIONS USING THE TXDOT VRS NETWORK.

2. ELEVATIONS SHOWN ARE BASED ON NAVD88 (GEOID 12B), OBTAINED BY RTK METHODS USING THE TXDOT VRS NETWORK, AND FINALIZED BY BALANCING A CLOSED DOUBLE RUN DIGITAL LEVEL LOOP.

LEGEND

△	CONTROL POINT
N.T.S.	NOT TO SCALE
STA.	STATION
CMP	CORRUGATED METAL PIPE
RCP	REINFORCED CONCRETE PIPE
⊗	REFLECTOR

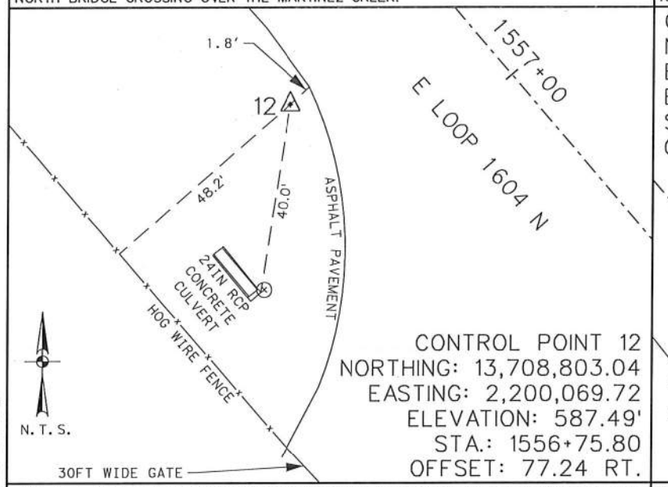
SURVEYOR'S CERTIFICATION:

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

5-10-22

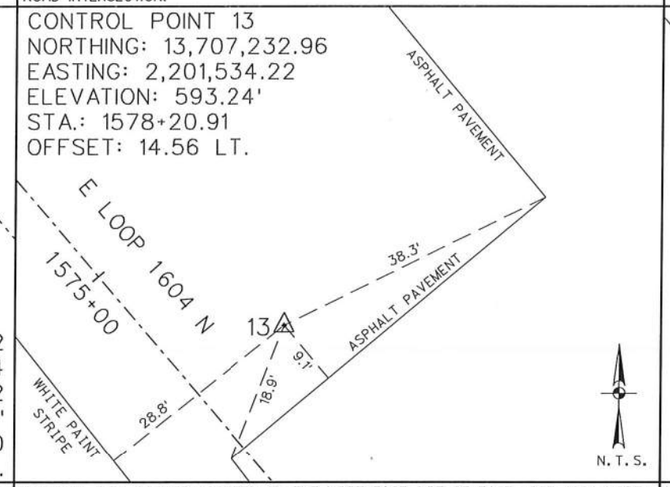
ERIC J SNELL — DATE
RPLS 6527

STATE OF TEXAS REGISTERED ERIC J. SNELL 6527 PROFESSIONAL LAND SURVEYOR



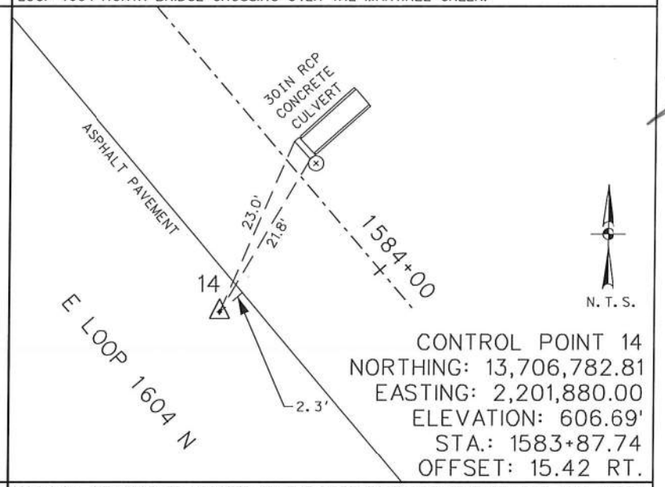
CONTROL POINT 12
NORTHING: 13,708,803.04
EASTING: 2,200,069.72
ELEVATION: 587.49'
STA.: 1556+75.80
OFFSET: 77.24 RT.

1/2" IRON ROD WITH RED CAP MARKED "TRAVERSE" LOCATED ON THE SOUTHWEST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 757 FEET NORTHWEST OF THE NORTHERN END OF THE EAST LOOP 1604 NORTH BRIDGE CROSSING OVER THE MARTINEZ CREEK.



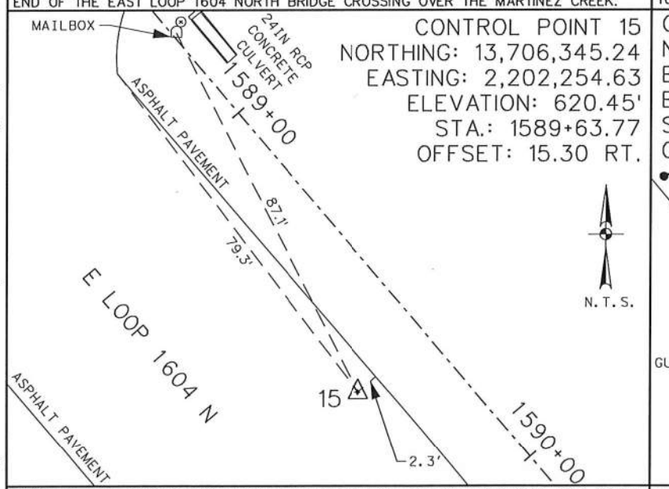
CONTROL POINT 13
NORTHING: 13,707,232.96
EASTING: 2,201,534.22
ELEVATION: 593.24'
STA.: 1578+20.91
OFFSET: 14.56 LT.

MAG NAIL WITH WASHER LOCATED ON THE NORTHEAST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 1,388 FEET SOUTHEAST OF THE SOUTHERN END OF THE EAST LOOP 1604 NORTH BRIDGE CROSSING OVER THE MARTINEZ CREEK.



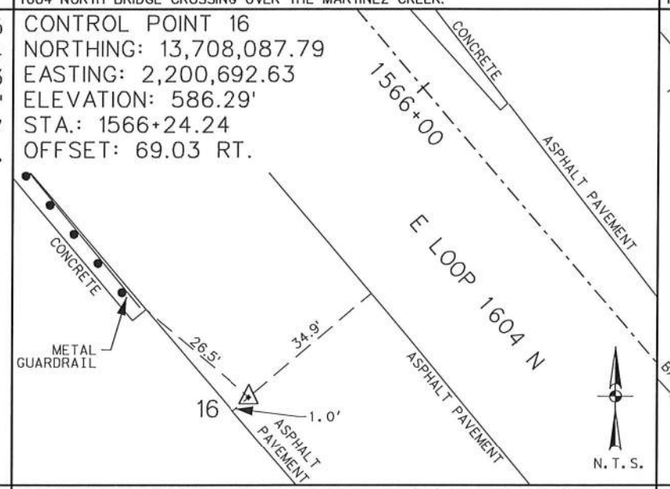
CONTROL POINT 14
NORTHING: 13,706,782.81
EASTING: 2,201,880.00
ELEVATION: 606.69'
STA.: 1583+87.74
OFFSET: 15.42 RT.

MAG NAIL WITH WASHER LOCATED ON THE NORTHEAST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 1,956 FEET SOUTHEAST OF THE SOUTHERN END OF THE EAST LOOP 1604 NORTH BRIDGE CROSSING OVER THE MARTINEZ CREEK.



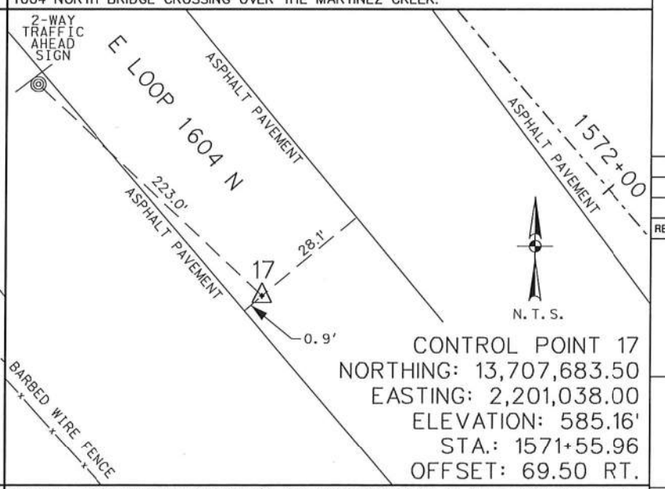
CONTROL POINT 15
NORTHING: 13,706,345.24
EASTING: 2,202,254.63
ELEVATION: 620.45'
STA.: 1589+63.77
OFFSET: 15.30 RT.

MAG NAIL WITH WASHER LOCATED ON THE NORTHEAST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 3,300 FEET SOUTHEAST OF THE EAST LOOP 1604 NORTH & SCHUWIRTH ROAD INTERSECTION.



CONTROL POINT 16
NORTHING: 13,708,087.79
EASTING: 2,200,692.63
ELEVATION: 586.29'
STA.: 1566+24.24
OFFSET: 69.03 RT.

MAG NAIL WITH WASHER LOCATED ON THE SOUTHWEST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 240 FEET SOUTHEAST OF THE SOUTHERN END OF THE EAST LOOP 1604 NORTH BRIDGE CROSSING OVER THE MARTINEZ CREEK.



CONTROL POINT 17
NORTHING: 13,707,683.50
EASTING: 2,201,038.00
ELEVATION: 585.16'
STA.: 1571+55.96
OFFSET: 69.50 RT.

MAG NAIL WITH WASHER LOCATED ON THE SOUTHWEST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 770 FEET SOUTHEAST OF THE SOUTHERN END OF THE EAST LOOP 1604 NORTH BRIDGE CROSSING OVER THE MARTINEZ CREEK.

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES

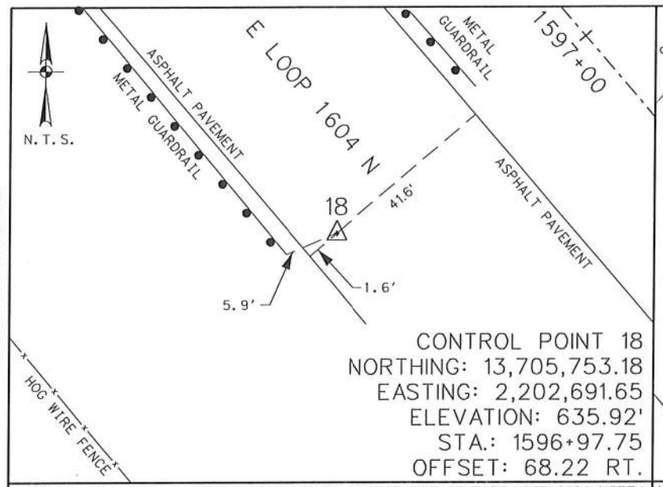
HORIZONTAL & VERTICAL CONTROL

SHEET 2 OF 3

0%% SUBMITTAL	PROJECT NO.: 12473-13			DATE: 5/10/2022	
DRWN. BY: JRM	DSGN. BY: JRM	CHKD.BY: EJS		SHEET NO. 36	

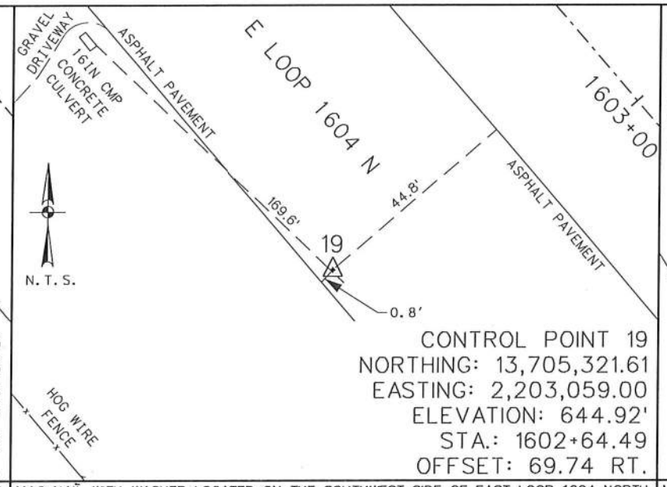
Plotted on: 5/10/2022

Design Filename: N:\Transpo\Civil\12473-13\dgn-topo\CT12473-13_Loop 1604.dgn



CONTROL POINT 18
NORTHING: 13,705,753.18
EASTING: 2,202,691.65
ELEVATION: 635.92'
STA.: 1596+97.75
OFFSET: 68.22 RT.

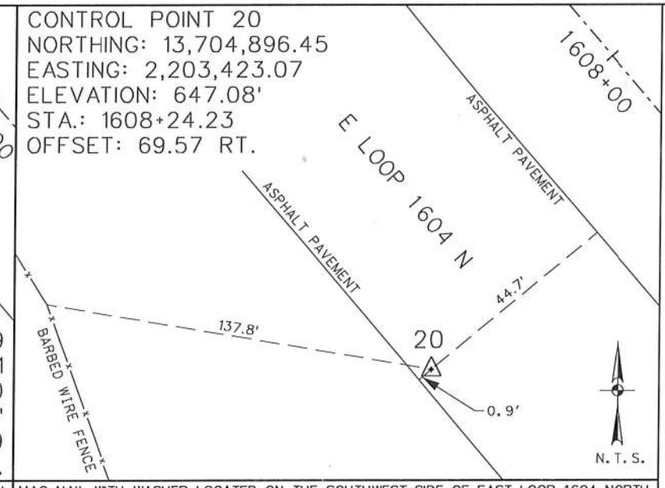
MAG NAIL WITH WASHER LOCATED ON THE SOUTHWEST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 2,790 FEET NORTHWEST OF THE EAST LOOP 1604 NORTH & FM 1346 INTERSECTION.



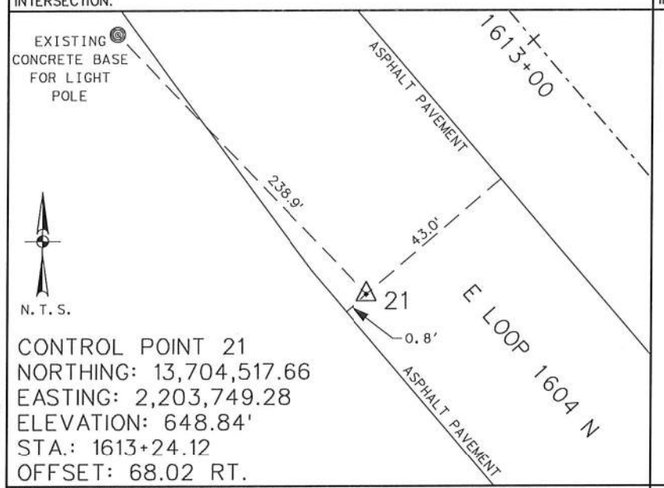
CONTROL POINT 19
NORTHING: 13,705,321.61
EASTING: 2,203,059.00
ELEVATION: 644.92'
STA.: 1602+64.49
OFFSET: 69.74 RT.

MAG NAIL WITH WASHER LOCATED ON THE SOUTHWEST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 2,242 FEET NORTHWEST OF THE EAST LOOP 1604 NORTH & FM 1346 INTERSECTION.

CONTROL POINT 20
NORTHING: 13,704,896.45
EASTING: 2,203,423.07
ELEVATION: 647.08'
STA.: 1608+24.23
OFFSET: 69.57 RT.



MAG NAIL WITH WASHER LOCATED ON THE SOUTHWEST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 1,713 FEET NORTHWEST OF THE EAST LOOP 1604 NORTH & FM 1346 INTERSECTION.



CONTROL POINT 21
NORTHING: 13,704,517.66
EASTING: 2,203,749.28
ELEVATION: 648.84'
STA.: 1613+24.12
OFFSET: 68.02 RT.

MAG NAIL WITH WASHER LOCATED ON THE SOUTHWEST SIDE OF EAST LOOP 1604 NORTH, APPROXIMATELY 1,086 FEET NORTHWEST OF THE EAST LOOP 1604 NORTH & FM 1346 INTERSECTION.

NOTES:

1. COORDINATES SHOWN ARE DISPLAYED AS SURFACE VALUES IN US SURVEY FEET, BASED ON THE NORTH AMERICAN DATUM OF 1983 (2011) EPOCH 2010.00 FROM THE TEXAS COORDINATE SYSTEM ESTABLISHED FOR THE SOUTH CENTRAL ZONE, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00017 APPLIED, AS OBTAINED FROM RTK OBSERVATIONS USING THE TXDOT VRS NETWORK.

2. ELEVATIONS SHOWN ARE BASED ON NAVD88 (GEOID 12B), OBTAINED BY RTK METHODS USING THE TXDOT VRS NETWORK, AND FINALIZED BY BALANCING A CLOSED DOUBLE RUN DIGITAL LEVEL LOOP.

LEGEND

△	CONTROL POINT
N.T.S.	NOT TO SCALE
STA.	STATION
CMP	CORRUGATED METAL PIPE
RCP	REINFORCED CONCRETE PIPE
⊗	REFLECTOR

SURVEYOR'S CERTIFICATION:

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

5-10-22

ERIC J SNELL
RPLS 6527
DATE

STATE OF TEXAS
REGISTERED
ERIC J. SNELL
6527
PROFESSIONAL
LAND SURVEYOR

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES

HORIZONTAL & VERTICAL CONTROL

SHEET 3 OF 3

%%% SUBMITTAL	PROJECT NO.: 12473-13			DATE: 5/10/2022
DRWN. BY: JRM	DSGN. BY: JRM	CHKD.BY: EJS		SHEET NO. 37

Plotted on: 5/10/2022

Design Filename: N:\Transpo\Civil\12473-13\dgn-topo\CT12473-13_Loop 1604.dgn

Plotted on: 9/21/2023

Design Filename: P:\124\73\13\Design\Civil\General\FM 1346\1247313hads_1346.dgn

℄ FM 1346

Beginning chain FM1346_CL description
Feature: Road_Centerline

Point 36 N 13,703,430.4730 E 2,197,154.7451 Sta 100+00.00

Course from 36 to PC FM1346_CL_3 S 70° 45′ 23.62" E Dist 637.6202

Curve FM1346_CL_3	Curve Data				
P.I. Station	112+73.62	N	13,703,010.7109	E	2,198,357.2015
Delta =	37° 00′ 51.97" (LT)				
Degree =	3° 00′ 56.04"				
Tangent =	635.9973				
Length =	1,227.4452				
Radius =	1,900.0000				
External =	103.6199				
Long Chord =	1,206.2117				
Mid. Ord. =	98.2610				
P.C. Station	106+37.62	N	13,703,220.3245	E	2,197,756.7394
P.T. Station	118+65.07	N	13,703,204.8258	E	2,198,962.8515
C.C.		N	13,705,014.1654	E	2,198,382.9462
Back = S 70° 45′ 23.62" E					
Ahead = N 72° 13′ 44.41" E					
Chord Bear = S 89° 15′ 49.61" E					

Course from PT FM1346_CL_3 to 37 N 72° 13′ 44.41" E Dist 158.6327

Point 37 N 13,703,253.2426 E 2,199,113.9149 Sta 120+23.70

Course from 37 to 38 N 71° 57′ 27.11" E Dist 331.3118

Point 38 N 13,703,355.8571 E 2,199,428.9352 Sta 123+55.01

Course from 38 to 39 N 71° 36′ 27.03" E Dist 541.6531

Point 39 N 13,703,526.7621 E 2,199,942.9192 Sta 128+96.66

Course from 39 to PC FM1346_CL_12 N 71° 19′ 00.47" E Dist 1,362.9354

Curve FM1346_CL_12	Curve Data				
P.I. Station	150+73.46	N	13,704,224.0660	E	2,202,005.0055
Delta =	31° 21′ 09.32" (RT)				
Degree =	1° 58′ 32.58"				
Tangent =	813.8587				
Length =	1,586.8971				
Radius =	2,900.0000				
External =	112.0369				
Long Chord =	1,567.1723				
Mid. Ord. =	107.8695				
P.C. Station	142+59.60	N	13,703,963.3583	E	2,201,234.0337
P.T. Station	158+46.50	N	13,704,045.5665	E	2,202,799.0483
C.C.		N	13,701,216.1761	E	2,202,163.0060
Back = N 71° 19′ 00.47" E					
Ahead = S 77° 19′ 50.21" E					
Chord Bear = N 86° 59′ 35.13" E					

Course from PT FM1346_CL_12 to 40 S 77° 19′ 50.21" E Dist 2,024.7383

Point 40 N 13,703,601.4909 E 2,204,774.4880 Sta 178+71.23

Ending chain FM1346_CL description

℄ SL 1604 SBML

Beginning chain 1604_SBML description
Feature: Road_Centerline

Point 30 N 13,716,483.5647 E 2,195,034.7388 Sta 463+89.08

Course from 30 to PC 1604_SBML_3 S 17° 09′ 15.00" E Dist 1,653.6499

Curve 1604_SBML_3	Curve Data				
P.I. Station	493+07.79	N	13,713,694.6944	E	2,195,895.5943
Delta =	23° 24′ 10.00" (LT)				
Degree =	0° 56′ 16.96"				
Tangent =	1,265.0604				
Length =	2,494.8463				
Radius =	6,108.0000				
External =	129.6311				
Long Chord =	2,477.5395				
Mid. Ord. =	126.9371				
P.C. Station	480+42.73	N	13,714,903.4781	E	2,195,522.4726
P.T. Station	505+37.58	N	13,712,733.5520	E	2,196,718.1409
C.C.		N	13,716,704.9948	E	2,201,358.7558
Back = S 17° 09′ 15.00" E					
Ahead = S 40° 33′ 25.00" E					
Chord Bear = S 28° 51′ 20.00" E					

Course from PT 1604_SBML_3 to PC 1604_SBML_6 S 40° 33′ 25.00" E Dist 4,407.2238

Curve 1604_SBML_6	Curve Data				
P.I. Station	552+10.37	N	13,709,183.3532	E	2,199,756.4046
Delta =	2° 09′ 28.84" (LT)				
Degree =	0° 24′ 22.87"				
Tangent =	265.5653				
Length =	531.0677				
Radius =	14,100.0000				
External =	2.5007				
Long Chord =	531.0364				
Mid. Ord. =	2.5002				
P.C. Station	549+44.80	N	13,709,385.1191	E	2,199,583.7331
P.T. Station	554+75.87	N	13,708,988.2324	E	2,199,936.5512
C.C.		N	13,718,552.9881	E	2,210,296.3509
Back = S 40° 33′ 25.00" E					
Ahead = S 42° 42′ 53.84" E					
Chord Bear = S 41° 38′ 09.42" E					

Curve 1604_SBML_9	Curve Data				
P.I. Station	557+41.43	N	13,708,793.1114	E	2,200,116.6980
Delta =	2° 09′ 28.83" (RT)				
Degree =	0° 24′ 22.87"				
Tangent =	265.5652				
Length =	531.0676				
Radius =	14,100.0001				
External =	2.5007				
Long Chord =	531.0362				
Mid. Ord. =	2.5002				
P.C. Station	554+75.87	N	13,708,988.2321	E	2,199,936.5515
P.T. Station	560+06.94	N	13,708,591.3456	E	2,200,289.3694
C.C.		N	13,699,423.4764	E	2,189,576.7517
Back = S 42° 42′ 53.84" E					
Ahead = S 40° 33′ 25.00" E					
Chord Bear = S 41° 38′ 09.42" E					

Course from PT 1604_SBML_9 to PC 1604_SBML_12 S 40° 33′ 25.00" E Dist 500.7185

Curve 1604_SBML_12	Curve Data				
P.I. Station	567+73.22	N	13,708,009.1530	E	2,200,787.6104
Delta =	2° 09′ 28.86" (RT)				
Degree =	0° 24′ 22.87"				
Tangent =	265.5662				
Length =	531.0697				
Radius =	14,100.0000				
External =	2.5007				
Long Chord =	531.0383				
Mid. Ord. =	2.5002				
P.C. Station	565+07.65	N	13,708,210.9196	E	2,200,614.9383
P.T. Station	570+38.72	N	13,707,801.0274	E	2,200,952.5624
C.C.		N	13,699,043.0505	E	2,189,902.3207
Back = S 40° 33′ 25.00" E					
Ahead = S 38° 23′ 56.14" E					
Chord Bear = S 39° 28′ 40.57" E					

Point 31 N 13,707,801.0274 E 2,200,952.5624 Sta 570+38.72

Curve 1604_SBML_17	Curve Data				
P.I. Station	573+04.29	N	13,707,592.9030	E	2,201,117.5134
Delta =	2° 09′ 28.86" (LT)				
Degree =	0° 24′ 22.87"				
Tangent =	265.5661				
Length =	531.0694				
Radius =	14,100.0000				
External =	2.5007				
Long Chord =	531.0380				
Mid. Ord. =	2.5002				
P.C. Station	570+38.73	N	13,707,801.0285	E	2,200,952.5615
P.T. Station	575+69.79	N	13,707,391.1365	E	2,201,290.1854
C.C.		N	13,716,559.0054	E	2,212,002.8032
Back = S 38° 23′ 56.14" E					
Ahead = S 40° 33′ 25.00" E					
Chord Bear = S 39° 28′ 40.57" E					

Course from PT 1604_SBML_17 to 32 S 40° 33′ 25.00" E Dist 6,637.3135

Point 32 N 13,702,348.3703 E 2,205,605.7897 Sta 642+07.11

Ending chain 1604_SBML description

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED · PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED · PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

REV. NO.	DATE	DESCRIPTION	BY

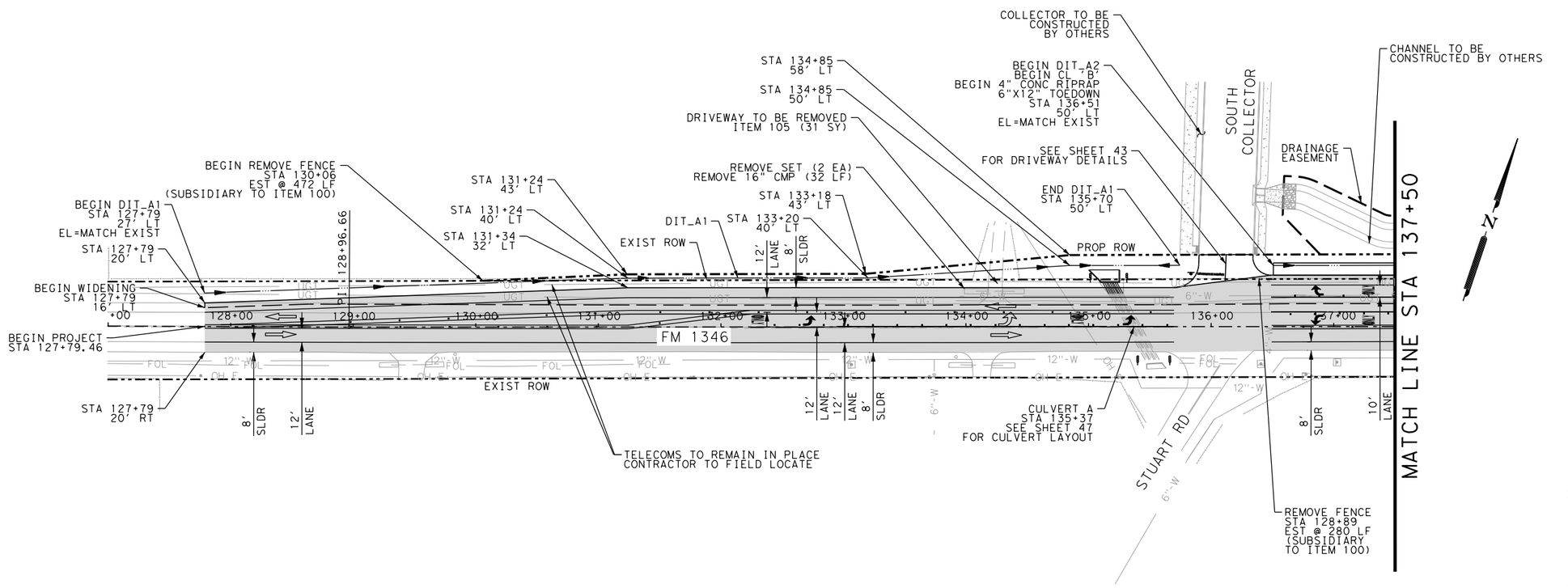
PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 38

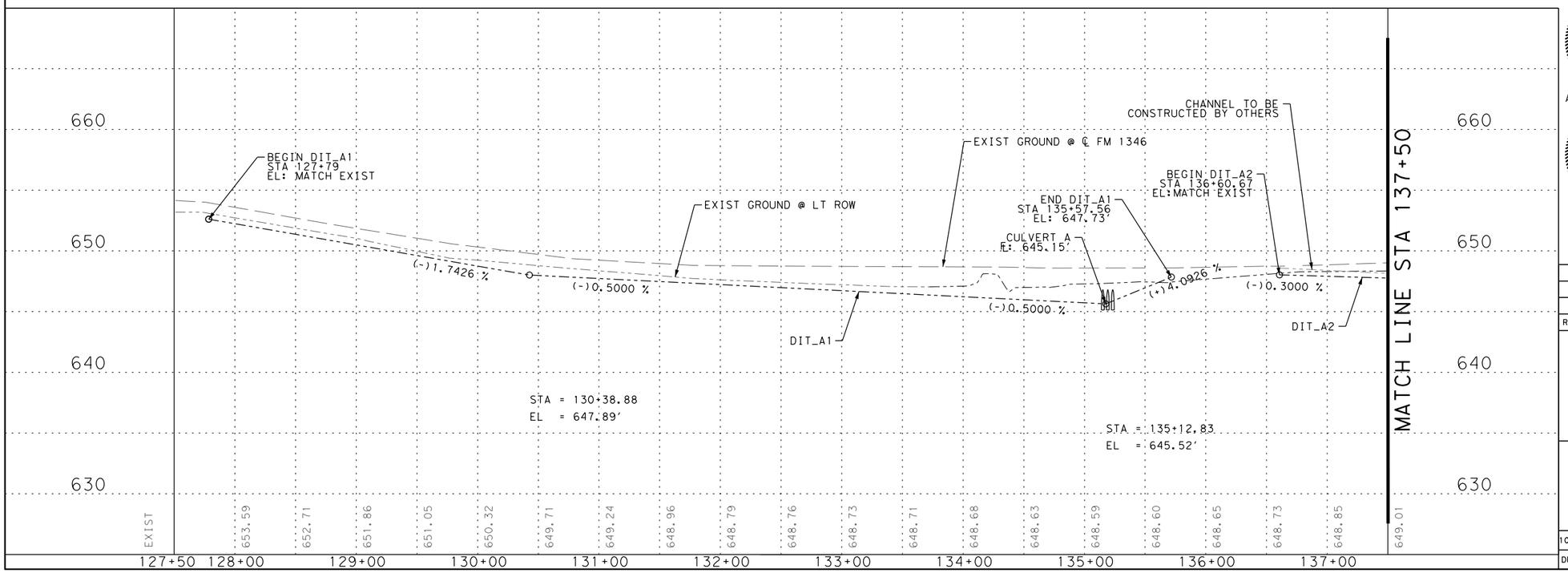


LEGEND

- EXIST ROW
- SAWCUT
- PROP ROW
- DITCH FLOWLINE
- SEAL COAT LIMITS
- TRAFFIC FLOW ARROW
- FOL — EXIST FIBER LINE
- G — EXIST GAS LINE
- OH E — EXIST OVERHEAD ELECTRIC
- W — EXIST WATER LINE
- UGT — EXIST TELEPHONE LINE

NOTES

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR HORIZONTAL ALIGNMENT DATA.
2. SEE SIGNING & PAVEMENT MARKING SHEETS FOR, SIGNING, STRIPING, AND OBJECT MARKER DETAILS.
3. EXISTING FEATURES ARE SHOWN SCREENED BACK; i.e. FADED
4. CONTRACTOR TO FIELD VERIFY EXISTING UTILITIES PRIOR TO CONSTRUCTION. UTILITIES ARE SHOWN BASED ON LEVEL C/D SUE AND DRAWN WITH BEST RECORDS AVAILABLE DURING DESIGN.



DESIGN

STATE OF TEXAS — STEVEN J. TATE — 131443 — LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/25/2023 DATE

APPROVAL

STATE OF TEXAS — DAN THOMA — 98622 — LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/25/2023 DATE

0 50 100

SCALE: PLAN 1" = 100' PROFILE: 1" = 10'

REV. NO.	DATE	DESCRIPTION	BY

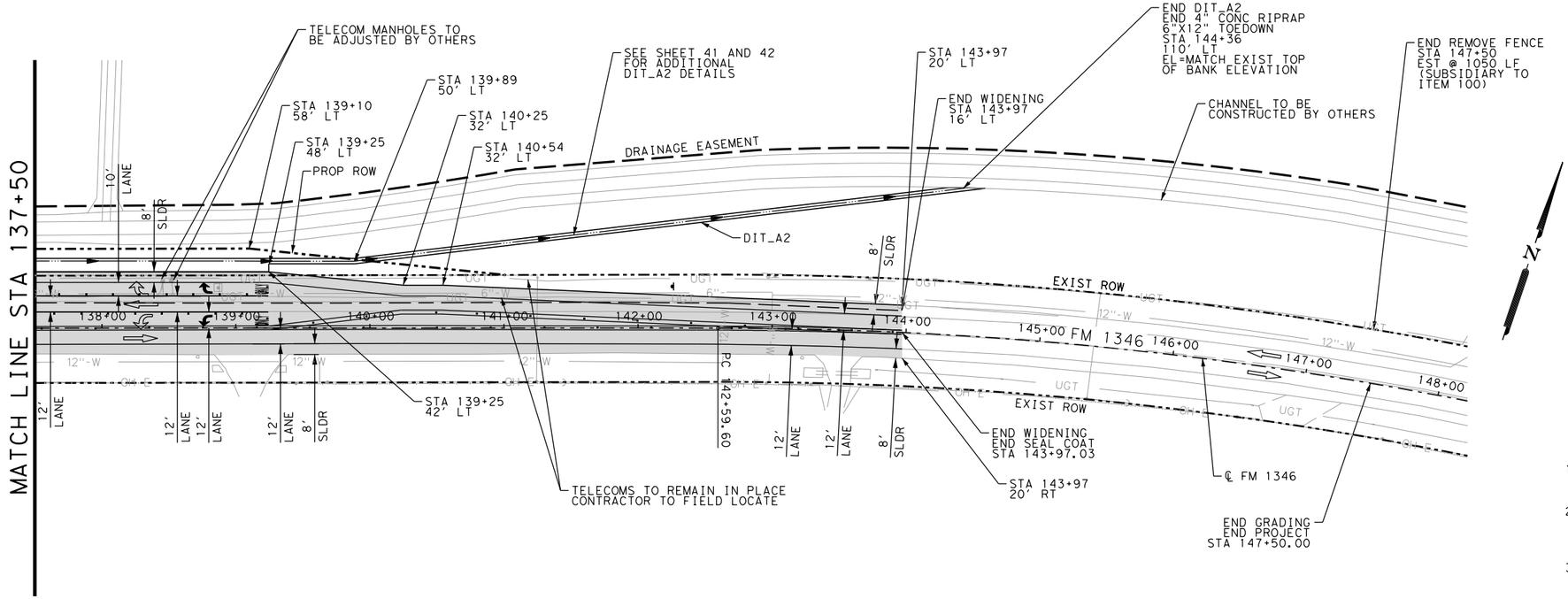
PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

ROADWAY PLAN & PROFILE

SHEET 1 OF 2

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/25/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 39

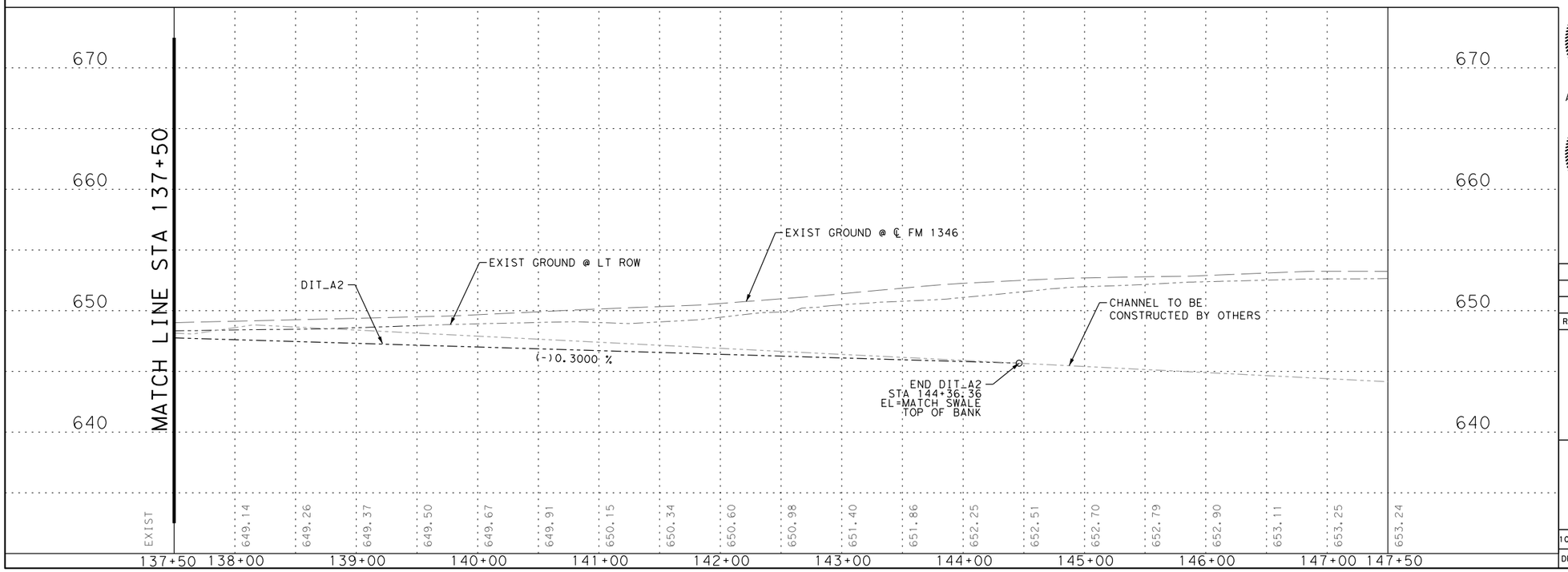


LEGEND

- EXIST ROW
- SAWCUT
- PROP ROW
- DITCH FLOWLINE
- SEAL COAT LIMITS
- TRAFFIC FLOW ARROW
- FOL — EXIST FIBER LINE
- G — EXIST GAS LINE
- OH E — EXIST OVERHEAD ELECTRIC
- W — EXIST WATER LINE
- UGT — EXIST TELEPHONE LINE

NOTES

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR HORIZONTAL ALIGNMENT DATA.
2. SEE SIGNING & PAVEMENT MARKING SHEETS FOR, SIGNING, STRIPING, AND OBJECT MARKER DETAILS.
3. EXISTING FEATURES ARE SHOWN SCREENED BACK; i.e. FADED
4. CONTRACTOR TO FIELD VERIFY EXISTING UTILITIES PRIOR TO CONSTRUCTION. UTILITIES ARE SHOWN BASED ON LEVEL C/D SUE AND DRAWN WITH BEST RECORDS AVAILABLE DURING DESIGN.



DESIGN

STATE OF TEXAS — STEVEN J. TATE — 131443 — LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/25/2023 DATE

APPROVAL

STATE OF TEXAS — DAN THOMA — 98622 — LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/25/2023 DATE

0 50 100

SCALE: PLAN 1" = 100' PROFILE: 1" = 10'

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

ROADWAY PLAN & PROFILE

SHEET 2 OF 2

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/25/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 40

Plotted on: 9/25/2023

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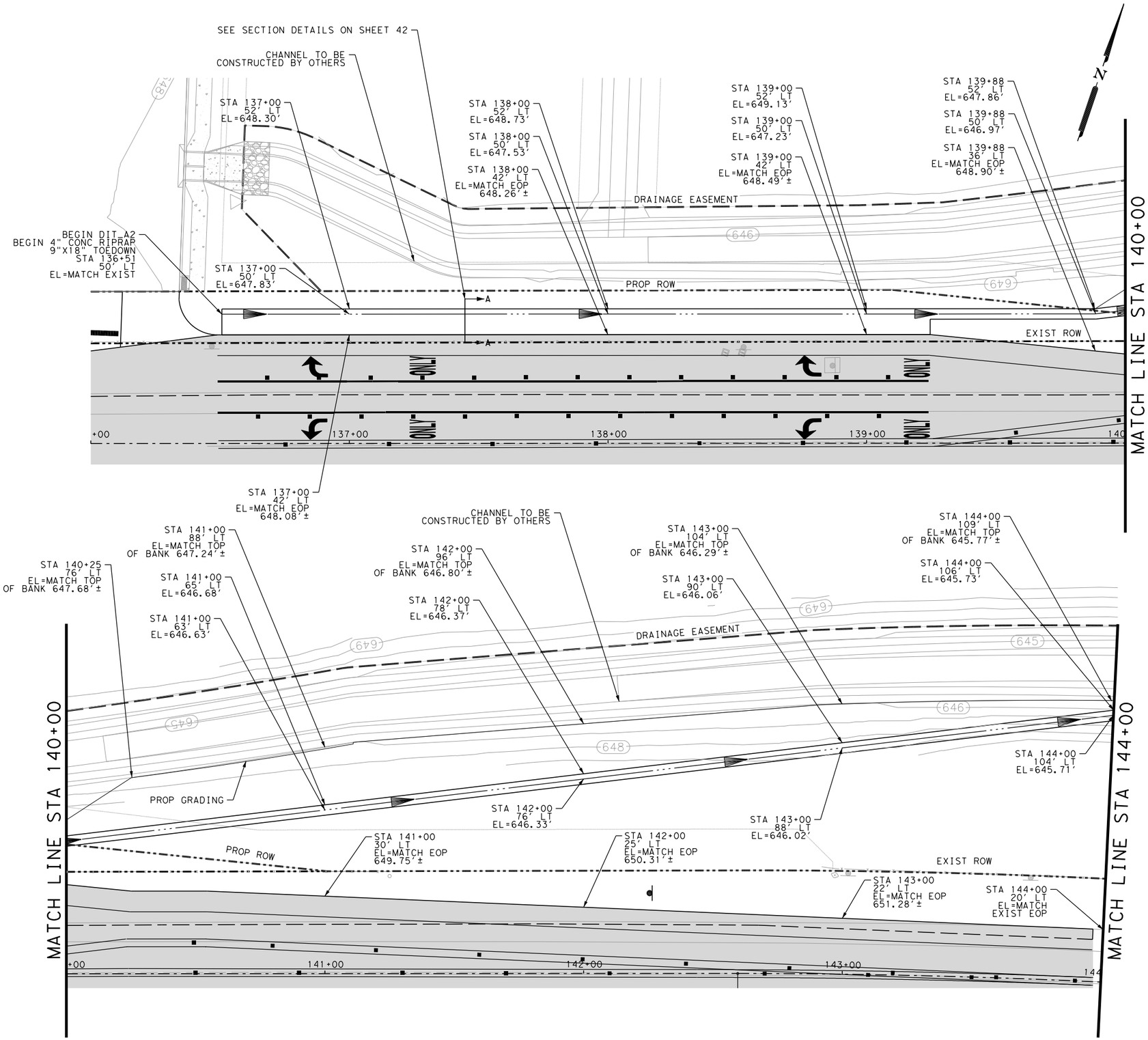


DESIGN

STATE OF TEXAS — STEVEN J. TATE — 131443 — LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/25/2023 DATE

APPROVAL

STATE OF TEXAS — DAN THOMA — 98622 — LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/25/2023 DATE

0 20 40 60

SCALE: 1" = 40'

REV. NO.	DATE	DESCRIPTION	BY

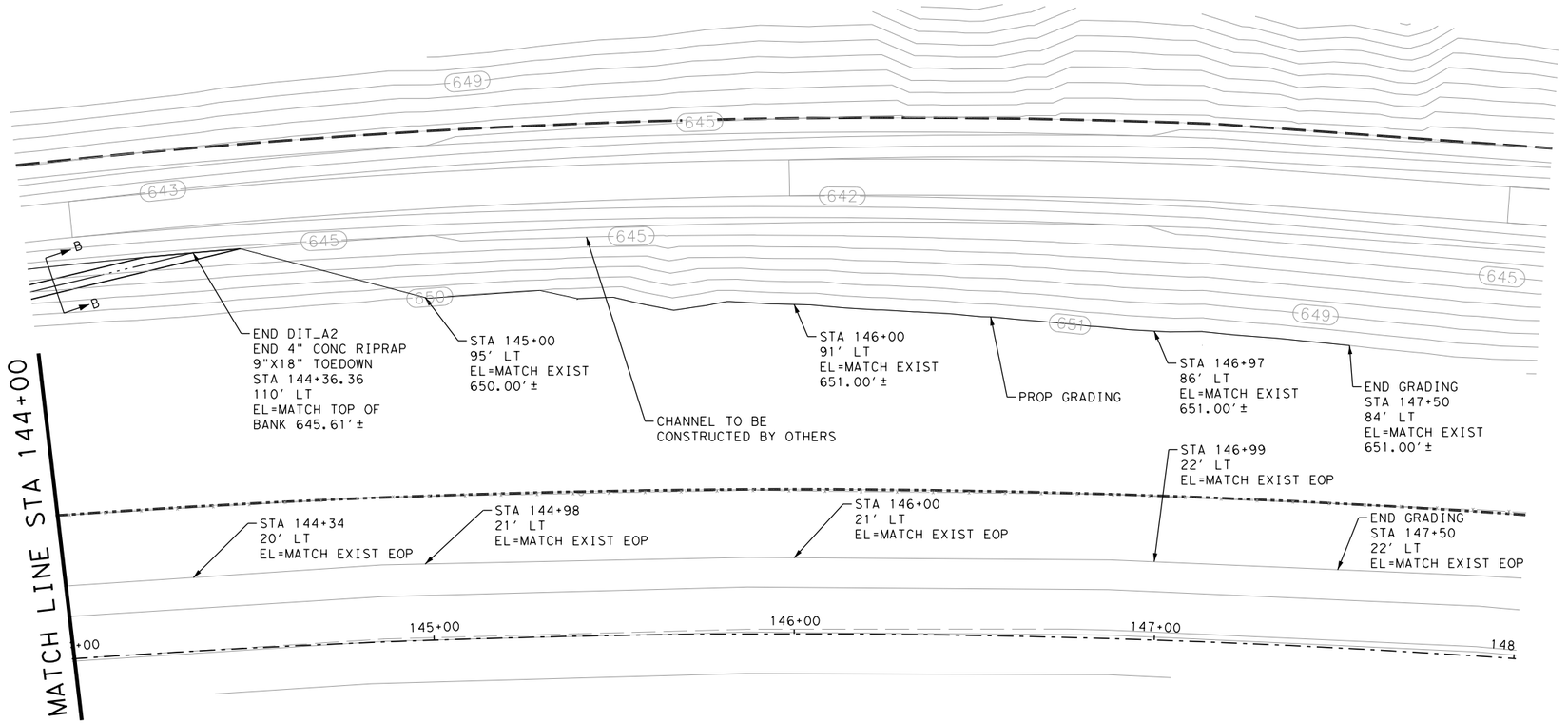
PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

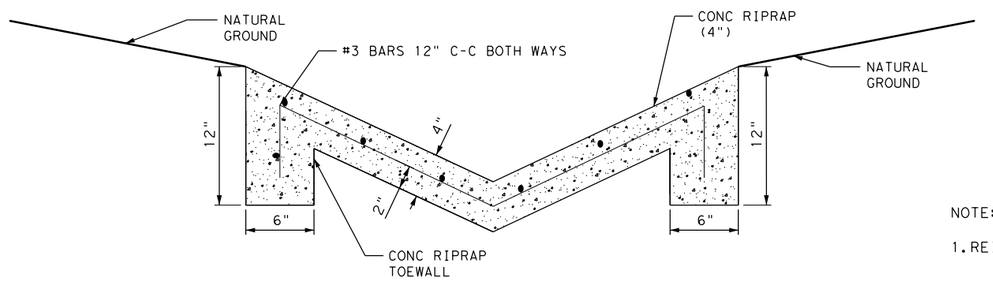
LUENSMANN PROPERTIES
FM 1346

ROADWAY DETAILS

SHEET 1 OF 4

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/25/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 41

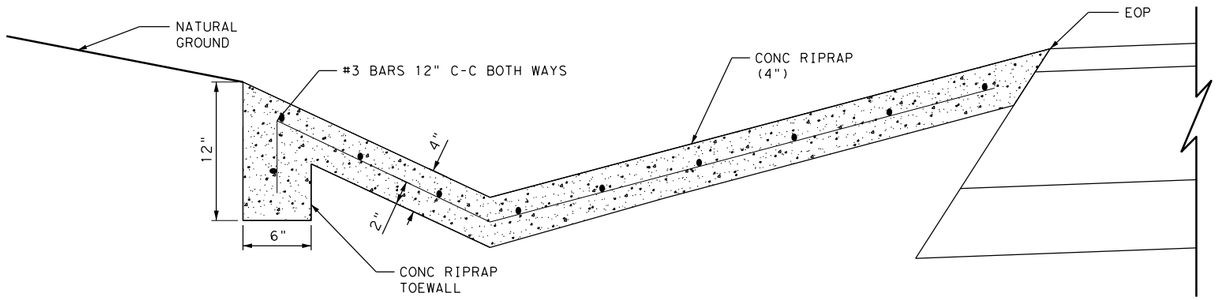




SECTION B-B
NTS

NOTE:

1. REINFORCEMENT AS SPECIFIED IN ITEM 432.



SECTION A-A
CONCRETE RIPRAP W/ TOEWALL DETAIL
NTS

DESIGN

STATE OF TEXAS
STEVEN J. TATE
131443
LICENSED
PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/25/2023 DATE

APPROVAL

STATE OF TEXAS
DAN THOMA
98622
LICENSED
PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/25/2023 DATE

0 20 40 60
SCALE: 1" = 40'

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
ROADWAY DETAILS

SHEET 2 OF 4

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/25/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 42

Plotted on: 9/25/2023

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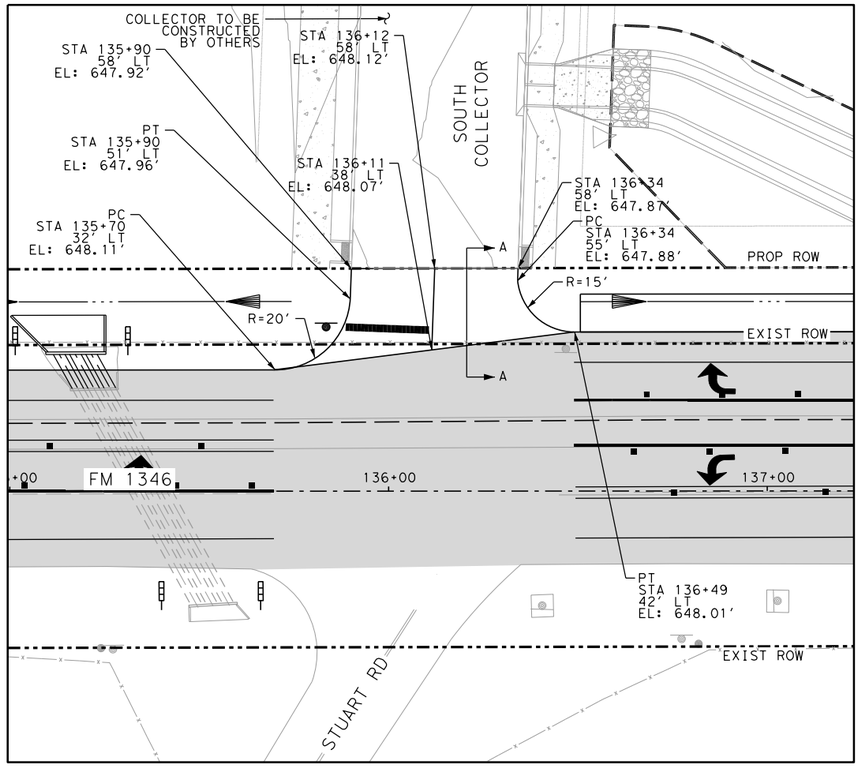
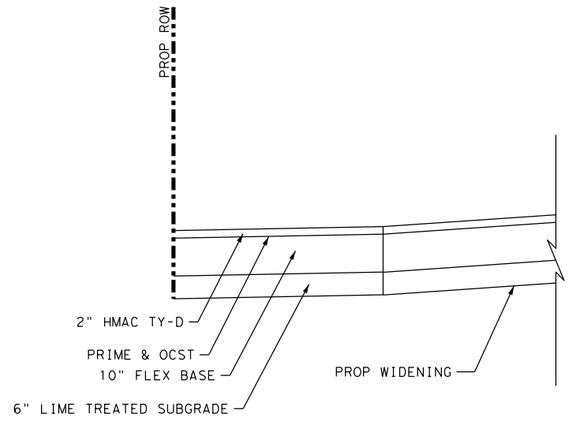


SOUTH COLLECTOR DETAIL

SCALE: 1" = 40'



SOUTH COLLECTOR DETAIL

(SECTION A-A)

NTS

DESIGN

STATE OF TEXAS
STEVEN J. TATE
131443
LICENSED
PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS
DAN THOMA
98622
LICENSED
PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

0 20 40 60

SCALE: 1" = 40'

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

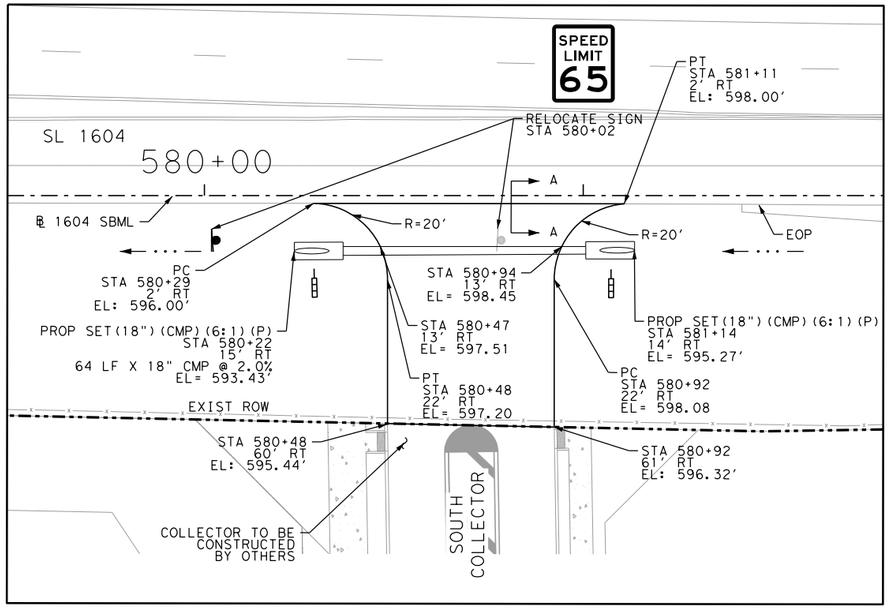
ROADWAY DETAILS

SHEET 3 OF 4

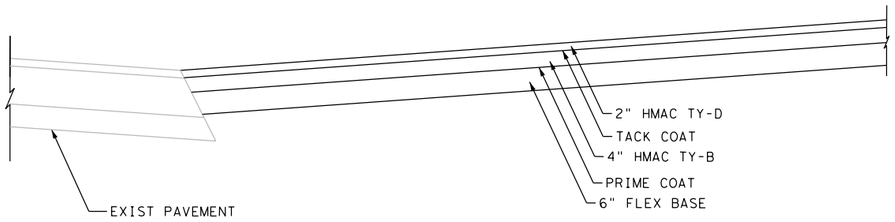
100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 43

Plotted on: 9/21/2023

Design Filename: P:\124\73\13\Design\Civil\Roadway\FM 1346\1247313_FM1346_details.dgn



SOUTH COLLECTOR DETAIL



SOUTH COLLECTOR DETAIL
(SECTION A-A)
NTS

CMP CAPACITY		
Q=	4.02	DISCHARGE, CFS
A=	1.77	AREA IN SQ. FT
V=	2.28	VELOCITY IN FPS
HV=	0.81	VELOCITY HEAD IN FT.
PW=	4.71	WETTED PERIMETER IN FT.
R=	0.38	HYDRAULIC RADIUS IN FT.
R(2/3)=	0.52	HYDRAULIC RADIUS TO (2/3)
AR(2/3)=	0.92	AREA * HYDRA. RAD. TO (2/3)
K=	56.90	CONVEYANCE

Q10=	2.71	DISCHARGE, CFS
Q100=	4.08	DISCHARGE, CFS
CMP CAPACITY EXCEEDS Q10 DESIGN EVENT		

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

0 20 40 60
SCALE: 1" = 40'

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
SL 1604
ROADWAY DETAILS

SHEET 4 OF 4

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 44

Plotted on: 9/21/2023

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Plotted on: 9/22/2023

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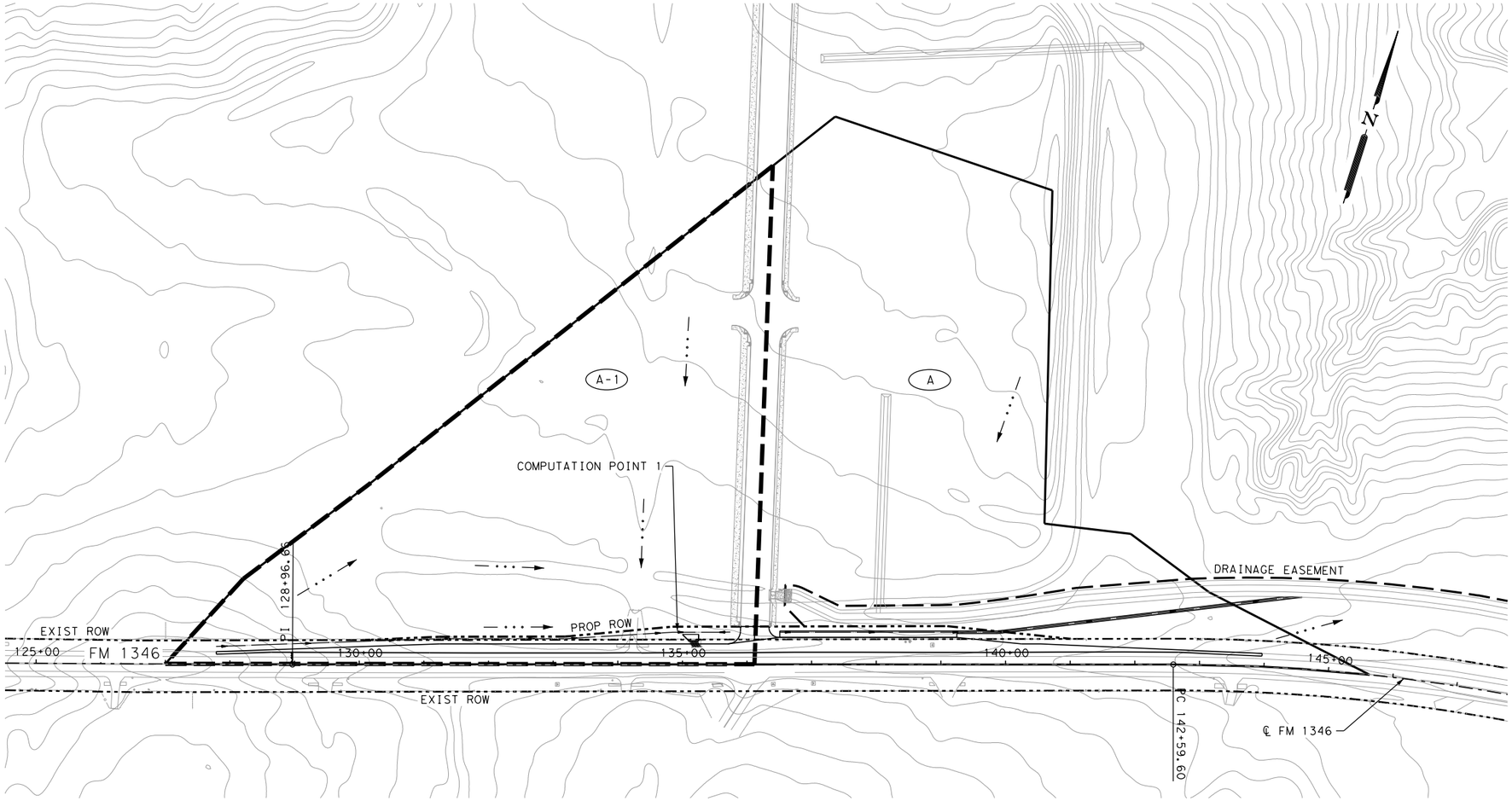


LEGEND

- EXIST ROW
- PROP ROW
- DRAINAGE EASEMENT
- EXIST DRAINAGE AREA BOUNDARY
- PROP DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW
- XX DRAINAGE AREA

NOTES

1. RATIONAL METHOD USED PEAK FLOW CALCULATIONS.
2. COMPUTED FLOWS CALCULATED USING RATIONAL METHOD. RAINFALL DATA OBTAINED FROM EBDLKUP-2019-vC6.2.10.xlsm.

DESIGN

STATE OF TEXAS — STEVEN J. TATE — 131443 — LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/22/2023 DATE

APPROVAL

STATE OF TEXAS — DAN THOMA — 98622 — LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/22/2023 DATE

0 100 200 300

SCALE: 1"= 200'

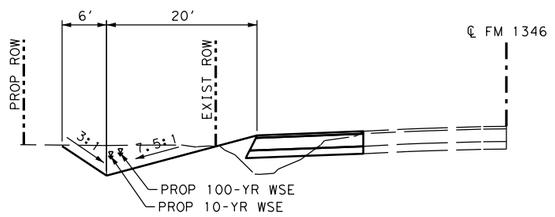
EXIST C-VALUE COMPUTATIONS				
DRAINAGE AREA	GRASS	ROAD	TOTAL AREA	COMPOSITE RUNOFF COEFFICIENT
	0.35	0.90	AC	
A	17.22	0.91	18.13	0.38

PROPOSED C-VALUE COMPUTATIONS				
DRAINAGE AREA	GRASS	ROAD	TOTAL AREA	COMPOSITE RUNOFF COEFFICIENT
	0.35	0.90	AC	
A-1	7.40	1.02	8.42	0.42

EXISTING HYDROLOGY - RATIONAL METHOD							
AREA ID	AREA (AC)	C	Tc (min)	INTENSITIES (in/hr)		COMPUTED FLOW (cfs)	
				I10	I100	Q10	Q100
A	18.13	0.38	19	5.53	8.45	38.2	58.3

PROPOSED HYDROLOGY - RATIONAL METHOD							
AREA ID	AREA (AC)	C	Tc (min)	INTENSITIES (in/hr)		COMPUTED FLOW (cfs)	
				I10	I100	Q10	Q100
A-1	8.42	0.42	19	5.53	8.45	19.6	29.9

COMPUTATION POINT 1		
D10=	1.30	D (FT)
D100=	1.52	D (FT)
BW=	0	BOTTOM WIDTH (FT)
L S.S=	3	LEFT SIDE SLOPE
R S.S.=	7.5	RIGHT SIDE SLOPE
SFL=	0.005	FL SLOPE IN FT/FT
N=	0.035	MANNING'S N-VALUE
Q10=	19.6	DISCHARGE, CFS
Q100=	29.9	DISCHARGE, CFS
V10=	2.21	FPS
V100=	2.45	FPS



COMPUTATION POINT 1 SECTION

N.T.S

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000

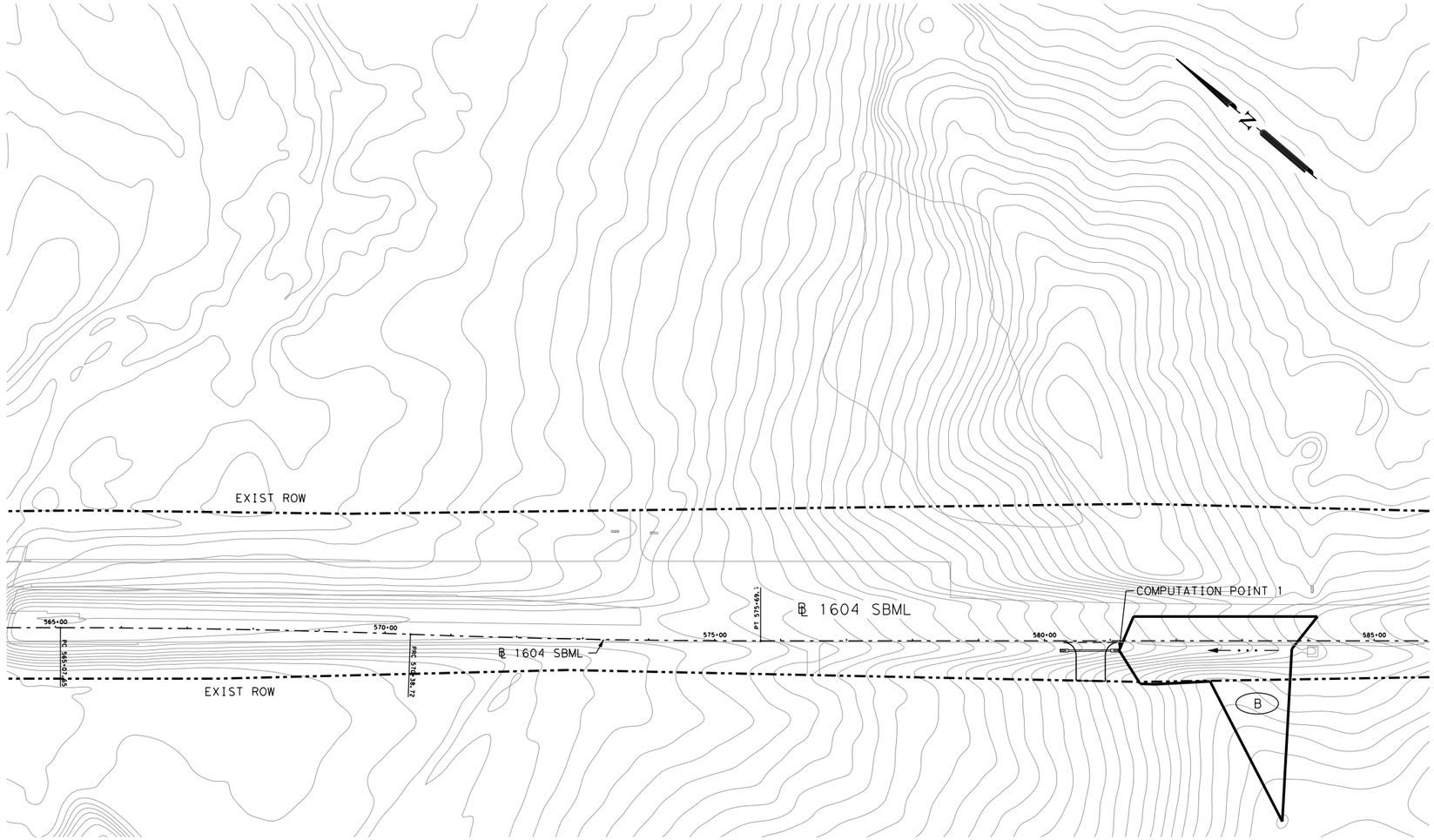
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

DRAINAGE AREA MAP

SHEET 1 OF 2

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/22/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 45



LEGEND

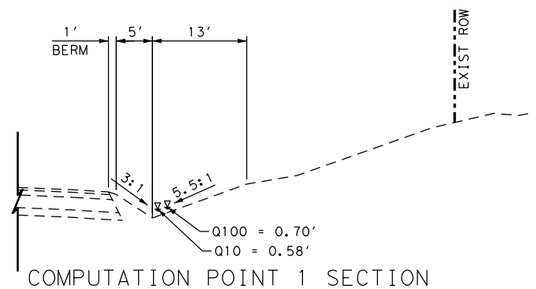
- EXIST ROW
- DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW
- (XX) INTERIOR DRAINAGE AREA

NOTES

1. RATIONAL METHOD USED FOR DRAINAGE AREAS LESS THAN 200 ACRES FOR PEAK FLOW CALCULATIONS.
2. 10 MIN. MINIMUM WAS USED FOR TIME OF CONCENTRATION CALCULATIONS.

EXIST C-VALUE COMPUTATIONS				
DRAINAGE AREA	GRASS	ROAD	TOTAL AREA	COMPOSITE RUNOFF COEFFICIENT
	0.35	0.90	AC	
B	0.60	0.25	0.85	0.44

EXISTING HYDROLOGY - RATIONAL METHOD							
AREA ID	AREA (AC)	C	Tc (min)	INTENSITIES (in/hr)		COMPUTED FLOW (cfs)	
				I10	I100	Q10	Q100
B	0.85	0.44	10	7.25	10.9	2.71	4.08



COMPUTATION POINT 1 SECTION
STA 581+14 (℄ 1604 SBML)
N.T.S

COMPUTATION POINT 1		
D10=	0.58	D (FT)
D100=	0.70	D (FT)
BW=	0	BOTTOM WIDTH (FT)
L S.S=	3	LEFT SIDE SLOPE
R S.S.=	5.5	RIGHT SIDE SLOPE
SFL=	0.005	FL SLOPE IN FT/FT
N=	0.024	MANNING'S N-VALUE
Q10=	2.71	DISCHARGE, CFS
Q100=	4.08	DISCHARGE, CFS
V10=	1.88	FPS
V100=	2.11	FPS

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

0 100 200 300

SCALE: 1"= 200'

REV. NO.	DATE	DESCRIPTION	BY

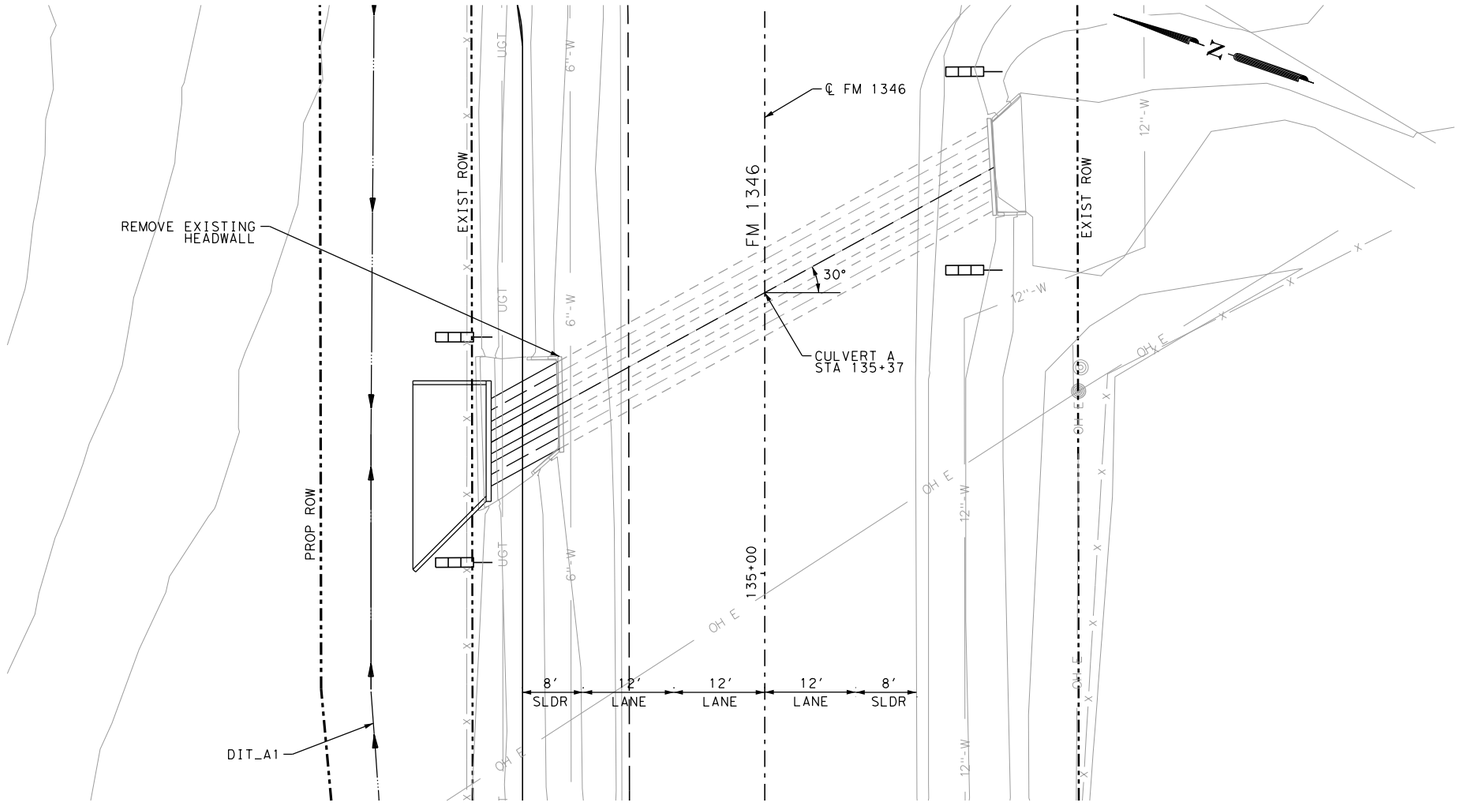
PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

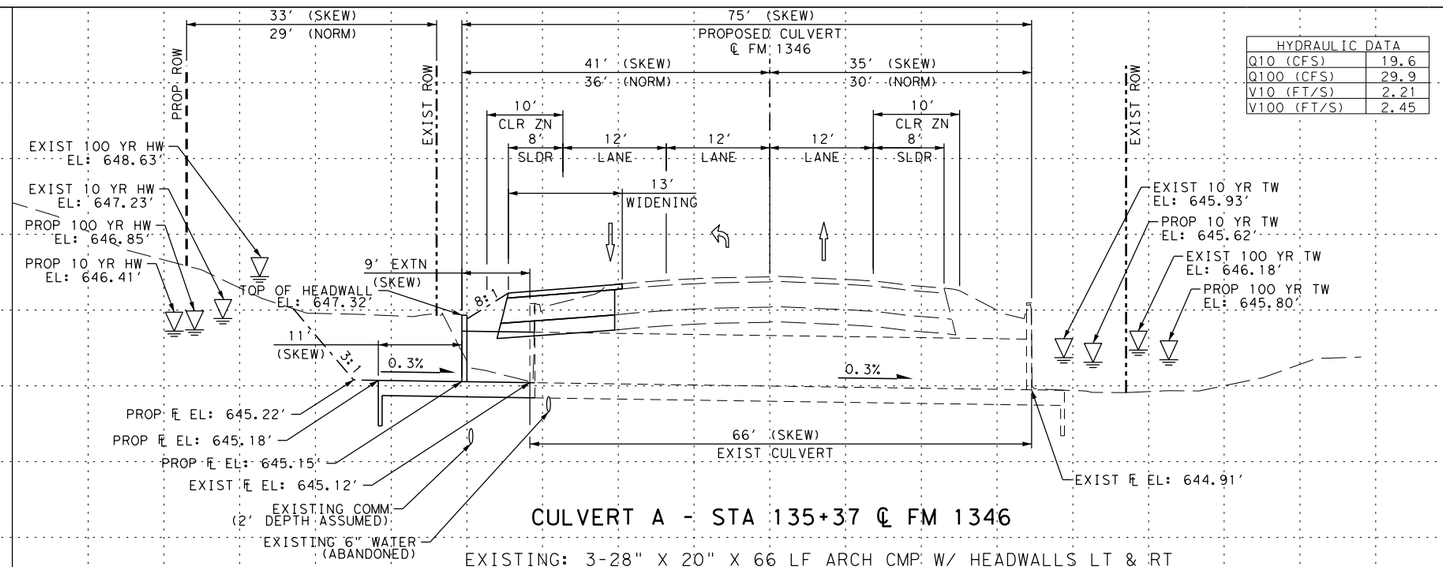
LUENSMANN PROPERTIES

DRAINAGE AREA MAP

SHEET 2 OF 2

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 46





HYDRAULIC DATA	
Q10 (CFS)	19.6
Q100 (CFS)	29.9
V10 (FT/S)	2.21
V100 (FT/S)	2.45

CULVERT A - STA 135+37 ℄ FM 1346

EXISTING: 3-28" X 20" X 66 LF ARCH CMP W/ HEADWALLS LT & RT

PROPOSED: REMOVE EXISTING HEADWALL LT
EXTEND 3-28" X 20" ARCH CMP 9' LT
W/ CH-FW-A-30 (HW=3') LT

LEGEND

- EXIST ROW
- PROP ROW
- EXISTING CONTOUR
- DITCH FLOWLINE
- FLOW ARROW
- TRAFFIC FLOW ARROW

NOTES

1. ALL UTILITIES AND EXISITNG DRAINAGE STRUCTURES SHOWN ARE APPROXIMATE LOCATIONS. CONTRACTOR SHALL VERIFY DEPTHS AND LOCATIONS PRIOR TO THE START OF CONSTRUCTION.
2. ALL EXISTING FEATURES ARE SHOWN SCREENED BACK; i.e. FADED.
3. EXISTING 1' CONTOURS ARE SHOWN.

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

0 10 20

SCALE: PLAN 1"= 20' PROFILE 1"= 5'

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

CULVERT A LAYOUT

SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13	DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 47

Plotted on: 9/21/2023

Design Filename: P:\124\73\13\Design\Civil\Drainage\FM 1346\12473120ulvA_1346.dgn

Plotted on: 9/21/2023

Design Filename: P:\124\73\13\Design\Civil\Drainage\FM 1346\1247313HDS_A_EX.dgn

Table 1 - Summary of Culvert Flows at Crossing: EX CULVERT 1346

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	EX CULVERT 1346 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
647.23	10 yr	38.20	38.20	0.00	1
647.80	25 yr	46.10	46.10	0.00	1
648.27	50 yr	52.10	52.10	0.00	1
648.63	100 yr	58.30	56.37	1.75	17
648.60	Overtopping	55.99	55.99	0.00	Overtopping

Rating Curve Plot for Crossing: EX CULVERT 1346

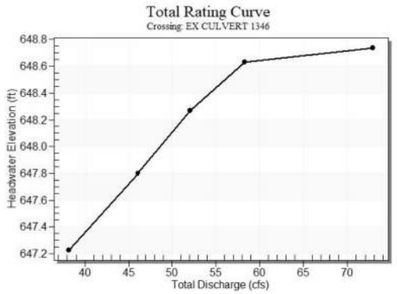


Table 2 - Culvert Summary Table: EX CULVERT 1346

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10 yr	38.20	38.20	647.23	1.766	2.107	7-M2c	1.667	1.037	1.037	1.017	5.854	1.869
25 yr	46.10	46.10	647.80	2.077	2.682	7-M2c	1.667	1.156	1.156	1.124	6.372	1.976
50 yr	52.10	52.10	648.27	2.346	3.148	7-M2c	1.667	1.235	1.235	1.200	6.782	2.049
100 yr	58.30	56.37	648.63	2.557	3.513	7-M2c	1.667	1.288	1.288	1.273	7.082	2.117

Straight Culvert

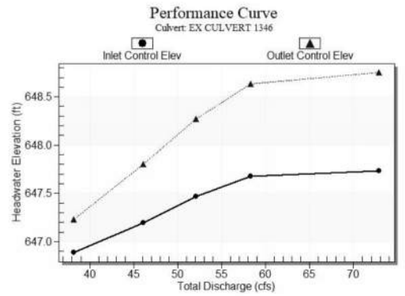
Inlet Elevation (invert): 645.12 ft, Outlet Elevation (invert): 644.91 ft

Culvert Length: 66.00 ft, Culvert Slope: 0.0032

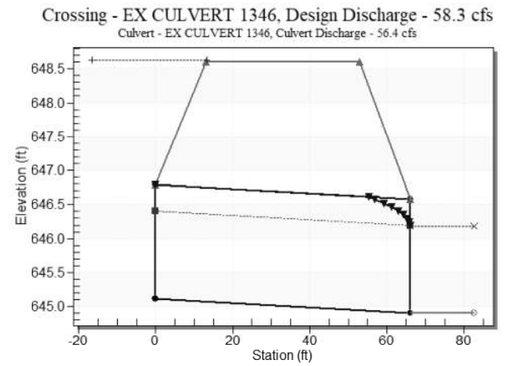
Crossing Discharge Data

Discharge Selection Method: User Defined

Culvert Performance Curve Plot: EX CULVERT 1346



Water Surface Profile Plot for Culvert: EX CULVERT 1346



Site Data - EX CULVERT 1346

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 645.12 ft
Outlet Station: 66.00 ft
Outlet Elevation: 644.91 ft
Number of Barrels: 3

Culvert Data Summary - EX CULVERT 1346

Barrel Shape: Pipe Arch
Barrel Span: 28.00 in
Barrel Rise: 20.00 in
Barrel Material: Steel or Aluminum
Embedment: 0.00 in
Barrel Manning's n: 0.0220
Culvert Type: Straight
Inlet Configuration: Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: EX CULVERT 1346)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
38.20	645.93	1.02	1.87	0.13	0.37
46.10	646.03	1.12	1.98	0.14	0.38
52.10	646.11	1.20	2.05	0.15	0.38
58.30	646.18	1.27	2.12	0.16	0.38

Tailwater Channel Data - EX CULVERT 1346

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 14.00 ft
Side Slope (H:V): 6.00 (_:1)
Channel Slope: 0.0020
Channel Manning's n: 0.0300
Channel Invert Elevation: 644.91 ft

Roadway Data for Crossing: EX CULVERT 1346

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 648.60 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
HYDRAULIC DATA SHEET
EXIST CULVERT A
SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 48

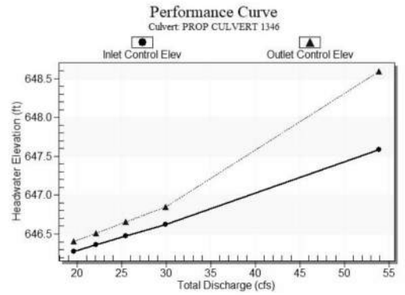
Plotted on: 9/21/2023

Design Filename: P:\124\73\13\Design\Civil\Drainage\FM 1346\124731 3HDS_A_PROP.dgn

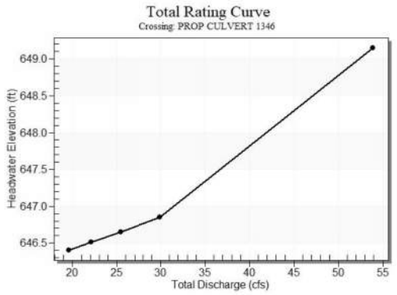
Table 1 - Summary of Culvert Flows at Crossing: PROP CULVERT 1346

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	PROP CULVERT 1346 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
646.41	10 yr	19.60	19.60	0.00	1
646.51	25 yr	22.10	22.10	0.00	1
646.65	50 yr	25.40	25.40	0.00	1
646.85	100 yr	29.90	29.90	0.00	1
648.60	Overtopping	53.89	53.89	0.00	Overtopping

Culvert Performance Curve Plot: PROP CULVERT 1346



Rating Curve Plot for Crossing: PROP CULVERT 1346



Water Surface Profile Plot for Culvert: PROP CULVERT 1346

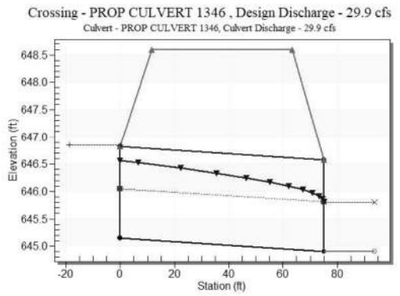


Table 2 - Culvert Summary Table: PROP CULVERT 1346

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10 yr	19.60	19.60	646.41	1.123	1.257	2-M2c	1.148	0.711	0.711	0.706	4.483	1.523
25 yr	22.10	22.10	646.51	1.211	1.363	2-M2c	1.667	0.762	0.762	0.754	4.686	1.581
50 yr	25.40	25.40	646.65	1.324	1.503	2-M2c	1.667	0.824	0.824	0.815	4.944	1.651
100 yr	29.90	29.90	646.85	1.476	1.700	7-M2c	1.667	0.899	0.899	0.891	5.306	1.736

****

Straight Culvert

Inlet Elevation (invert): 645.15 ft, Outlet Elevation (invert): 644.91 ft

Culvert Length: 75.00 ft, Culvert Slope: 0.0032

****

Crossing Discharge Data

Discharge Selection Method: User Defined

Site Data - PROP CULVERT 1346

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 645.15 ft

Outlet Station: 75.00 ft

Outlet Elevation: 644.91 ft

Number of Barrels: 3

Culvert Data Summary - PROP CULVERT 1346

Barrel Shape: Pipe Arch

Barrel Span: 28.00 in

Barrel Rise: 20.00 in

Barrel Material: Steel or Aluminum

Embedment: 0.00 in

Barrel Manning's n: 0.0220

Culvert Type: Straight

Inlet Configuration: Headwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: PROP CULVERT 1346)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
19.60	645.62	0.71	1.52	0.09	0.35
22.10	645.66	0.75	1.58	0.09	0.36
25.40	645.72	0.81	1.65	0.10	0.36
29.90	645.80	0.89	1.74	0.11	0.37

Tailwater Channel Data - PROP CULVERT 1346

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 14.00 ft

Side Slope (H:V): 6.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0300

Channel Invert Elevation: 644.91 ft

Roadway Data for Crossing: PROP CULVERT 1346

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 648.60 ft

Roadway Surface: Paved

Roadway Top Width: 52.00 ft

DESIGN

STATE OF TEXAS — STEVEN J. TATE — 131443 — LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS — DAN THOMA — 98622 — LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000

TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES

FM 1346

HYDRAULIC DATA SHEET PROPOSED CULVERT A

SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 49

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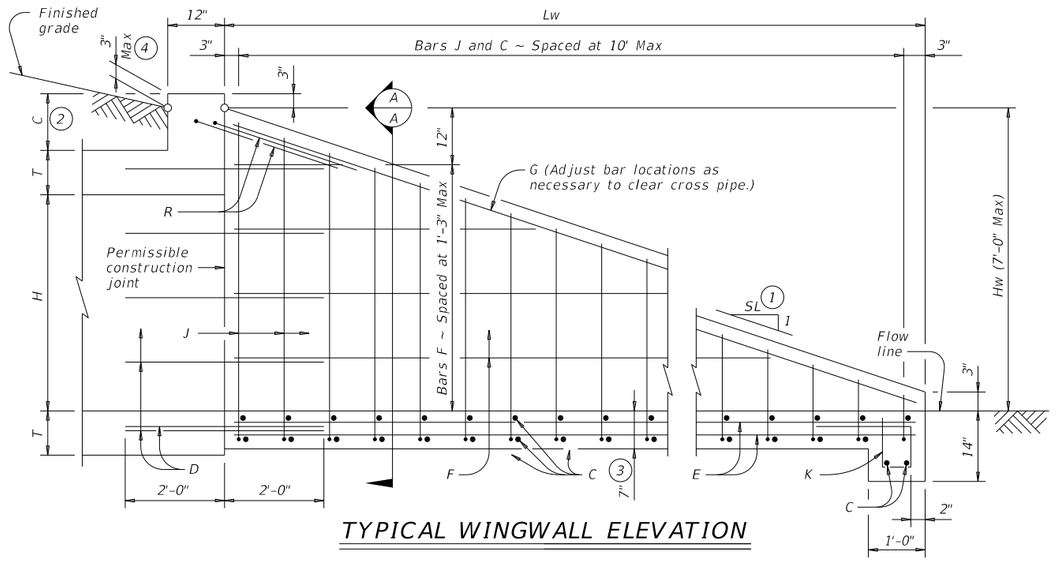
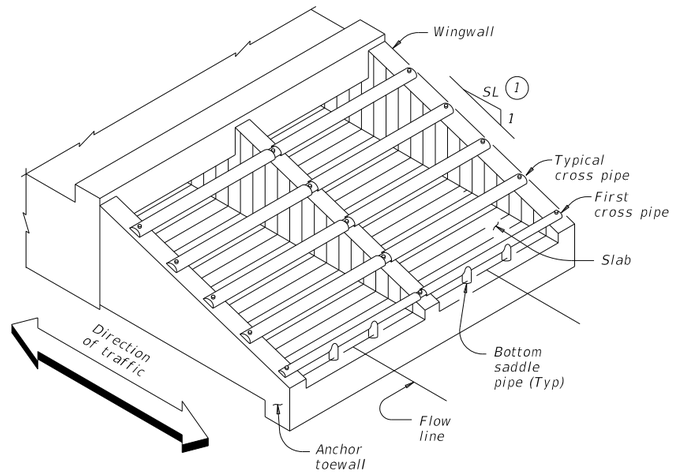


TYPICAL WINGWALL ELEVATION

(Cross pipes not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing bolted anchor option.)

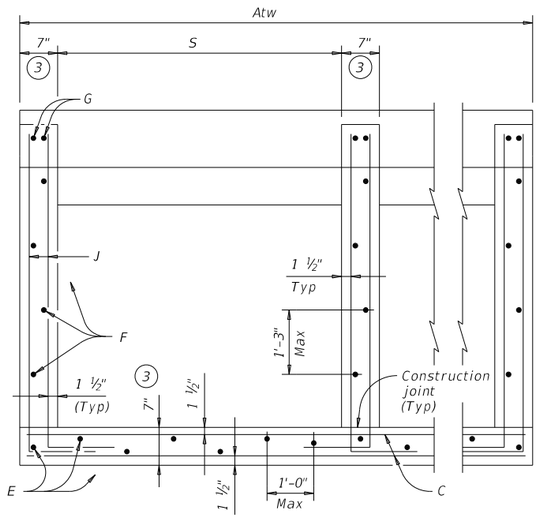
WING DIMENSION CALCULATIONS:

Hw = H + T + C – 0.250'
Lw = (Hw – 0.250') (SL)

For cast-in-place culverts:
Atw = (N) (S) + (N + 1) (U)
For precast culverts:
Atw = (N) (2U + S) + (N – 1) (0.500')

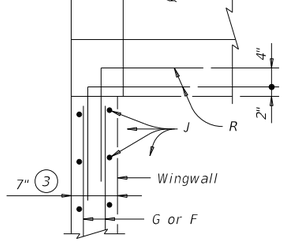
Total Wingwall Area (SF)
= (0.5) (Hw + 0.250') (Lw) (N – 1)
Total Concrete Volume (CY)
= [(Wingwall Area) (0.583') +
(Lw) (Atw) (0.583') +
(Atw) (1.000') (1.167' – 0.583')] ÷ (27)
Total Reinforcing (Lb)
= (1.55) (Lw) (Atw) +
(4.43) (Atw) +
(K) (Hw) (N + 1) (√Lw)

C = Height of curb above top of top slab (feet)
Hw = Height of wingwall (feet)
K = Constant value for use in formulas
Slope SL:1 K
6:1 ~ 10.41
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)
See applicable box culvert standard for H, S, T, and U values.



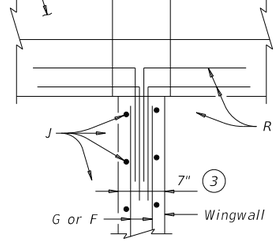
SECTION A-A

(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)



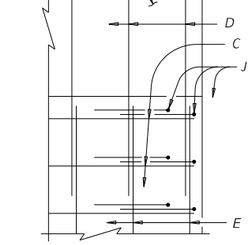
AT TOP OF EXTERIOR WINGWALL

(Cast-in-place culvert)



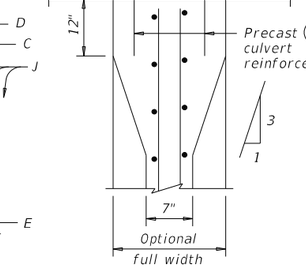
AT TOP OF INTERIOR WINGWALL

(Cast-in-place culvert)



AT OUTSIDE OF BOTTOM SLAB

(Cast-in-place culvert)



AT INTERIOR WINGWALL

(Precast culvert)

PLAN VIEWS OF CORNER DETAILS

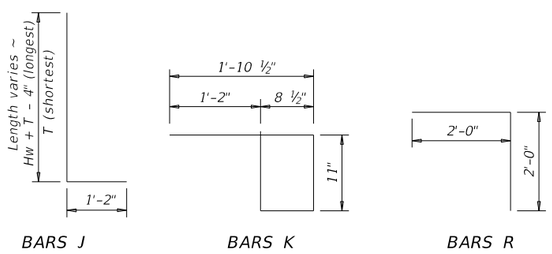


TABLE OF REINFORCING BAR SIZES AND SPACING

Bar	Size	Spacing
C	#4	10" Max
D	#4	Match F and E
E	#4	1'- 0" Max
F	#4	1'- 3" Max
G	#6	As shown
J	#4	10" Max
K	#4	1'- 0" Max
R	#4	As shown

(1) *Provide 6:1 or flatter slope.*

(2) *0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to Extended Curb Details the Extended Curb Details (ECD) standard sheet.*

(3) *Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" Minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.*

(4) *For vehicle safety, reduce height, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.*

(5) *For culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into wingwall. Wingwall bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP-MD) standard sheet.*

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Adjust reinforcing as necessary to provide a minimum clear cover of 1½".
Provide Class "C" concrete (f`c = 3,600 psi).
Provide pipe runners, cross pipes, and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts.
Galvanize all steel components, except the concrete reinforcing, unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with Item 445, "Galvanizing."

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.
Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.
The quantities for concrete, reinforcing steel, and cross pipes resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR BOX CULVERTS (MAXIMUM Hw = 7'-0") TYPE I ~ PARALLEL DRAINAGE

SETB-PD

FILE: setbpdse-22.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 06-2022 ~ Wing dimesions				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		50

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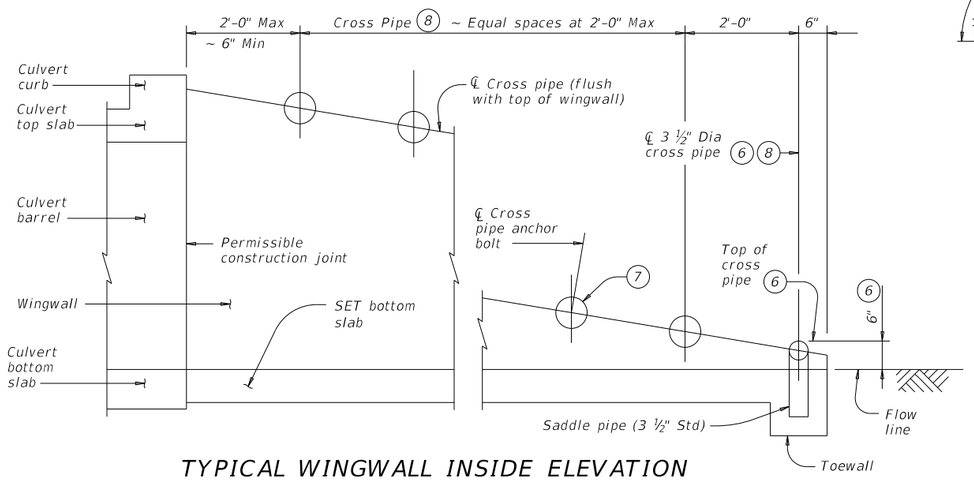
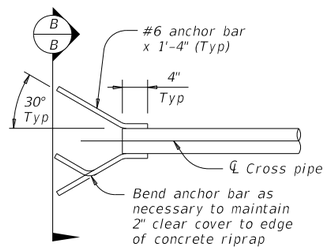
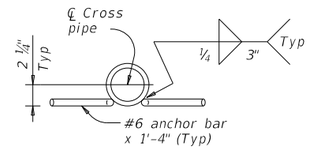


TYPICAL WINGWALL INSIDE ELEVATION

(Showing installation of cross pipes.)



PART PLAN



SECTION B-B

OPTIONAL ANCHOR BAR DETAILS

REQUIRED PIPE SIZES (8)		
Culvert Span Sizes	Cross Pipe Size	Sleeve Pipe Size (9)
First Pipe	3 ½" STD	2 ½" STD
30" to 42"	4" STD	3" STD
48" to 72"	5" STD	4" STD
78" to 120"	6" STD	5" STD

STANDARD PIPE SIZES		
Pipe Size	Pipe O.D.	Pipe I.D.
2 ½" STD	2.875"	2.469"
3" STD	3.500"	3.068"
3 ½" STD	4.000"	3.548"
4" STD	4.500"	4.026"
5" STD	5.563"	5.047"
6" STD	6.625"	6.065"

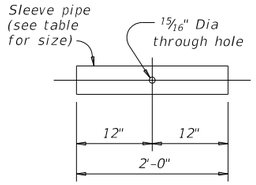
(6) The proper installation of the first cross pipe is critical for vechicle saftey. Place the top of the first cross pipe at no more than 6" above the flow line.

(7) Always install the third cross pipe from the bottom of the culvert using a bolted connection. Take care to ensure that concrete does not flow into this cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

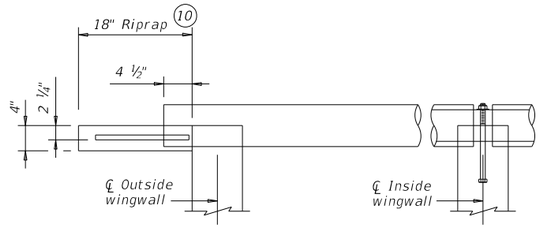
(8) Provide cross pipes and sleeve pipes (if required) as shown in the Required Pipe Sizes table. Provide 3 1#2" saddle pipes for the 3 1#2" first cross pipe.

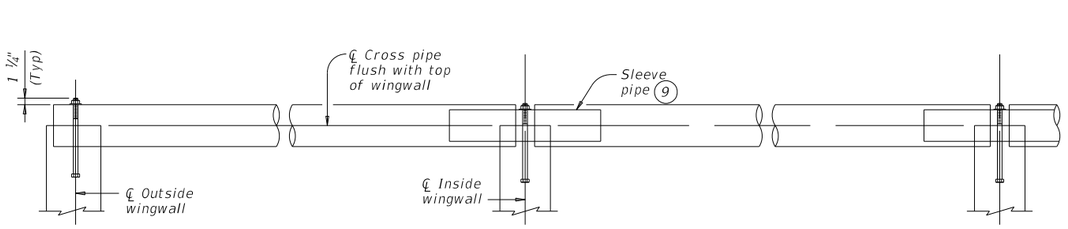
(9) At Contractor's option, make the cross pipe continuous across the inside wingwalls. If this option is selected, omit the sleeve pipe and make a 15#16" diameter throughhole in the cross pipe to accept the anchor bolt at the centerline of each interior wingwall.

(10) Provide riprap when using the Optional Anchor Bar details. Riprap is included in the bid price for Safety End Treatment. Provide riprap in accordance with Item 432, "Riprap".



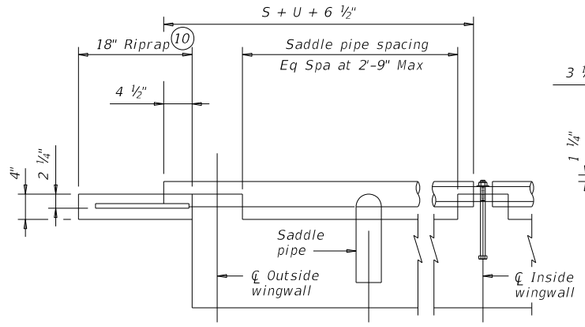
SLEEVE PIPE DETAILS (9)

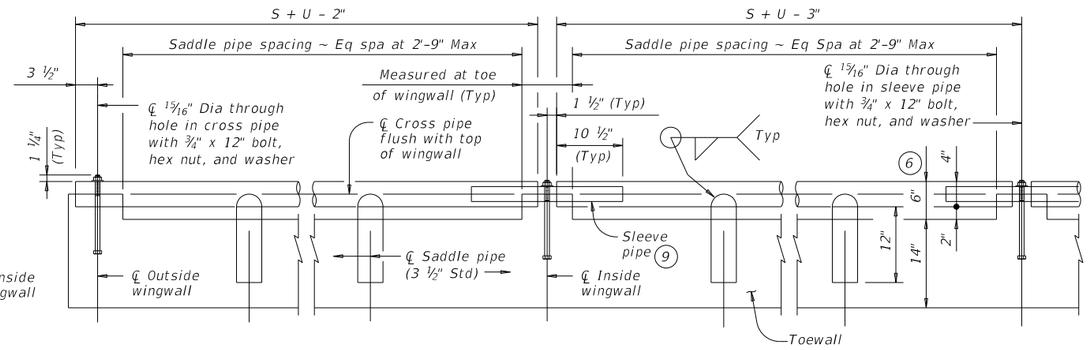




SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE

(Anchor details and dimensions are similar to those shown below in Section Through Installation of 3 ½" First Cross Pipe detail.)





SECTION THROUGH INSTALLATION OF 3 ½" FIRST CROSS PIPE

OUTSIDE CULVERT BARREL WITH OPTIONAL ANCHOR BARS & RIPRAP

OUTSIDE CULVERT BARREL WITH BOLTED ANCHOR

INSIDE CULVERT BARREL

CROSS PIPE INSTALLATION DETAILS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ PARALLEL DRAINAGE

SETB-PD

FILE: setbpdse-22.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 06-2022 ~ Wing dimesions				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		51

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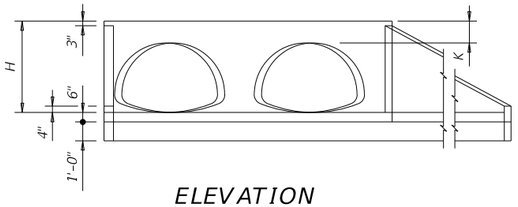
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (6)

Slope	Design	Size of Pipe Arch Span	Size of Pipe Arch Rise	Values for One Pipe W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	Values to be Added for Each Addt'l Pipe X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	1	17"	13"	5' - 4 3/4"	3' - 7 1/4"	3' - 0"	4' - 3"	109	0.7	2' - 9 1/2"	39	0.4
	2	21"	15"	6' - 1 1/4"	3' - 11 3/4"	3' - 4"	4' - 8 1/2"	120	0.9	3' - 4 1/2"	46	0.5
	3	28"	20"	7' - 7 1/2"	4' - 8"	4' - 2"	5' - 10 3/4"	158	1.2	4' - 4"	65	0.7
	4	35"	24"	8' - 11 1/2"	5' - 4"	4' - 10"	6' - 10"	192	1.5	5' - 3 1/2"	88	0.9
	5	42"	29"	10' - 5 1/2"	6' - 0"	5' - 8"	8' - 0 1/4"	230	2.0	6' - 3"	109	1.2
	6	49"	33"	11' - 9 3/4"	6' - 8 1/4"	6' - 4"	8' - 11 1/4"	261	2.4	7' - 2 1/2"	124	1.5
	7	57"	38"	13' - 5"	7' - 5 1/2"	7' - 2"	10' - 1 3/4"	308	2.9	8' - 3 1/4"	149	1.9
	8	64"	43"	14' - 11"	8' - 1 1/2"	8' - 0"	11' - 3 3/4"	355	3.5	9' - 5 1/4"	186	2.3
	9	71"	47"	16' - 3"	8' - 9 1/2"	8' - 8"	12' - 3"	402	4.1	10' - 5 3/4"	215	2.8
3:1	1	17"	13"	6' - 10 3/4"	3' - 7 1/4"	4' - 6"	6' - 4 1/4"	140	1.1	2' - 9 1/2"	41	1.4
	2	21"	15"	7' - 9 1/4"	3' - 11 3/4"	5' - 0"	7' - 0 3/4"	160	1.3	3' - 4 1/2"	52	1.6
	3	28"	20"	9' - 8 1/2"	4' - 8"	6' - 3"	8' - 10"	211	1.8	4' - 4"	72	1.8
	4	35"	24"	11' - 4 1/2"	5' - 4"	7' - 3"	10' - 3"	257	2.3	5' - 3 1/2"	98	1.1
	5	42"	29"	13' - 3 1/2"	6' - 0"	8' - 6"	12' - 0 1/4"	315	2.9	6' - 3"	126	1.5
	6	49"	33"	14' - 11 3/4"	6' - 8 1/4"	9' - 6"	13' - 5 1/4"	361	3.6	7' - 2 1/2"	145	1.9
	7	57"	38"	17' - 0"	7' - 5 1/2"	10' - 9"	15' - 2 1/2"	431	4.4	8' - 3 1/4"	178	2.4
	8	64"	43"	18' - 11"	8' - 1 1/2"	12' - 0"	16' - 11 3/4"	500	5.4	9' - 5 1/4"	221	3.0
	9	71"	47"	20' - 7"	8' - 9 1/2"	13' - 0"	18' - 4 3/4"	559	6.2	10' - 5 3/4"	255	3.6
4:1	1	17"	13"	8' - 4 3/4"	3' - 7 1/4"	6' - 0"	8' - 5 3/4"	179	1.4	2' - 9 1/2"	46	0.5
	2	21"	15"	9' - 5 1/4"	3' - 11 3/4"	6' - 8"	9' - 5 1/4"	202	1.7	3' - 4 1/2"	58	0.7
	3	28"	20"	11' - 9 1/2"	4' - 8"	8' - 4"	11' - 9 1/2"	270	2.4	4' - 4"	81	1.0
	4	35"	24"	13' - 9 1/2"	5' - 4"	9' - 8"	13' - 8"	334	3.1	5' - 3 1/2"	112	1.4
	5	42"	29"	16' - 1 1/2"	6' - 0"	11' - 4"	16' - 0 1/4"	396	4.1	6' - 3"	139	1.8
	6	49"	33"	18' - 1 3/4"	6' - 8 1/4"	12' - 8"	17' - 11"	475	4.9	7' - 2 1/2"	170	2.3
	7	57"	38"	20' - 7"	7' - 5 1/2"	14' - 4"	20' - 3 1/4"	555	6.2	8' - 3 1/4"	204	3.0
	8	64"	43"	22' - 11"	8' - 1 1/2"	16' - 0"	22' - 7 1/2"	658	7.5	9' - 5 1/4"	256	3.7
	9	71"	47"	24' - 11"	8' - 9 1/2"	17' - 4"	24' - 6 1/4"	733	8.7	10' - 5 3/4"	295	4.4
6:1	1	17"	13"	11' - 4 3/4"	3' - 7 1/4"	9' - 0"	12' - 8 3/4"	256	2.2	2' - 9 1/2"	53	0.7
	2	21"	15"	12' - 9 1/4"	3' - 11 3/4"	10' - 0"	14' - 1 3/4"	295	2.7	3' - 4 1/2"	68	0.9
	3	28"	20"	15' - 11 1/2"	4' - 8"	12' - 6"	17' - 8 1/4"	401	3.9	4' - 4"	100	1.3
	4	35"	24"	18' - 7 1/2"	5' - 4"	14' - 6"	20' - 6"	486	5.1	5' - 3 1/2"	132	1.8
	5	42"	29"	21' - 9 1/2"	6' - 0"	17' - 0"	24' - 0 1/2"	602	6.7	6' - 3"	172	2.5
	6	49"	33"	24' - 5 3/4"	6' - 8 1/4"	19' - 0"	26' - 10 1/2"	723	8.2	7' - 2 1/2"	212	3.2
	7	57"	38"	27' - 9"	7' - 5 1/2"	21' - 6"	30' - 5"	861	10.4	8' - 3 1/4"	264	4.1
	8	64"	43"	30' - 11"	8' - 1 1/2"	24' - 0"	33' - 11 1/4"	1,017	12.6	9' - 5 1/4"	325	5.1
	9	71"	47"	33' - 7"	8' - 9 1/2"	26' - 0"	36' - 9 1/4"	1,149	14.7	10' - 5 3/4"	382	6.1



ELEVATION

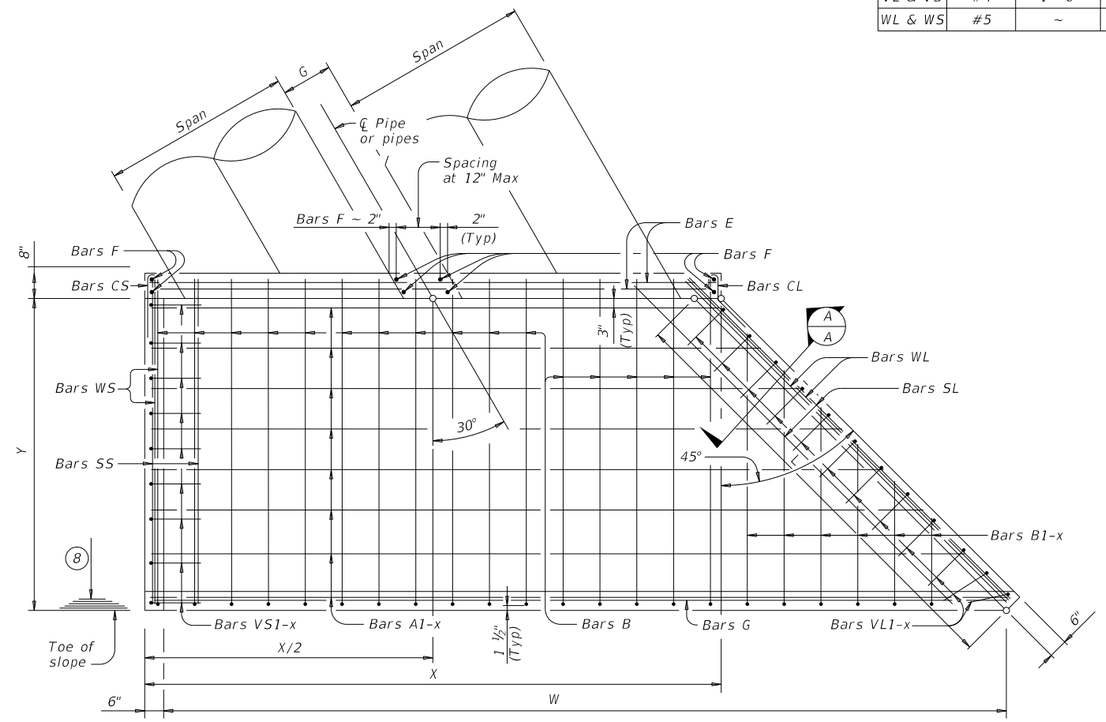
(Showing dimensions.)

TABLE OF (6) REINFORCING STEEL

Bar	Size	Spa	No.
A	#4	1' - 0"	~
B	#3	1' - 6"	~
CL & CS	#4	1' - 0"	~
D	#3	1' - 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
SL & SS	#4	~	6
VL & VS	#4	1' - 0"	~
WL & WS	#5	~	4

TABLE OF CONSTANT DIMENSIONS

Design	Size of Pipe Arch Span	Size of Pipe Arch Rise	G	K (5)	H
1	17"	13"	1' - 0"	1' - 0"	2' - 1"
2	21"	15"	1' - 2"	1' - 0"	2' - 3"
3	28"	20"	1' - 5"	1' - 0"	2' - 8"
4	35"	24"	1' - 8"	1' - 0"	3' - 0"
5	42"	29"	1' - 11"	1' - 0"	3' - 5"
6	49"	33"	2' - 2"	1' - 0"	3' - 9"
7	57"	38"	2' - 5"	1' - 0"	4' - 2"
8	64"	43"	2' - 10"	1' - 0"	4' - 7"
9	71"	47"	3' - 2"	1' - 0"	4' - 11"



PLAN

(1) Quantities shown are for metal pipe and will increase slightly for concrete pipe installations.

(2) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

(4) K is measured from top of curb to inside face of pipe.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).

(7) Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$

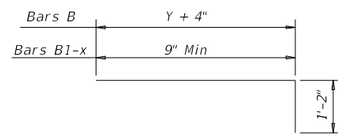
Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$

(8) Lengths of wings based on SL:1 slope along this line.

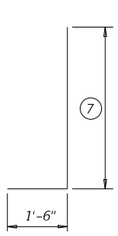
MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

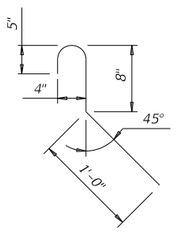
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing dimensions are out-to-out of bars.



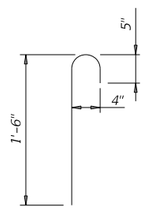
BARS B and B1-x



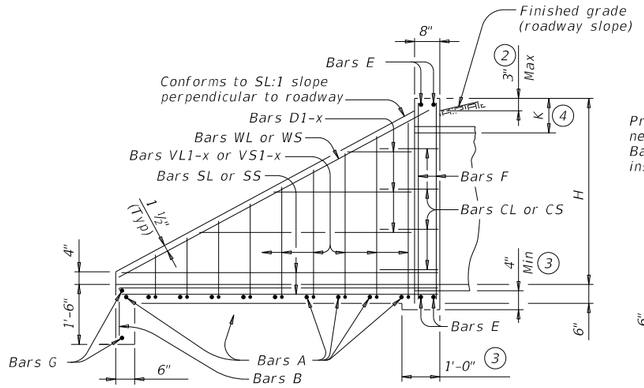
BARS VL and VS



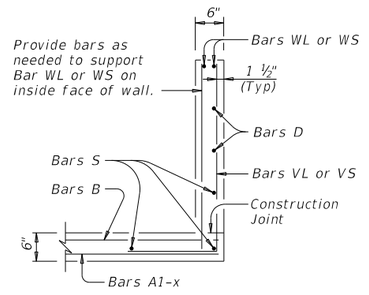
BARS CL
(Length = 2'-5')



BARS CS
(Length = 2'-3")



TYPICAL WING ELEVATION



SECTION A-A

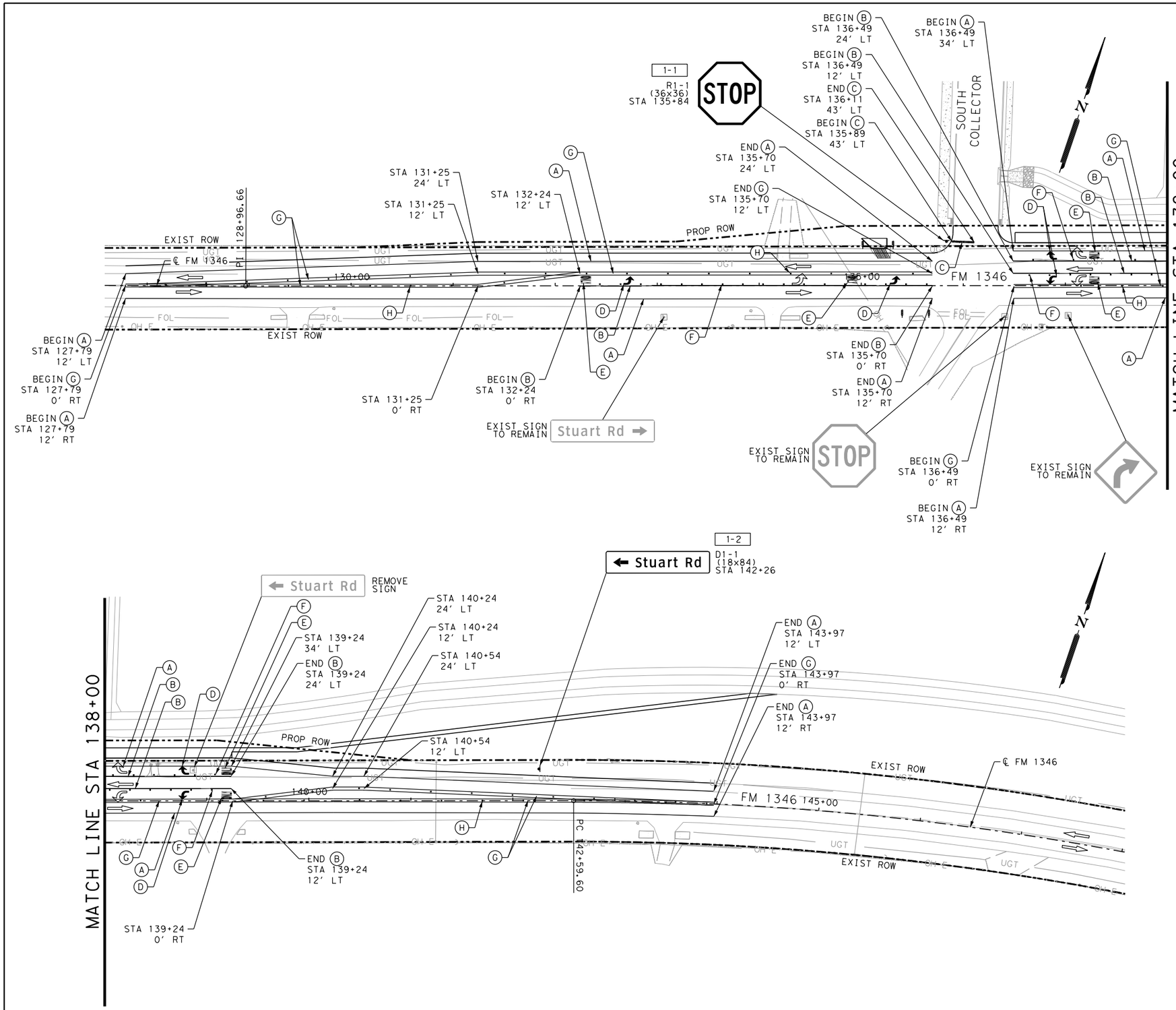
Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH FLARED WINGS FOR 30° SKEW ARCH PIPE CULVERTS

CH-FW-A-30

FILE: chfa30se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		52



LEGEND

(A)	REFL PAV MRK TY I (W) 6" (SLD)
(B)	REFL PAV MRK TY I (W) 8" (SLD)
(C)	REFL PAV MRK TY I (W) 24" (SLD)
(D)	REFL PAV MRK TY I (W) (ARROW)
(E)	REFL PAV MRK TY I (W) (WORD)
(F)	REFL PAV MRKR TY I-C 20'c-c
(G)	REFL PAV MRK TY I DBL (Y) 6" (SLD)
(H)	TY II-A-A @ 40' c-c
	SIGN
	OBJECT MARKER OM-2Z(FLX)
XX-X	SIGN DESIGNATION
	TRAFFIC FLOW ARROW

NOTES

1. FOR ADDITIONAL DETAILS SEE TxDOT TYPICAL STANDARD SHEETS.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK.
3. ALL REFLECTIVE PAVEMENT MARKINGS SHALL RECEIVE A TY I AND TY II APPLICATION.
4. ALL DIMENSIONS ARE TO FACE OF CURB AND/OR CENTER OF PAVEMENT MARKINGS, UNLESS OTHERWISE INDICATED.
5. SEE SUMMARY OF SMALL SIGNS FOR MORE INFORMATION.

DESIGN

STATE OF TEXAS · STEVEN J. TATE · 131443 · LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS · DAN THOMA · 98622 · LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

0 50 100 150

SCALE: 1"= 100'

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

SIGNING AND PAVEMENT MARKING LAYOUT

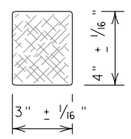
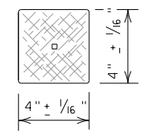
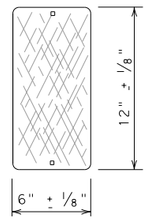
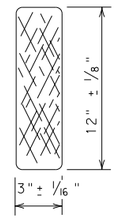
SHEET 1 OF 1

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 53

Plotted on: 9/21/2023

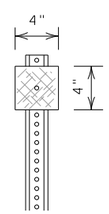
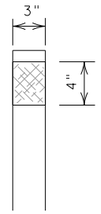
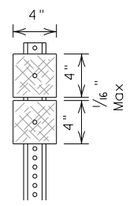
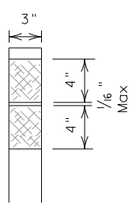
Design Filename: P:\124\73\13\Design\Civil\Traffic\FM 1346\1247313_FM1346_spm01.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE
1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

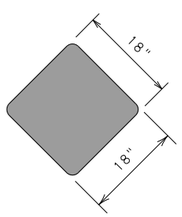
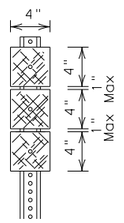
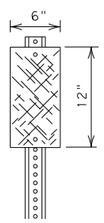
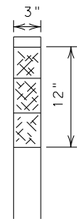
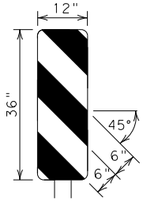
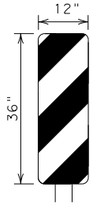
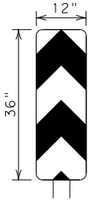
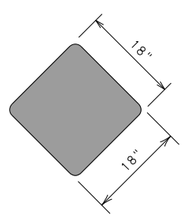
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

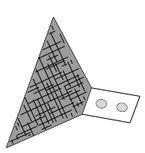
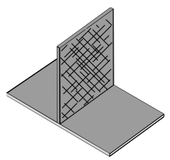
TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

DIRECTION
- If Required
- BI = Bi-Directional

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

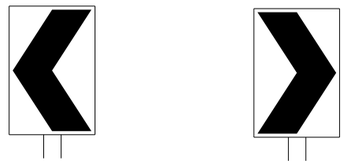
	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING	Yellow, White, Red
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE



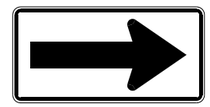
W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

NOTE:
Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS				FM 1346
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	BEXAR		54

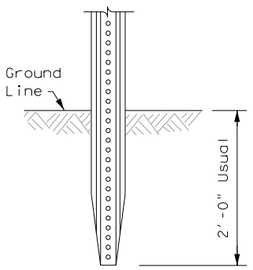
20A

DATE: 9/21/2023 5:55:35 PM
FILE: P:\124V73\13\Design\Civil\Standards_FM 1346 STANDARDS\SPM\dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

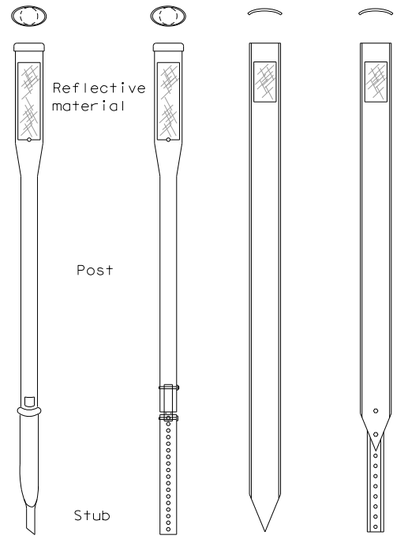


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

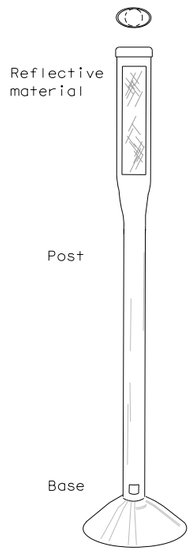
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



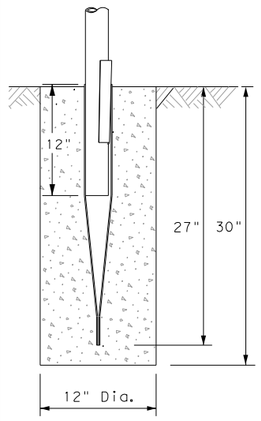
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

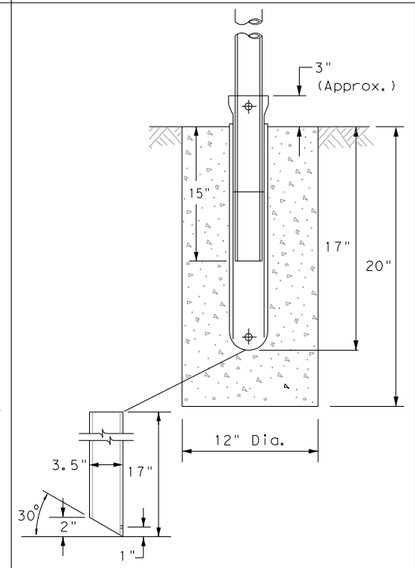
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

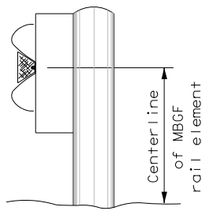
NOTE

1. Install per manufacturer's recommendations.

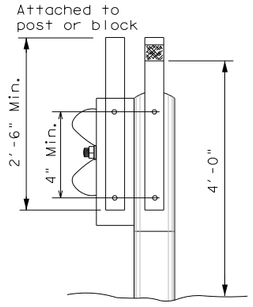
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

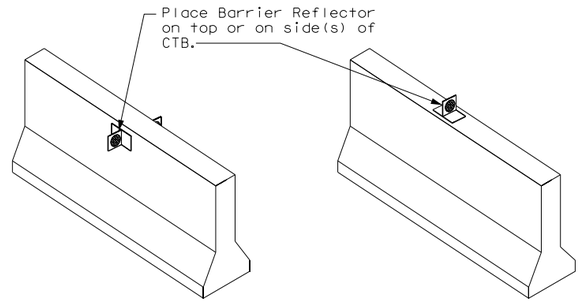
GF1



GF2



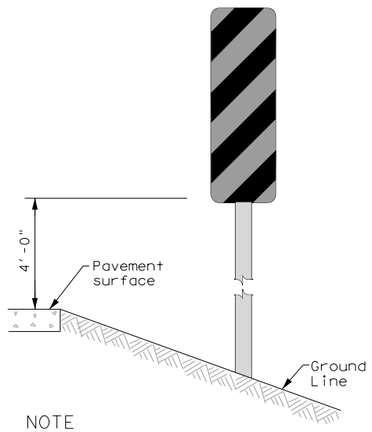
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

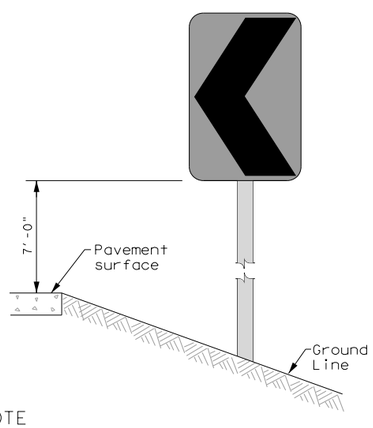
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

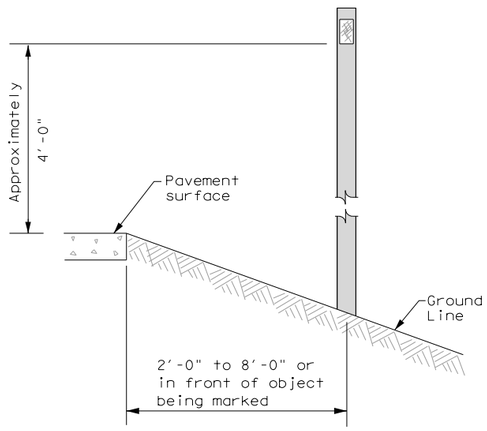
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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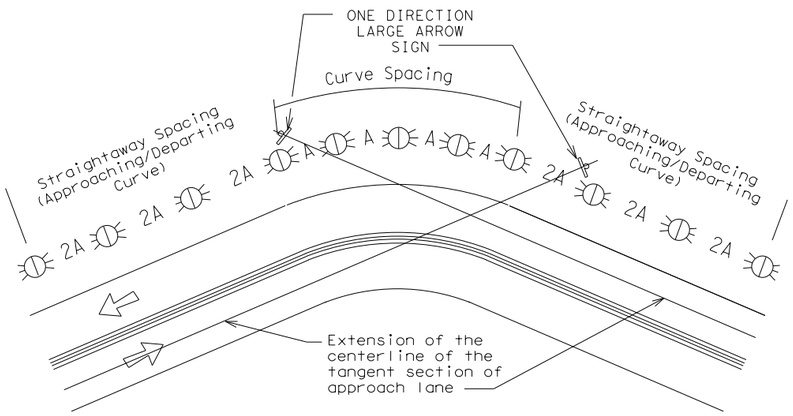
REVISIONS				FM 1346
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	BEXAR		55

20B

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

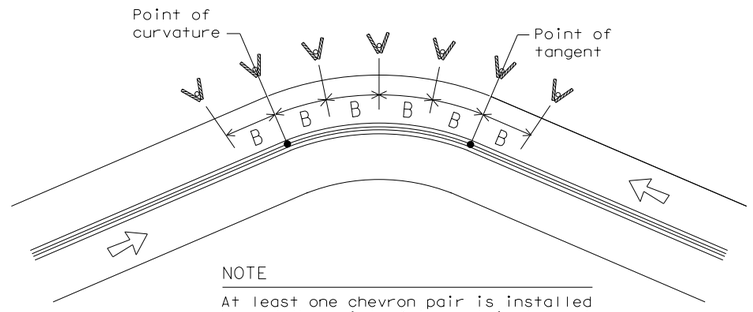
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS				FM 1346
3-15 8-15 8-15 7-20	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		56

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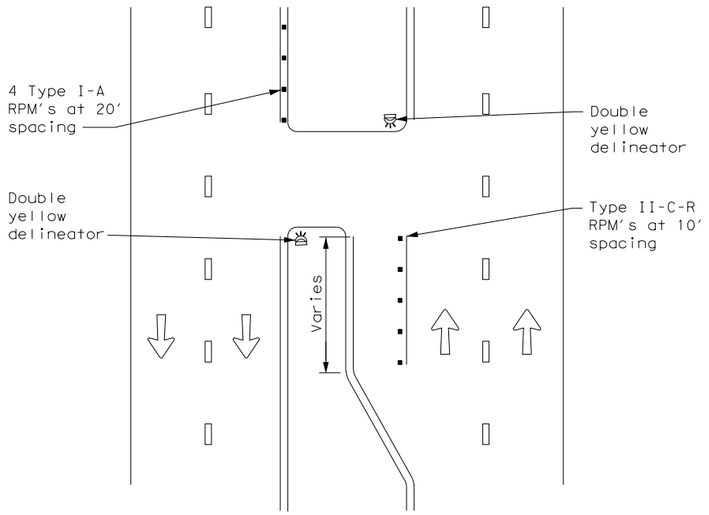
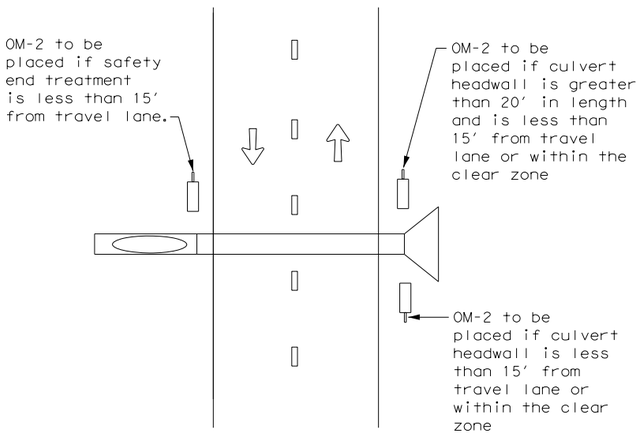
CROSSOVERS



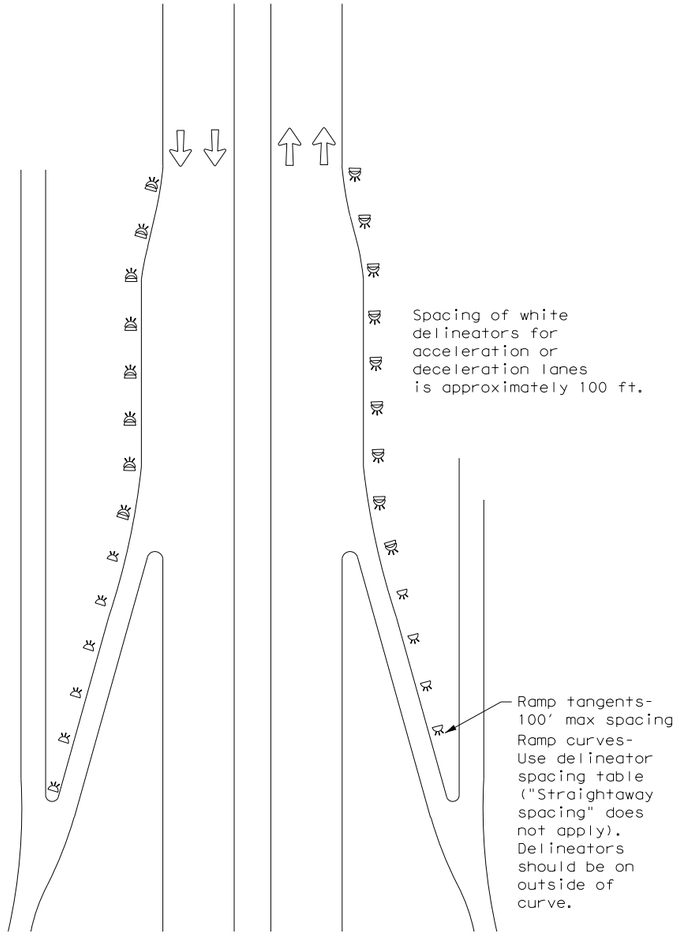
DETAIL 1

FOR CULVERTS WITHOUT MBGF



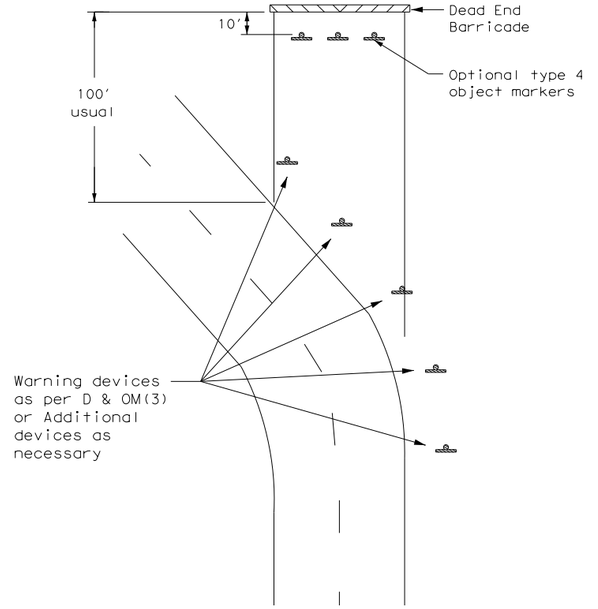
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



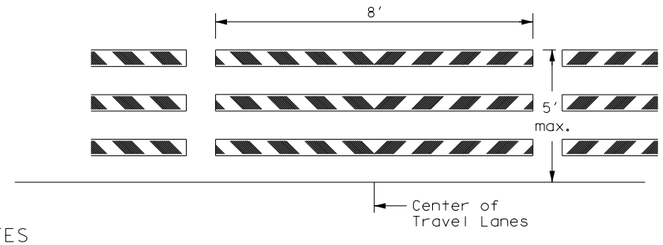
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS				FM 1346
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20D

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

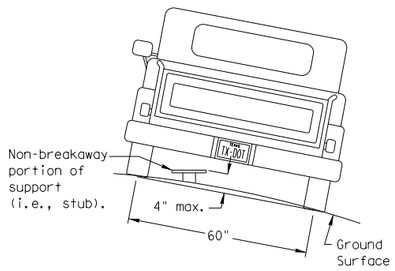
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

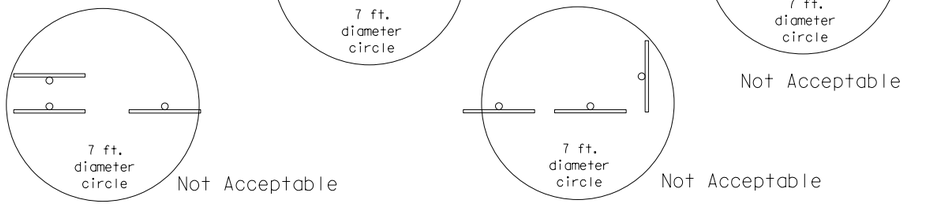
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



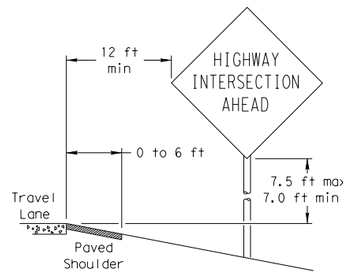
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

No more than 2 sign posts should be located within a 7 ft. circle.



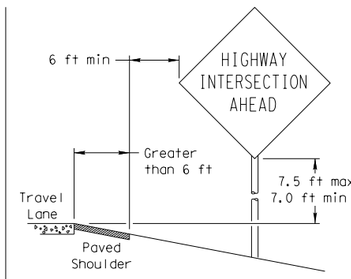
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

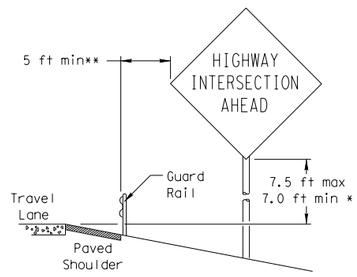
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



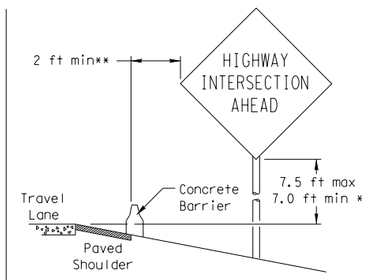
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



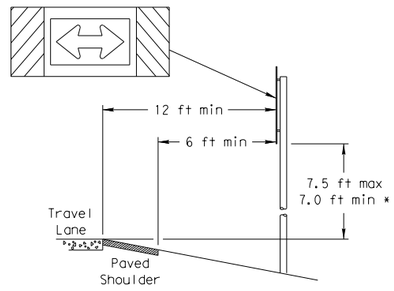
BEHIND GUARDRAIL



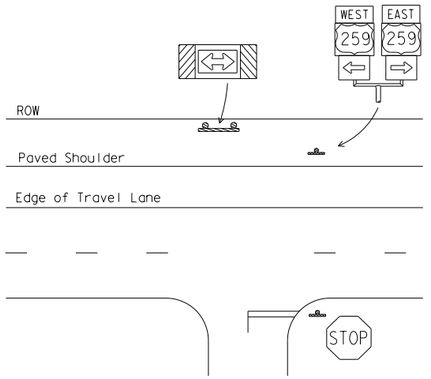
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

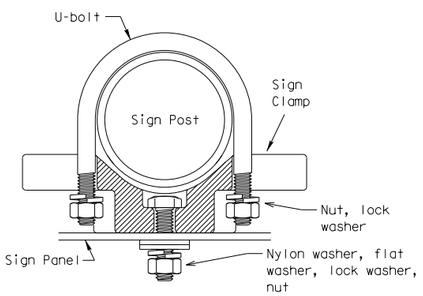
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

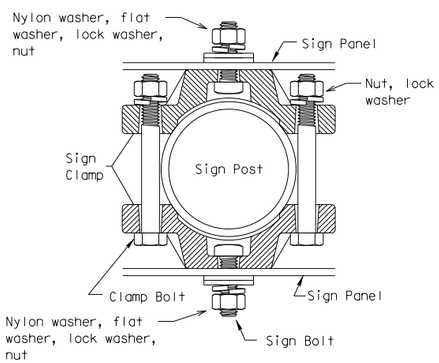


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

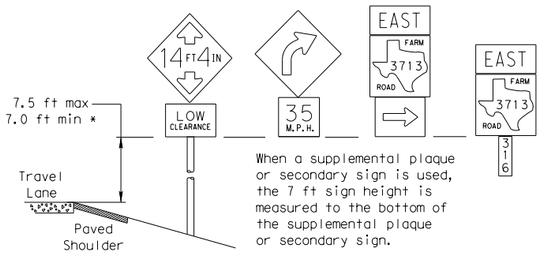
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



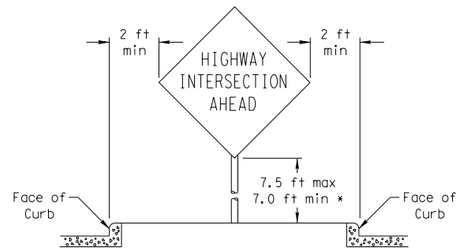
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



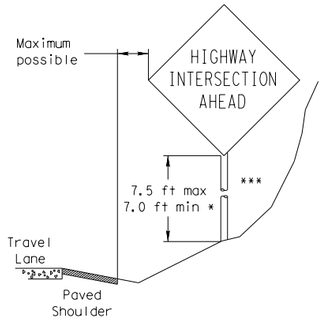
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

9-08 REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
			FM 1346
DIST	COUNTY		SHEET NO.
SAT	BEXAR		58

26A

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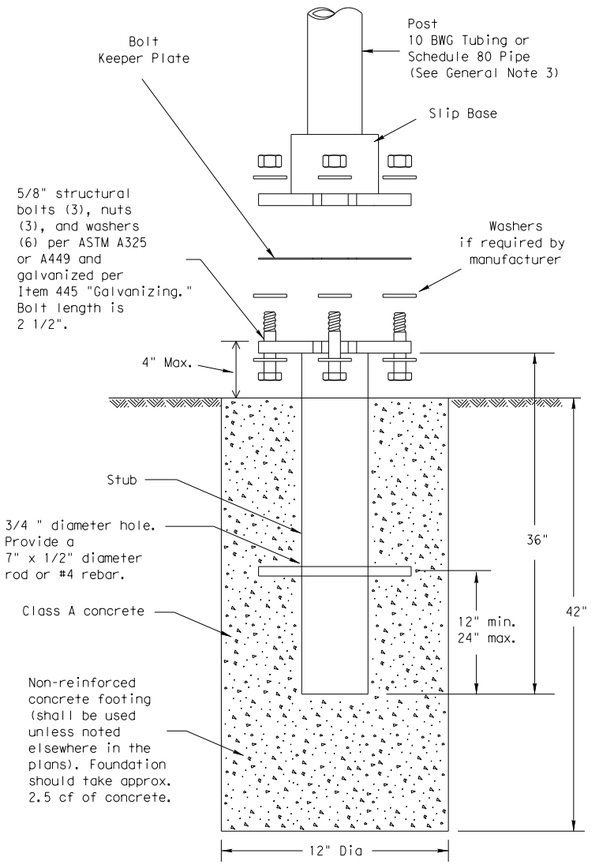
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

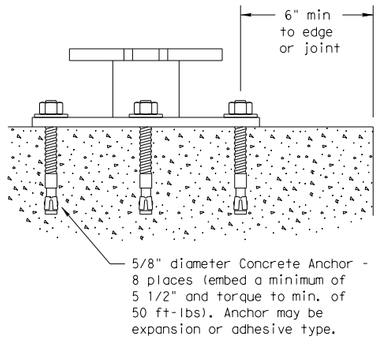
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
			FM 1346
DIST	COUNTY		SHEET NO.
SAT	BEXAR		59

9-08 REVISIONS

26B

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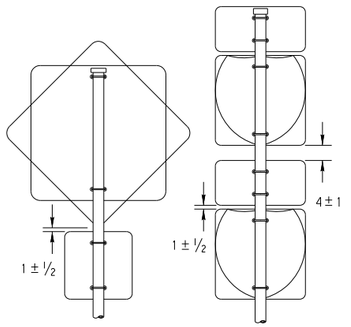

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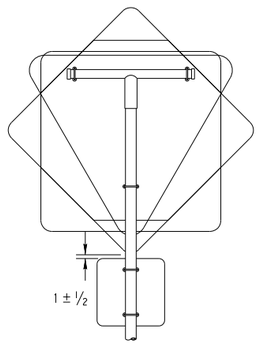

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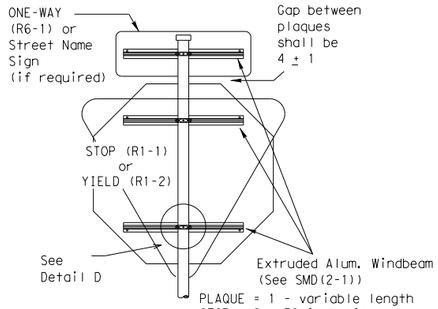
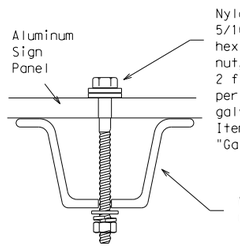
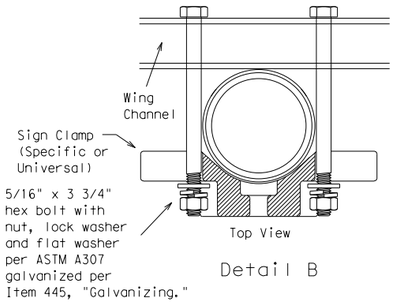


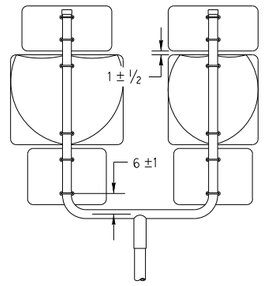
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A



Detail B



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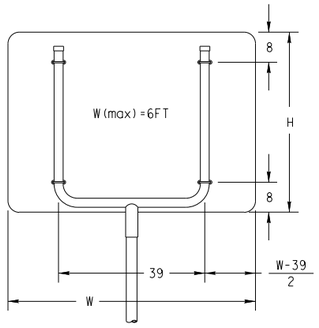

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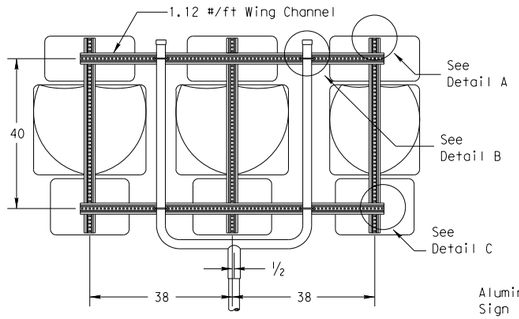
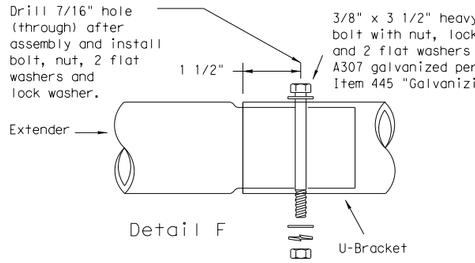
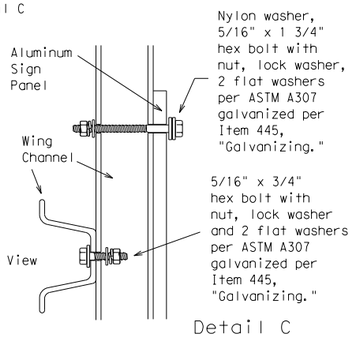


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

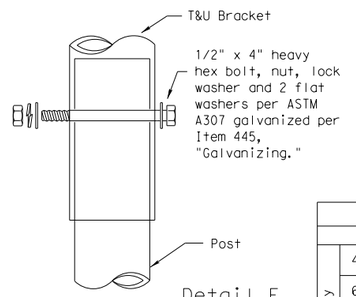


Detail F

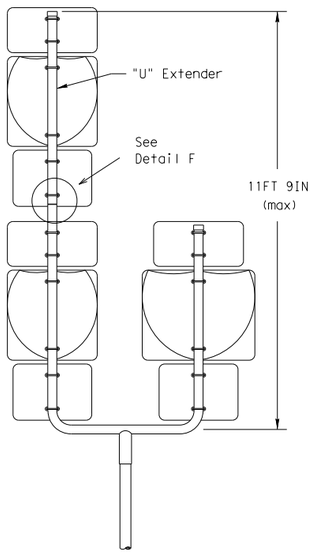
Splices shall only be allowed behind the sign substrate.



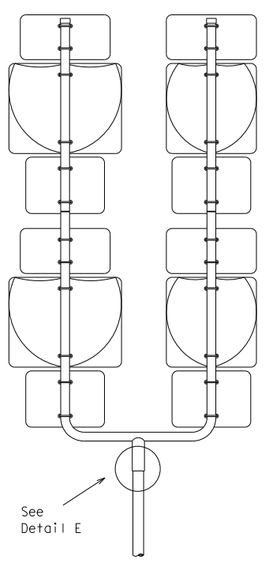
Detail C



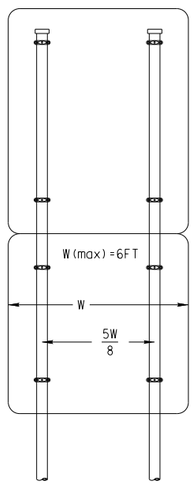
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

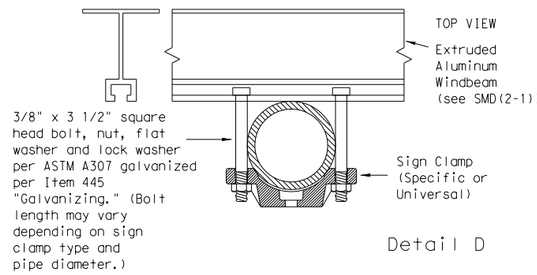


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

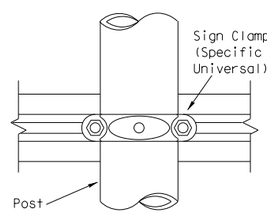


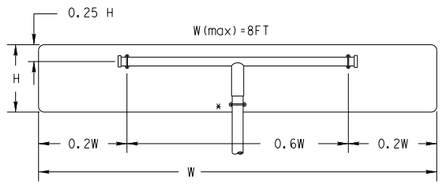
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

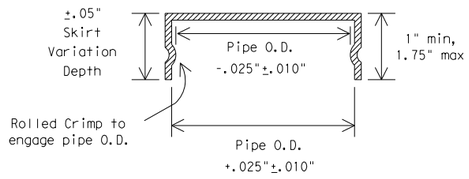




All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		60

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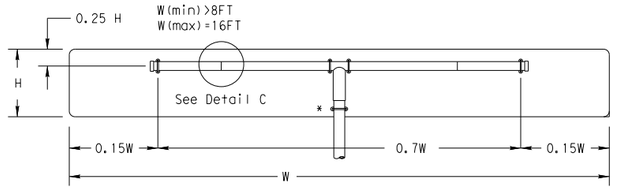
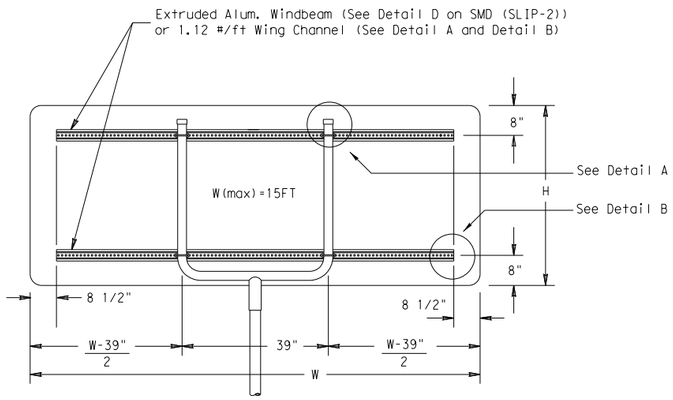
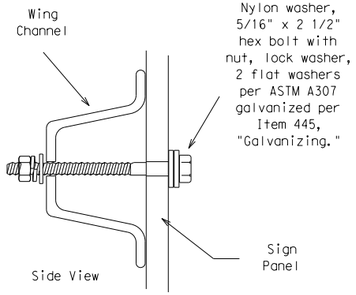


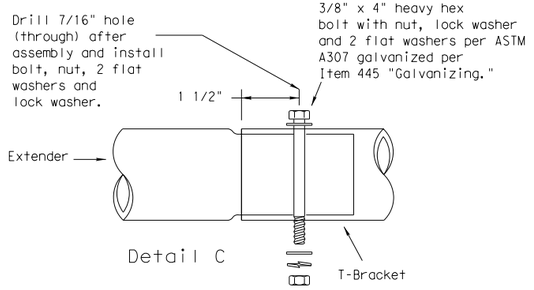
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

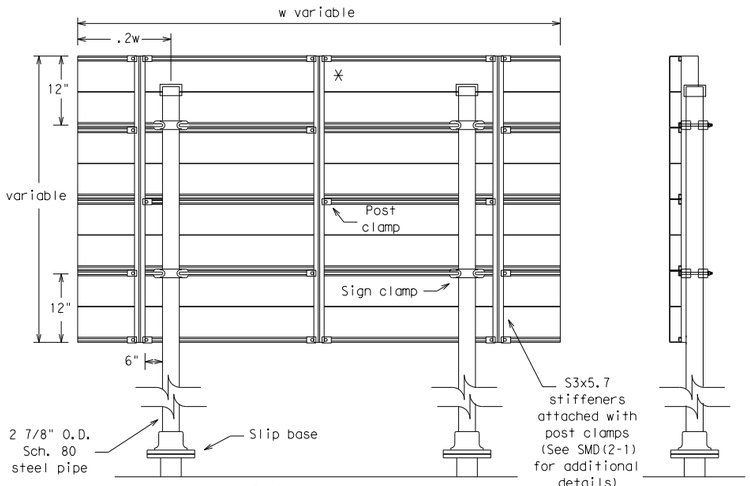


Detail B



Detail C

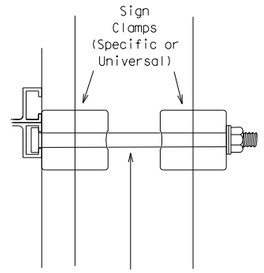
Splices shall only be allowed behind the sign substrate.



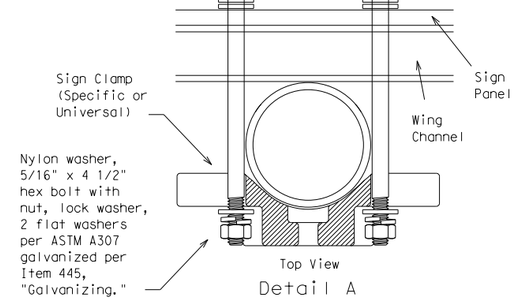
Typical Sign Mount
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

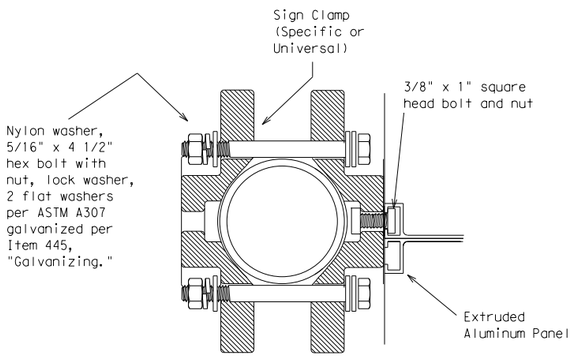
See Detail E
for clamp installation



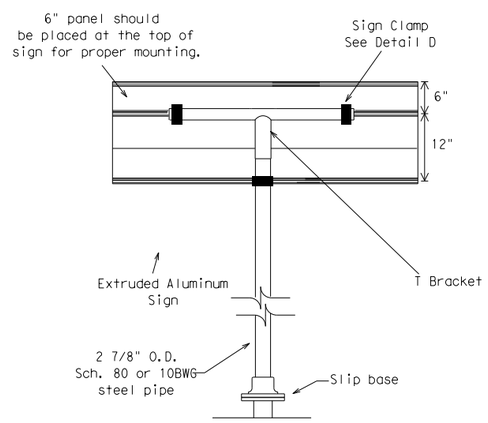
Detail E



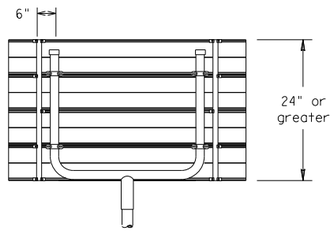
Top View
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		61

26D

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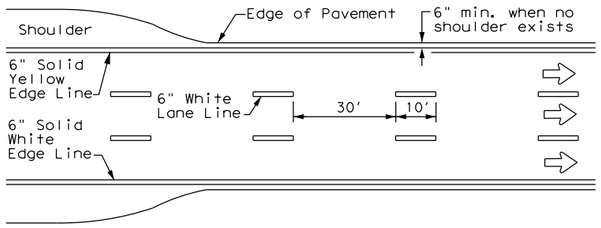
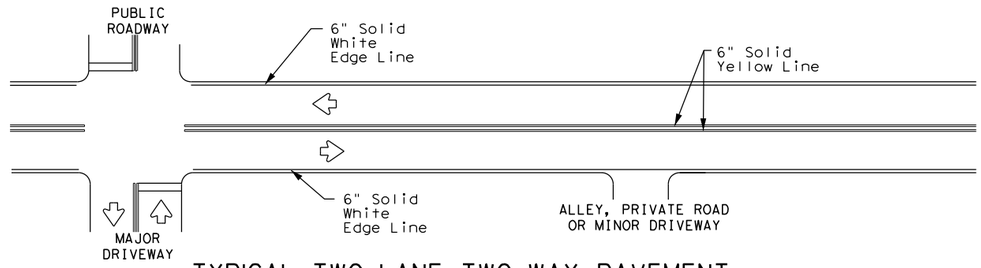
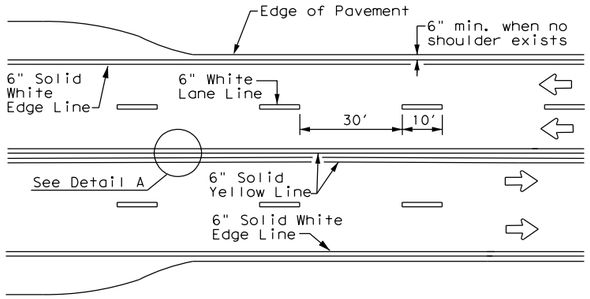
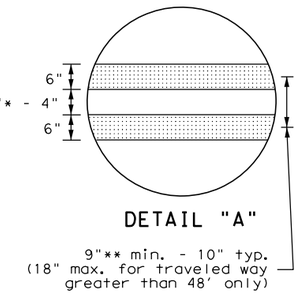


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

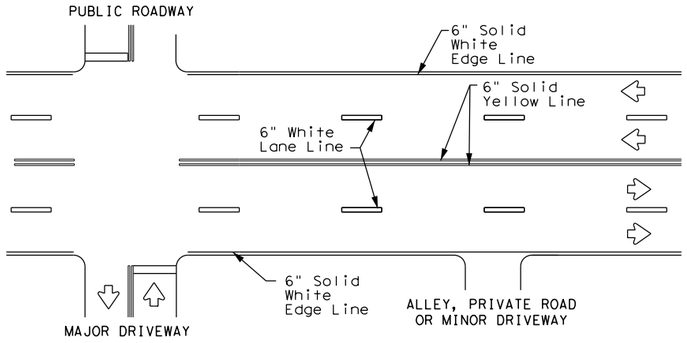




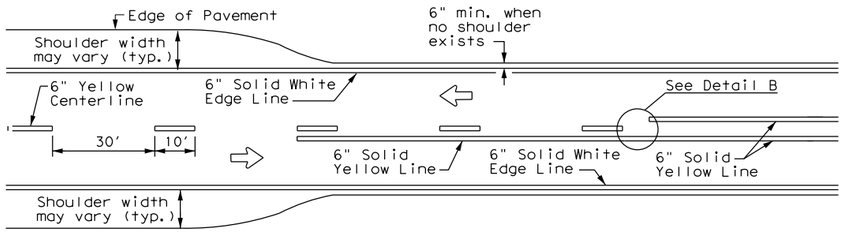
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

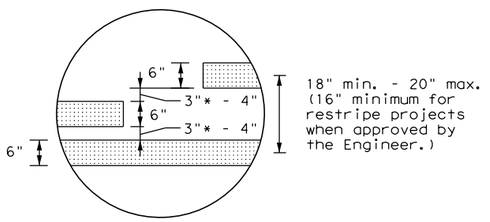
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

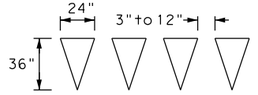


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



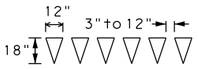
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

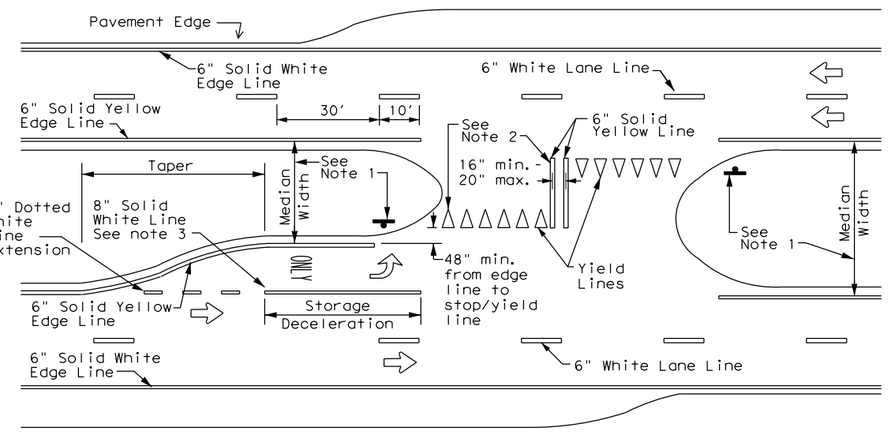


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

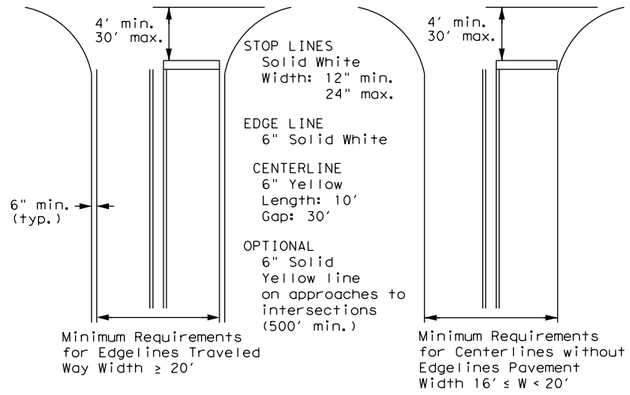
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

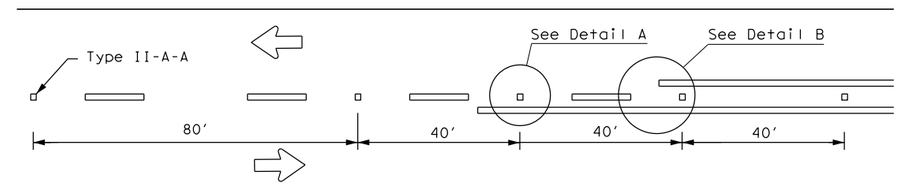
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

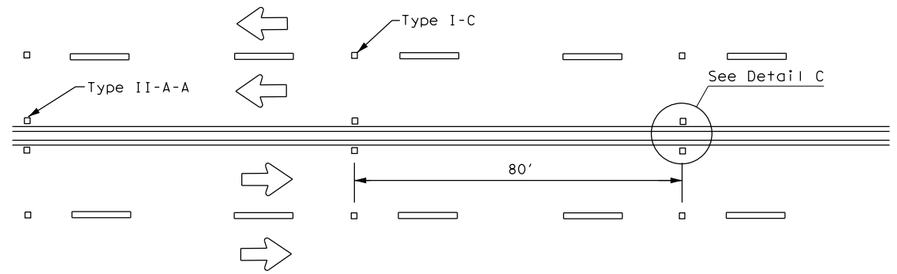
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
11-78 8-00 6-20				
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	SAT	BEXAR		62

22A

REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

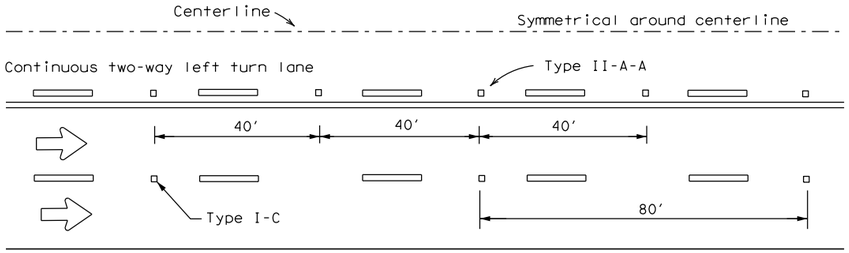


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

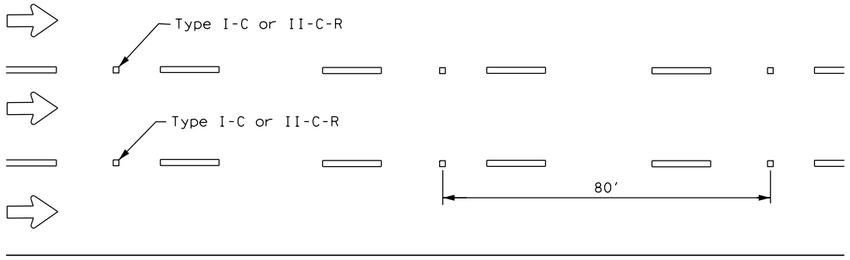


CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS

DETAIL "A" DETAIL "B" DETAIL "C"



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



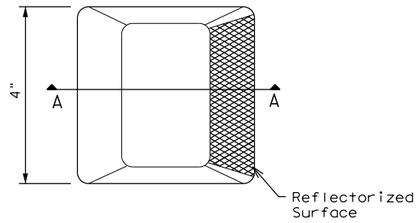
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

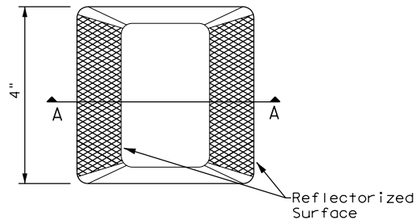
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

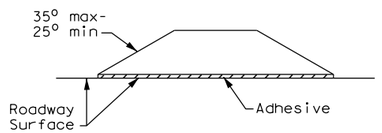
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

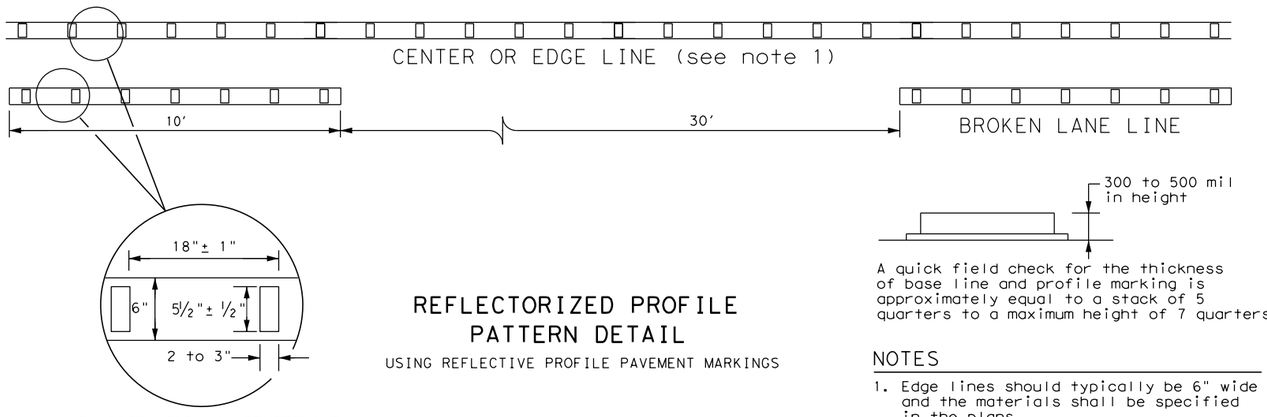


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE
OR 6" LANE LINE

REFLECTORIZED PROFILE
PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
4-77 8-00 6-20				
4-92 2-10 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	SAT	BEXAR		63

22B

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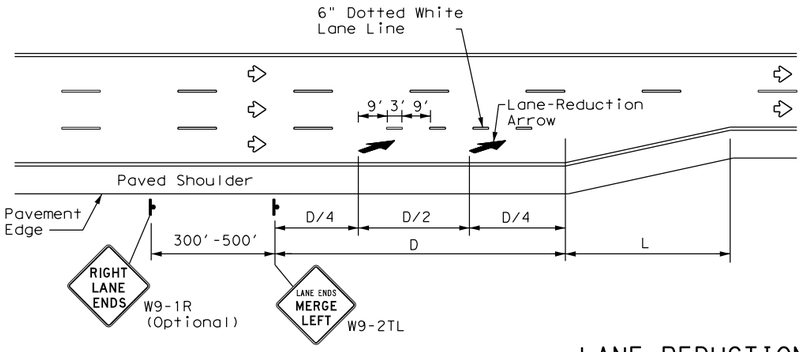


LANE REDUCTION

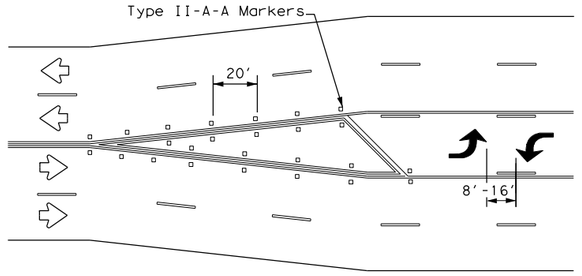
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

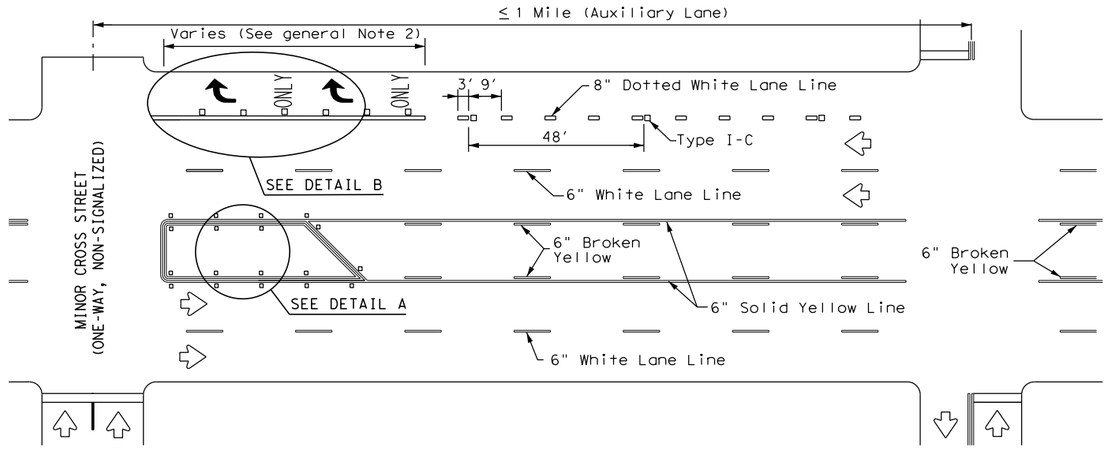


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

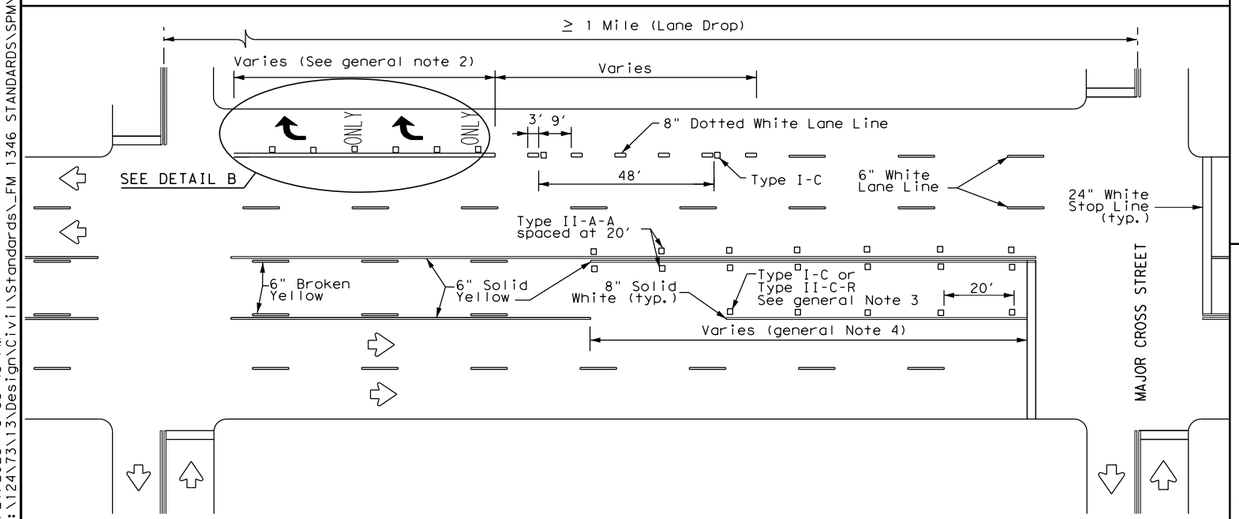
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

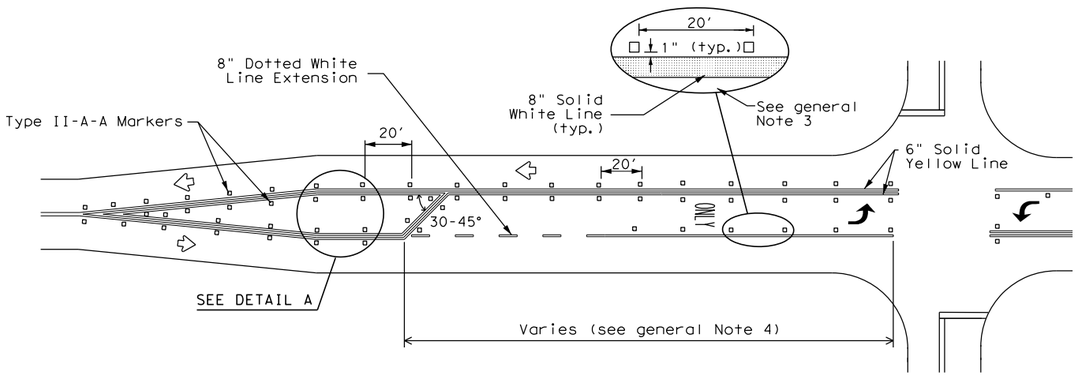
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



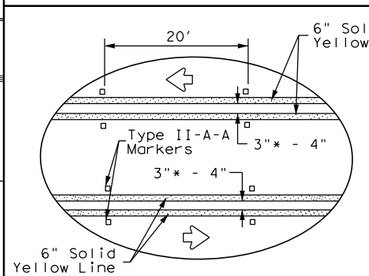
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



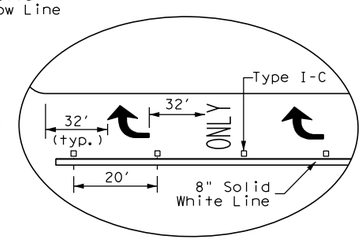
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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4-98 3-03 6-20	DIST	COUNTY		SHEET NO.
5-00 2-10 12-22	SAT	BEXAR		64
8-00 2-12				

22C

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DATE: 9/21/2023 5:55:46 PM
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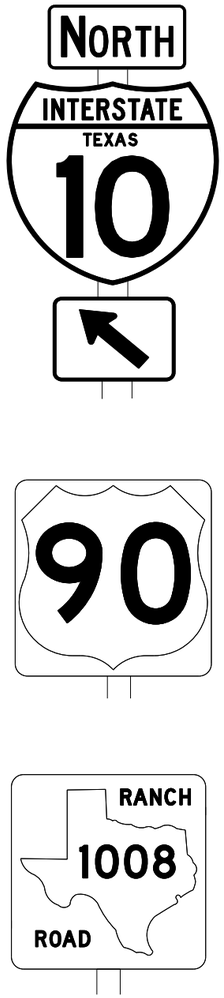
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

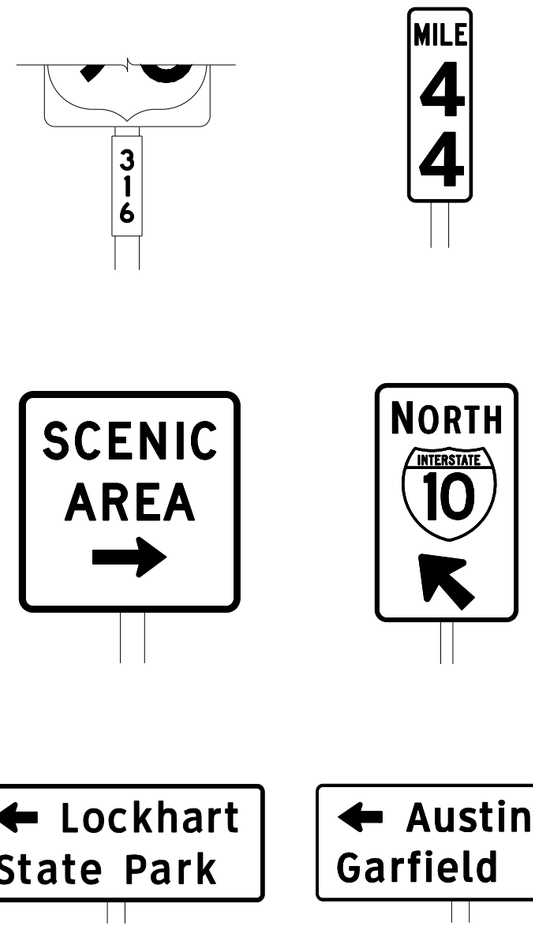
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

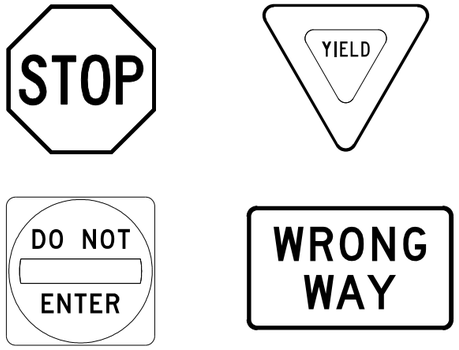
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	SAT	BEXAR		65

3

DATE: 9/21/2023 5:55:47 PM
FILE: P:\124\73\13\Design\Civil\Standards_FM 1346 STANDARDS\SPM\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

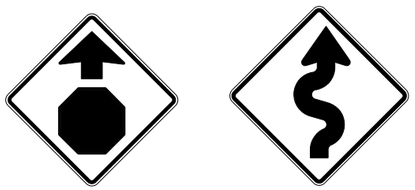
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				FM 1346
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		66

Note To Designer:
1. Do not alter Sheet Design or Font style, size or weight - match text attributes.
2. If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from it's relative position.

A. GENERAL SITE DATA

1. PROJECT LIMITS: *FROM 728' WEST OF STUART RD TO 684' EAST OF STUART RD*

2. PROJECT SITE MAPS:
   - * *Project Latitude 29°25'37.2948" Project Longitude 98°16'22.5500"*
   - * *Project Location Map: Shown on Title Sheet*
   - * *Drainage Patterns: Shown on Drainage Area Maps (SHEET 38 & 39)*
   - * *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Shown on Typical Sections (SHEETS 3 TO 4)*
   - * *Major Controls and Locations of Stabilization Practices: Shown on SW3P Sheets (SHEET 68)*
   - * *Project Specific Locations: Off-site waste, borrow, or storage areas are not part of this SW3P.*
   - * *Surface Waters and Discharge Locations: Shown on Drainage and Culvert Layout Sheets (SHEET 47)*

3. PROJECT DESCRIPTION: *PAVEMENT, TURN LANES, GRADING, AND DRAINAGE*

   * *Joint-bid utilities are not covered by this SW3P*
   Non-Joint Bid Utilities are not part of this SW3P.

4. FOR MAJOR SOIL DISTURBING ACTIVITIES SEQUENCE OF EVENTS:

   1. *Install controls down-slope of work area and initiate inspection and maintenance activities.*
   2. *Begin phased construction with interim stabilization practices. Adjust erosion and sedimentation controls during construction to meet requirements and changing conditions and as directed/approved by the Engineer.*
   3. *Major soil disturbing activities may include but are not limited to: right-of-way preparation, cut and/or fill to improve roadway profile, final grading and placement of topsoil and the following (if marked):*

      _X_ *Placement of road base*
      _X_ *Extensive ditch grading*
      _X_ *Upgrading or replacing culverts or bridges*
      ____ *Temporary detour road(s)*
      ____ *Other:* _____

5. EXISTING AND PROPOSED CONDITIONS:

   Description of existing vegetative cover: MAINTAINED GRASSES
   Percentage of existing vegetative cover: APPROX. 71%
   Existing vegetative cover:(mark one) _X_ *Thick or uniformly established*
   ____ *Thin and Patchy*
   ____ *None or minimal cover*
   Description of soils: HEIDEN CLAY, HOUSTON BLACK CLAY
   Site Acreage: 18.98 AC *Acreage disturbed: 1.72 AC*
   Site runoff coefficient (pre-construction): 0.38 *Site runoff coefficient (post-construction): 0.39*

6. RECEIVING WATERS: *(Mark all that apply)*

   _X_ *A classified stream does not pass through project.*
   ____ *A classified stream passes through project. Name* _____ *Segment Number* _____
   Name of receiving waters that will receive discharges from disturbed areas of the project: _____

   Site is in a Municipal Separate Storm Sewer System (MS4).
   MS4 Operator (name): _____

B. BEST MANAGEMENT PRACTICES

General timing or sequence for implementation of BMPs shall be as required and/or as directed/approved by the Engineer to provide adequate controls. BMPs shown on plan sheets are to be considered "proposed" unless/until install date is shown. BMPs are to reduce sediments from road construction activities.

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

   - T,P SEEDING
   - ____ MULCHING (Hay or Straw)
   - ____ BUFFER ZONES
   - ____ PLANTING
   - ____ COMPOST/MULCH FILTER BERM
   - ____ SODDING
   - ____ PRESERVATION OF NATURAL RESOURCES
   - ____ FLEXIBLE CHANNEL LINER
   - ____ RIGID CHANNEL LINER
   - ____ SOIL RETENTION BLANKET
   - P COMPOST MANUFACTURED TOPSOIL
   - ____ OTHER: (Specify Practice)

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

   - T SILT FENCES
   - ____ HAY BALES
   - T ROCK FILTER DAMS
   - ____ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
   - ____ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
   - ____ DIVERSION DIKE AND SWALE COMBINATIONS
   - ____ PIPE SLOPE DRAINS
   - ____ PAVED FLUMES
   - T ROCK BEDDING AT CONSTRUCTION EXIT
   - ____ TIMBER MATTING AT CONSTRUCTION EXIT
   - ____ CHANNEL LINERS
   - ____ SEDIMENT TRAPS
   - ____ SEDIMENT BASINS
   - ____ STORM INLET SEDIMENT TRAP
   - ____ STONE OUTLET STRUCTURES
   - ____ CURBS AND GUTTERS
   - ____ STORM SEWERS
   - ____ VELOCITY CONTROL DEVICES
   - ____ OTHER: *(Specify Practice)*

3. STORM WATER MANAGEMENT:

   The proposed facility was designed in consideration of hydraulic design standards to convey stormwater in a manner that is protective of public safety and property. The control of erosion from the facility is inherent to the design. Additional factors affecting post-construction stormwater at the project location include:(mark all that apply)

   _X_ *Existing or new vegetation provides natural filtration.*
   _X_ *The design includes provisions for permanent erosion controls provided by strategically placed pervious and impervious surfaces.*
   ____ *Project includes permanent sedimentation controls (other than grass).*
   _X_ *Velocities do not require dissipation devices.*
   ____ *Velocity-dissipation devices included in the design.*
   ____ *Other :* _____
   _____

4. NON-STORM WATER DISCHARGES:

   Off-site discharges are prohibited except as follows:

   1. *Discharges from fire fighting activities and/or fire hydrant flushings.*
   2. *Vehicle, external building, and pavement wash water where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed).*
   3. *Plain water used to control dust.*
   4. *Plain water originating from potable water sources.*
   5. *Uncontaminated groundwater, spring water or accumulated stormwater.*
   6. *Foundation or footing drains where flows are not contaminated with process materials such as solvents.*
   7. *Other:* _____

   Concrete truck wash water discharges on the site should be prohibited or minimized. If allowed by the Engineer, they must be managed in a manner so as not to contaminate surface water. They must not be located in areas of concentrated flow. Concrete truck wash-out locations must be shown on the SW3P Layout and included in the inspections.

   Hazardous material spill/leak shall be prevented or minimized. At a minimum, this includes asphalt products, fuels, oils, lubricants, solvents, paints, acids, concrete curing compounds and chemical additives for soil stabilization. BMPs shall be implemented to the storage areas of these products. All spills must be cleaned and disposed properly and reported to the Engineer. Report any release at or above the reportable quantity during a 24 hour period to the National Response Center at 1-800-424-8802.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

   All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed before the next anticipated storm event but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from equipment. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by protecting storm sewer inlets.

2. INSPECTION:

   For areas of the construction site that have not been finally stabilized, areas used for storage of materials, structural control measures, and locations where vehicles enter or exit the site, personnel provided by the permittee and familiar with the SW3P must inspect disturbed areas at least once every seven (7) calendar days. An inspection and Maintenance Report shall be prepared for each inspection and the controls shall be revised on the SW3P within seven (7) calendar days following the inspection.

3. WASTE MATERIALS:

   All non-hazardous municipal waste materials such as litter, rubbish, trash and garbage located on or originating from the project shall be collected and stored in a securely lidded metal dumpster, provided by the Contractor. The dumpster shall be emptied as necessary or as required by local regulation and the trash shall be hauled to a permitted disposal facility. The burying of non-hazardous municipal waste on the project shall not be permitted. Construction material waste sites, stockpiles and haul roads shall be constructed to minimize and control the amount of sediment that may enter receiving waters. Construction material waste sites shall not be located in any wetland, water body or stream bed. Construction staging areas and vehicle maintenance areas shall be constructed in a manner to minimize the runoff of pollutants.

4. OFFSITE VEHICLE TRACKING:

   Off-site vehicle tracking of sediments and the generation of dust must be minimized. Excess sediments on road shall be removed on a regular basis as directed/approved by the Engineer.

5. OTHER:

   See the EPIC sheet for additional environmental information.

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

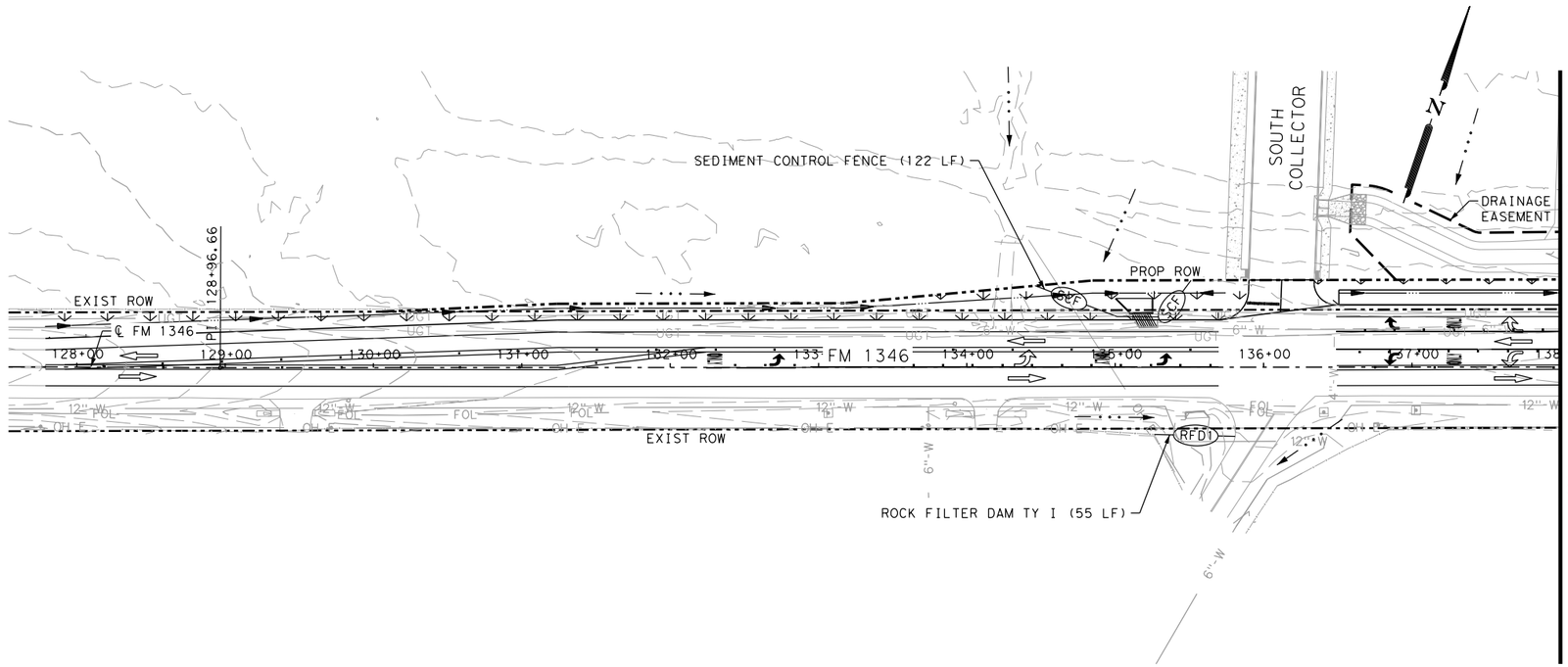
STATE OF TEXAS — STEVEN J. TATE — 131443 — LICENSED PROFESSIONAL ENGINEER
STEVEN J. TATE, P.E. — 9/21/2023 — DATE

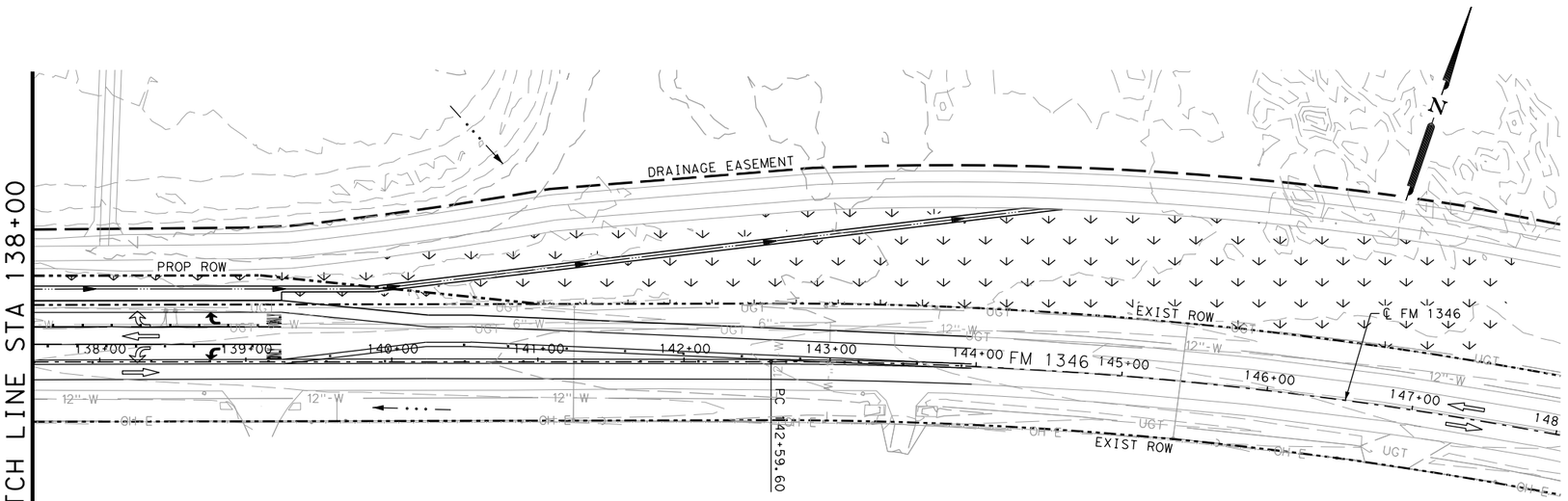
STATE OF TEXAS — DAN THOMA — 98622 — LICENSED PROFESSIONAL ENGINEER
DAN THOMA, P.E. — 9/21/2023 — DATE

REVISION DATE: 10/12

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	12473-13		FM 1346
STATE	DISTRICT	COUNTY	
TEXAS	SAT	BEXAR	
CONTROL	SECTION	JOB	SHEET NO.
			67





LEGEND

- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- RFD1 — ROCK FILTER DAM TY I
- TRAFFIC FLOW ARROWS
- PERMANENT SEEDING AND TOPSOIL
- FLOW ARROW

NOTES:

1. QUANTITIES ARE TO BE ADJUSTED AS PER FIELD CONDITIONS OR AS DIRECTED BY THE ENGINEER.
2. PHASE SW3P WITH TCP PHASING. SEE TCP NARRATIVE FOR DETAILS.
3. LOCATION OF CONSTRUCTION ENTRANCE TO BE PLACED AS DIRECTED BY THE ENGINEER.

DESIGN

STATE OF TEXAS — STEVEN J. TATE — 131443 — LICENSED PROFESSIONAL ENGINEER

STEVEN J. TATE, P.E. — 9/21/2023 DATE

APPROVAL

STATE OF TEXAS — DAN THOMA — 98622 — LICENSED PROFESSIONAL ENGINEER

DAN THOMA, P.E. — 9/21/2023 DATE

0 50 100 150

SCALE: 1" = 100'

REV. NO.	DATE	DESCRIPTION	BY

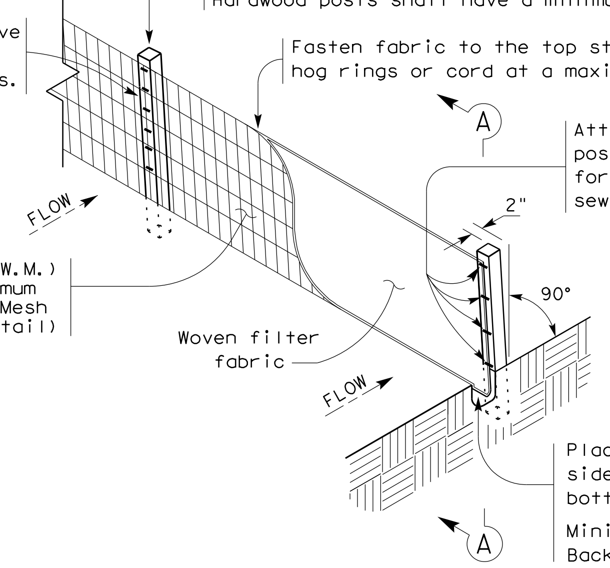
PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

SW3P LAYOUT

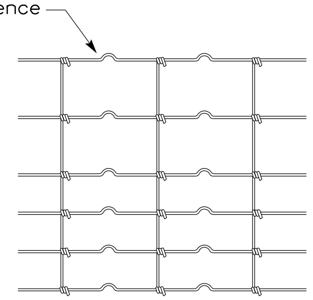
SHEET 1 OF 1

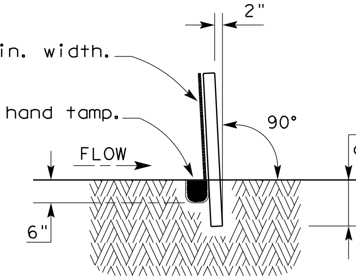
100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 68



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

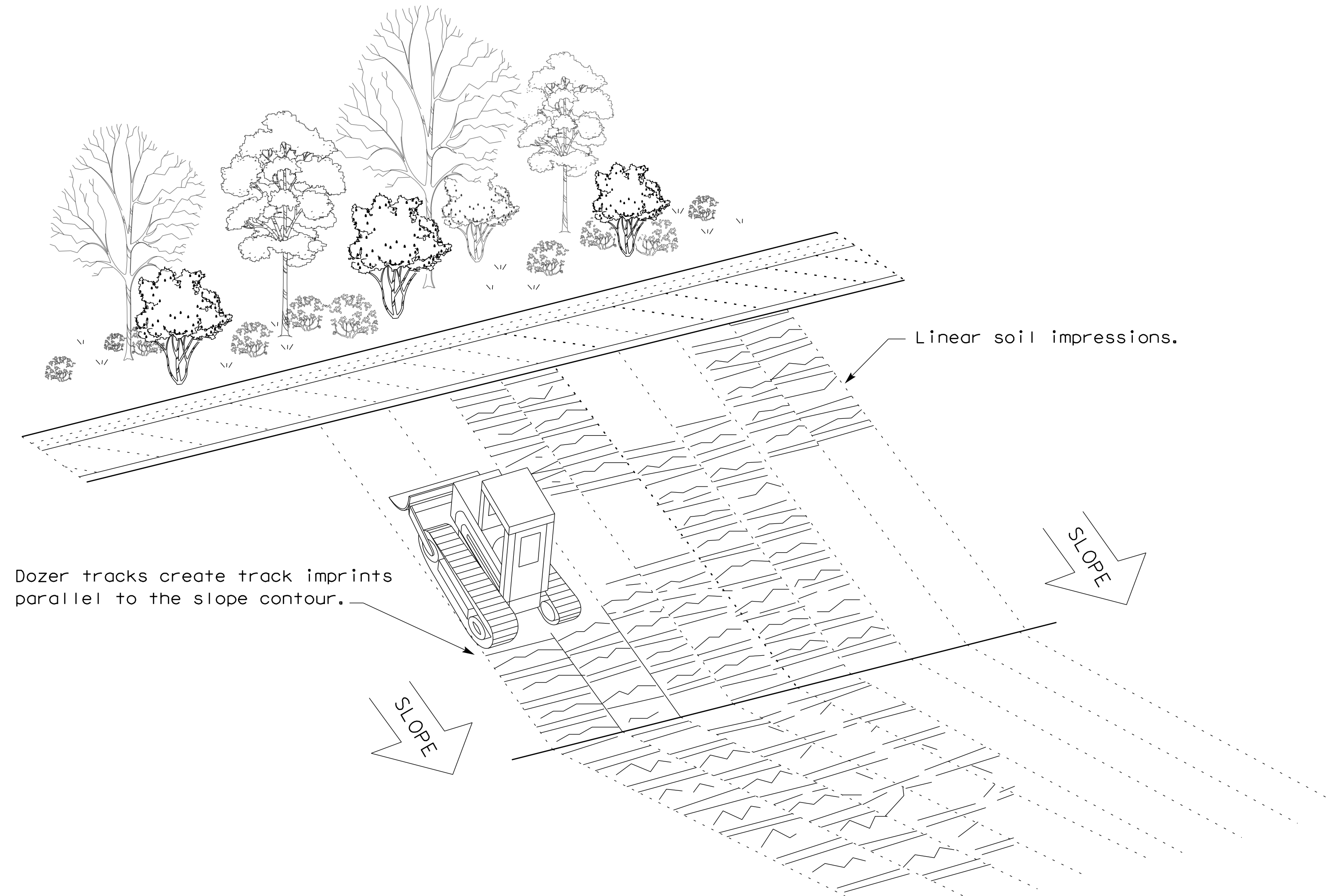
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		69

DATE: 9/21/2023
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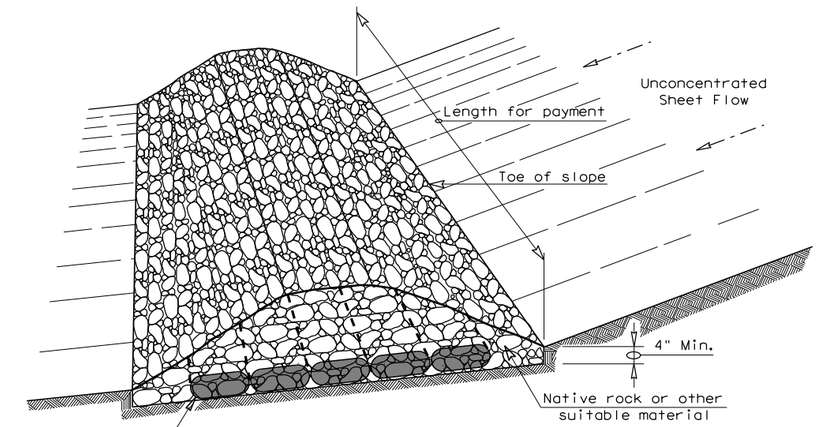
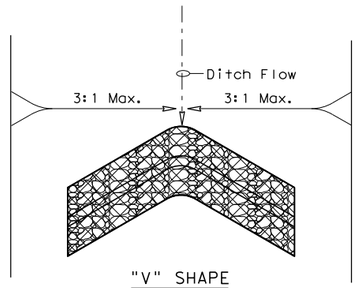
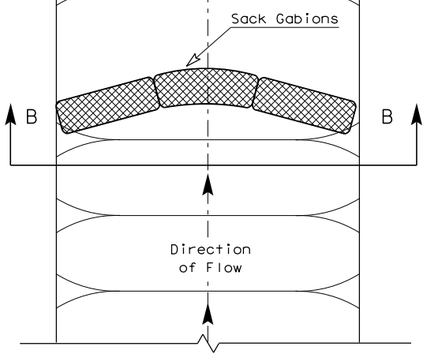


FILTER DAM AT TOE OF SLOPE

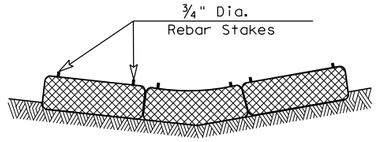
RFD1



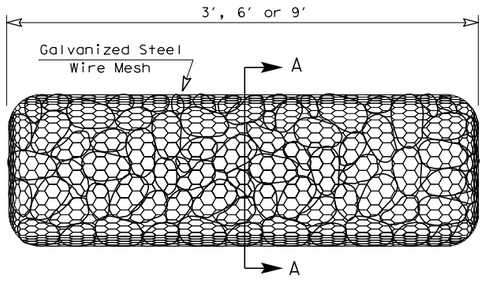
"V" SHAPE
PLAN VIEW



PLAN VIEW

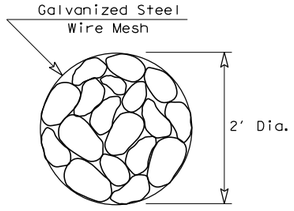


SECTION B-B

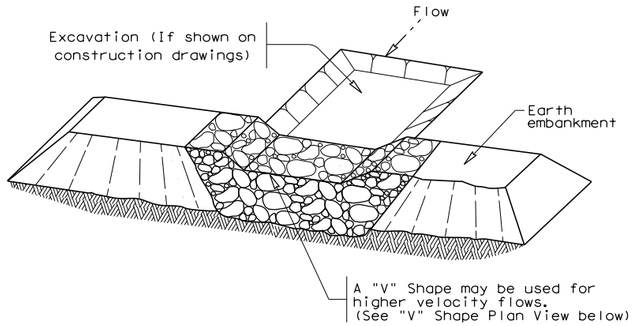


TYPE 4 (SACK GABIONS)

RFD4

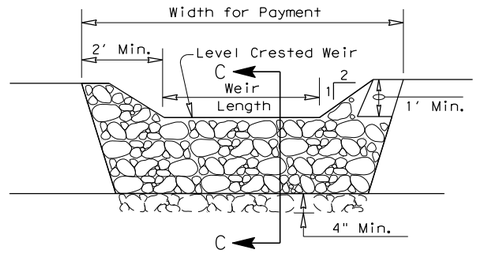


SECTION A-A

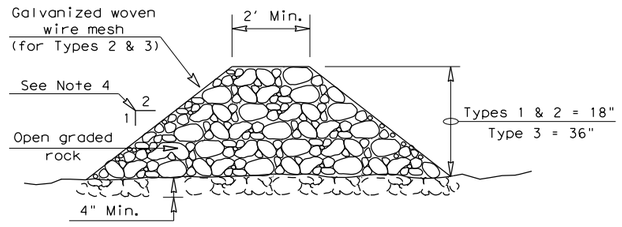


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

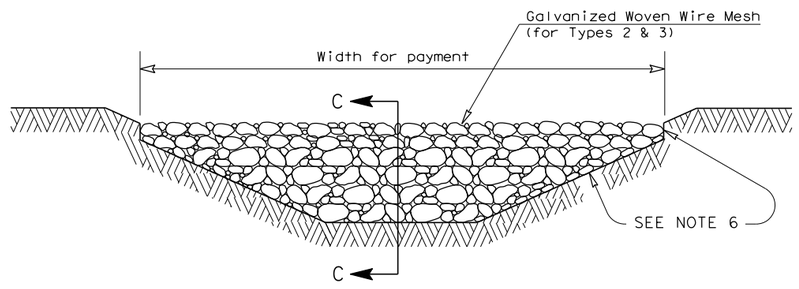
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

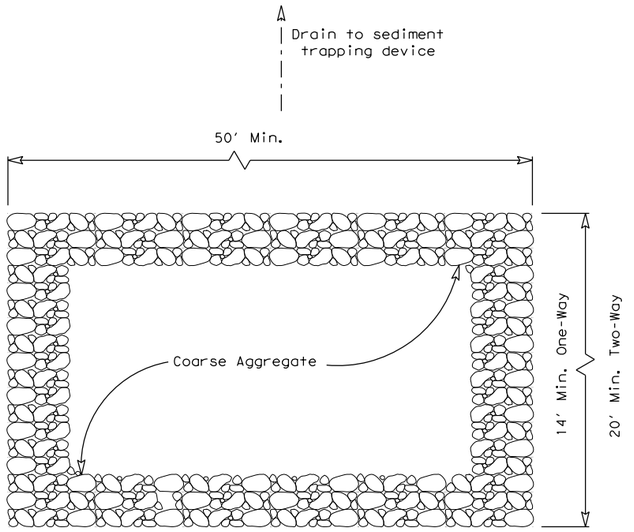
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

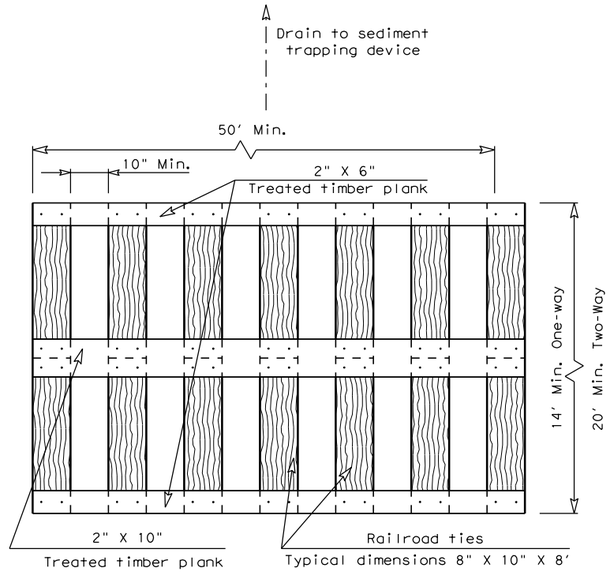
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
REVISIONS				FM 1346		
	DIST	COUNTY		SHEET NO.		
	SAT	BEXAR		70		

DATE: 9/21/2023
FILE: P:\124V73\13\Design\Civil\Standards_FM 1346 STANDARDS\SW3P\ec316 (1).dgn



PLAN VIEW



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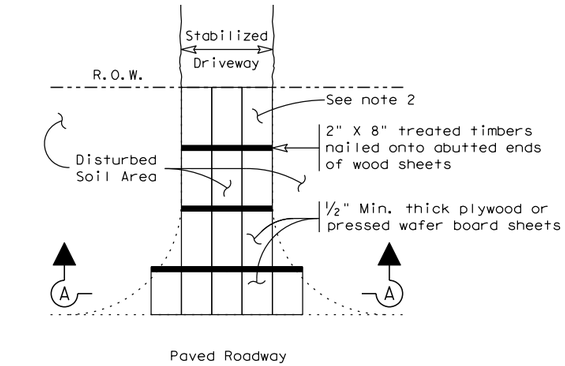

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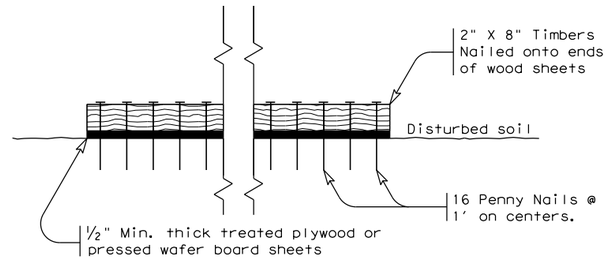
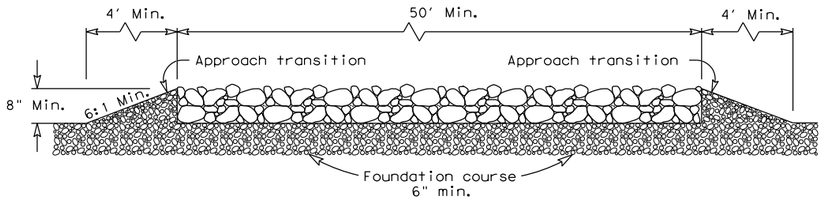


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

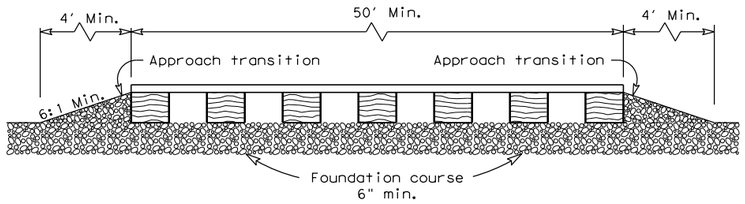
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP		DN/CK: LS
	CONT	SECT	JOB		HIGHWAY
REVISIONS					FM 1346
	DIST	COUNTY			SHEET NO.
	SAT	BEXAR			71

DATE: 9/21/2023
FILE: P:\124\73\13\Design\Civil\Standards_FM 1346 STANDARDS\SW3P\epic_1346.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☒ No Action Required ☐ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

TPWD Terrestrial Reptile BMPS
Reptiles present may include tamalipan spot-tailed earless lizard and plateau spot-tailed earless lizard. For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees(1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.
-Avoid or minimize disturbing or removing cover objects, such as downed tress, rotting stumps, brush piles, and leaf litter. If avoidance or minimization is not practicable, consider removing cover objects prior to the start of the project and replace them at project completion.
-Eaxmine heavy equipment stored on site before use, particularly after rain events when reptile and amphibian movements occur more often, to ensure use will not harm individuals that might be seeking temporary refuge.
-Due to increased activity (mating) of reptiles and amphibian during the spring, construction activities like clearing or grading should attempt to be scheuled outside of the spring (March-May) season. Also, timing ground disturbing activities before October when reptiles and amphibians become less active and may be using burrows in the project area is also encouraged.
- When designing roads with curbs, consider using Type I or Type II curbs to provide a gentle slope to enable turtles and small animals to get out of roadways.
-If Texas tortoises (Gopherus berlandieri) or box turtles (Terrepene spp.) are present in a project area, they should be removed from the area and relocated between 100 and 200 meters from the project area. After removal of the individuals, the area that will be disturbed during active construction and project specific locations should be fenced off to exclude reentry by turtles, tortoises and other reptiles. The exclusion fence should be constructed and maintained as follows:
a. The exclusion fence should be constructed with metal flashing or drift fence material.
b. Rolled erosion control mesh amterial should not be used.
c. The exclusion fence should be buried at least 6 inches deep and be at least 24 inches high.
d. The exclusion fence should be maintained for the life of the project and only removed after the construction is completed and the disturbed site has been revegetated.
-After project is complete,revegetate disturbed areas with an appropriate locally sourced native seed mix. If erosion control blankets or mats will be used, the product shuld not contain netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):
Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				FM 1346
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		72

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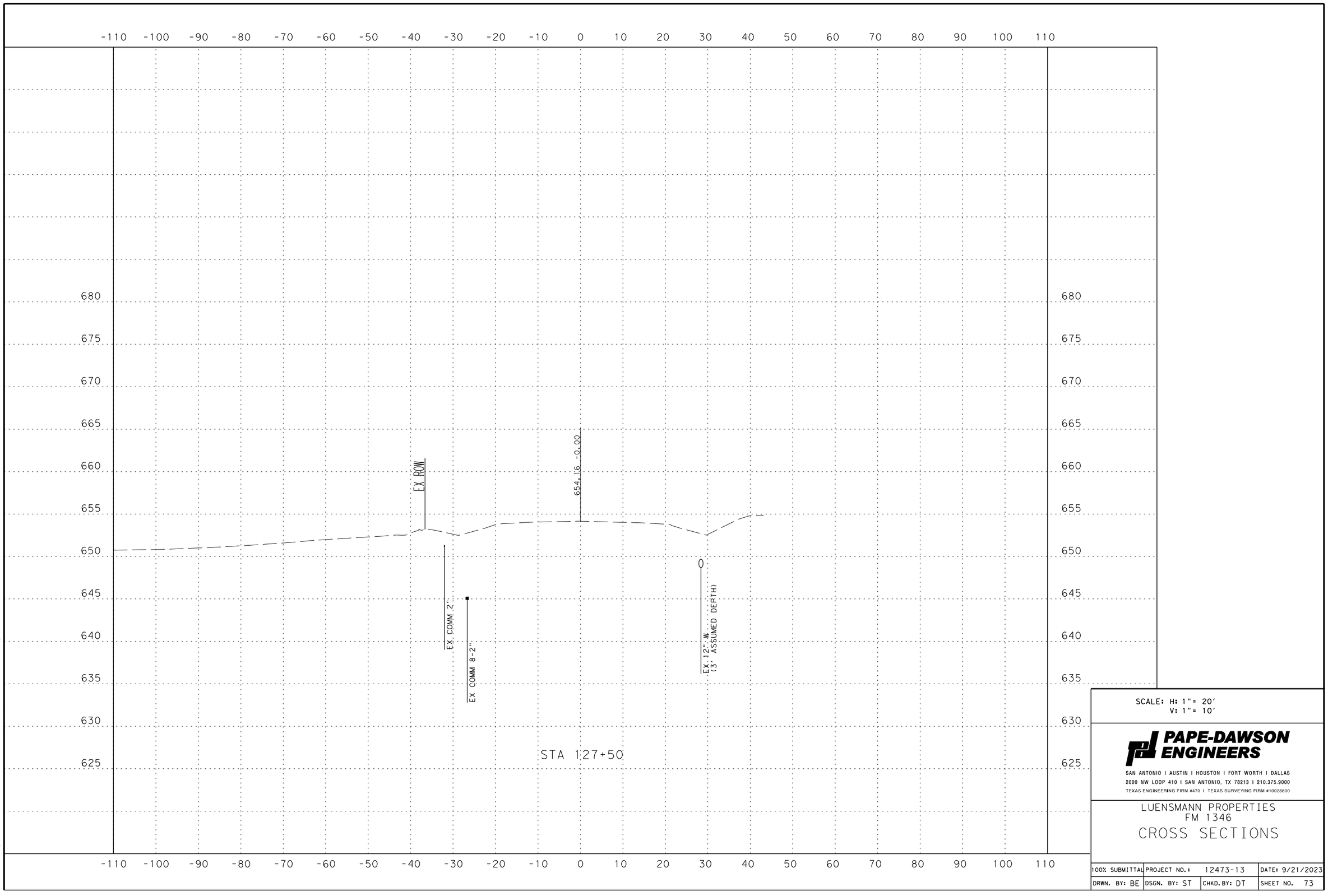

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PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 73

Plotted on: 9/21/2023

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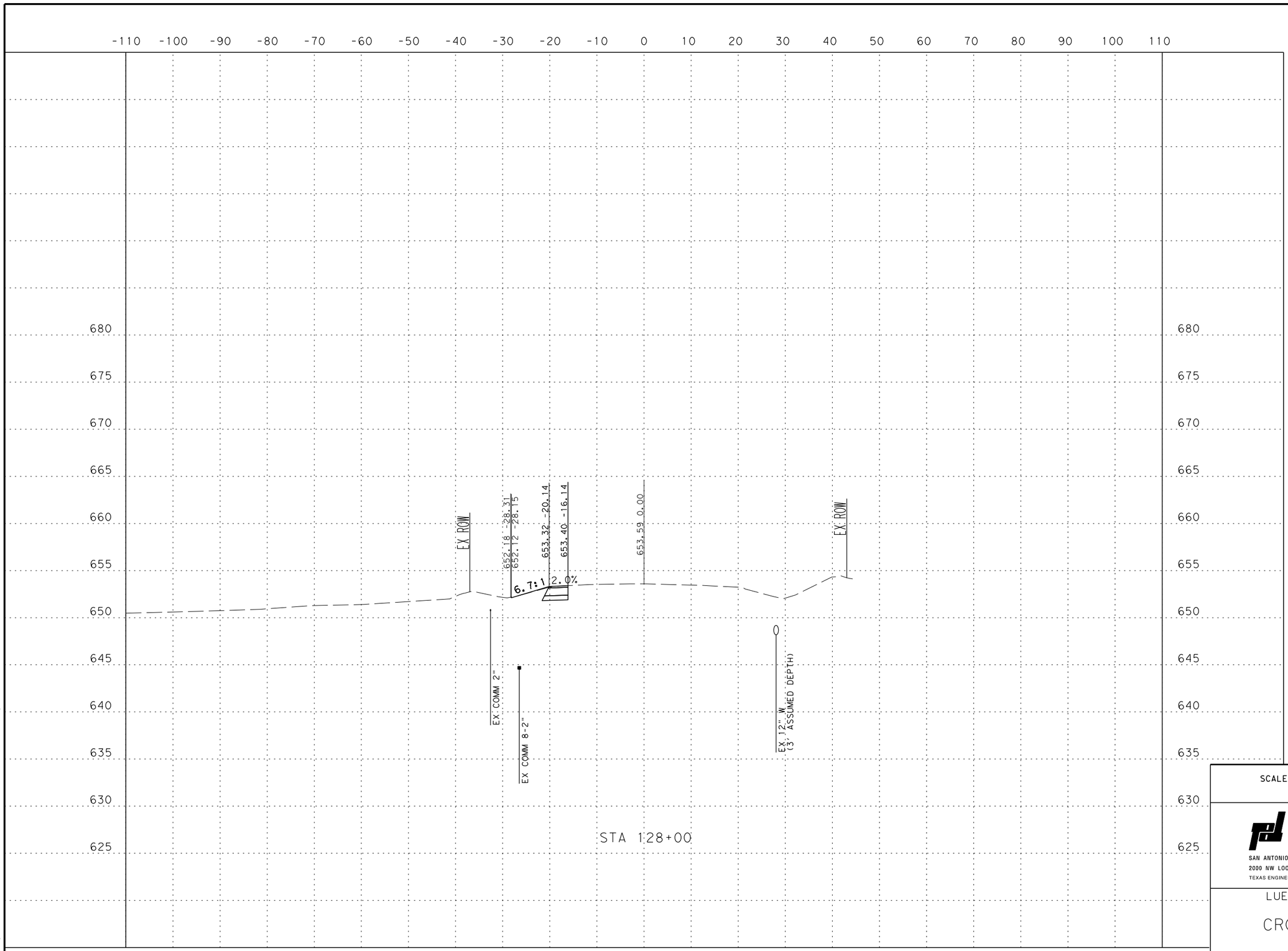

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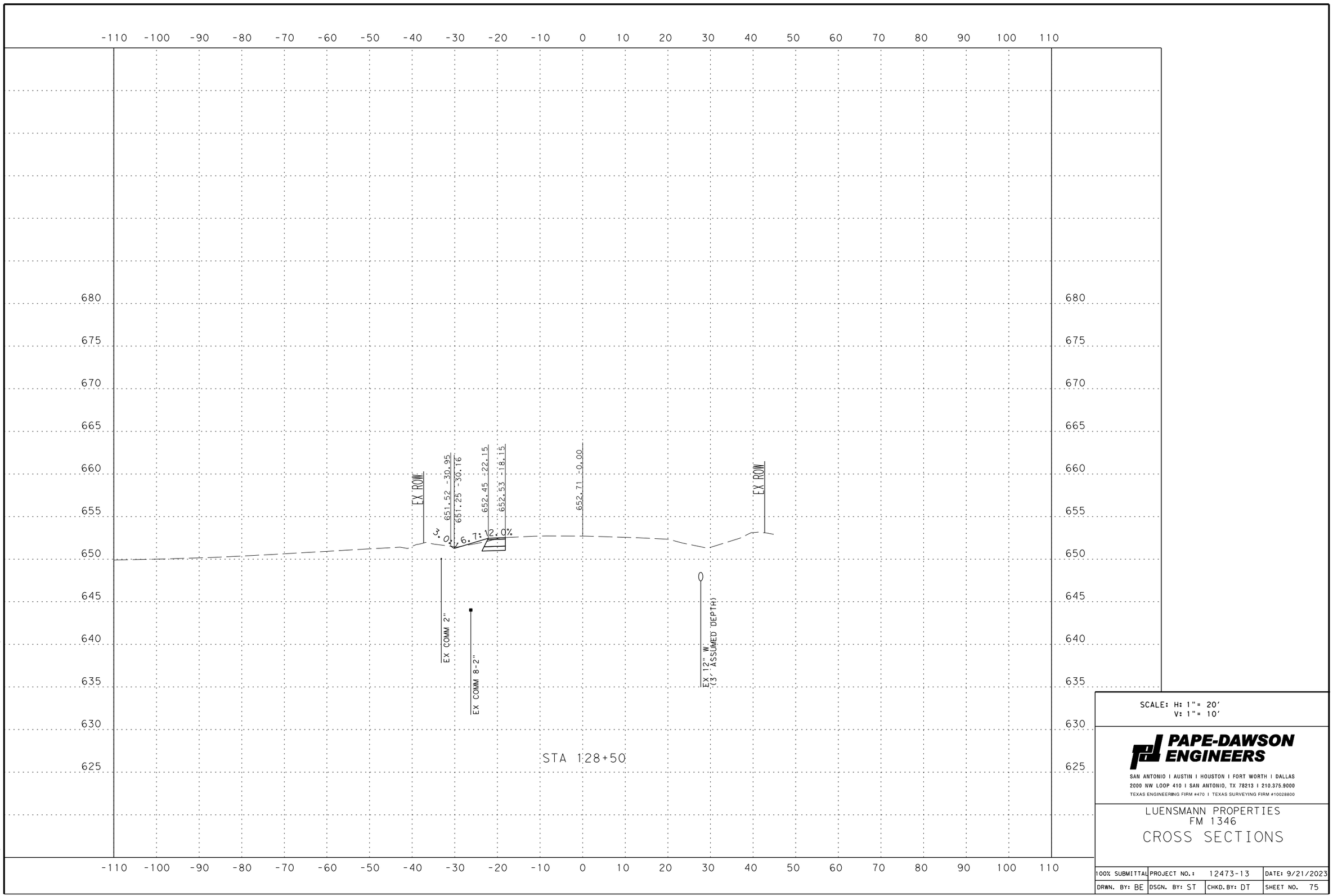

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680 675 670 665 660 655 650 645 640 635 630 625

EX ROW
650.79 -33.36
650.38 -32.14
651.60 -24.14
651.70 -18.75
651.86 0.00
EX ROW
6:1
2.0%
EX COMM 2"
EX COMM 8-2"
EX 12" W
(3' ASSUMED DEPTH)

STA 129+00

SCALE: H: 1"= 20'
V: 1"= 10'

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DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 76

Plotted on: 9/21/2023

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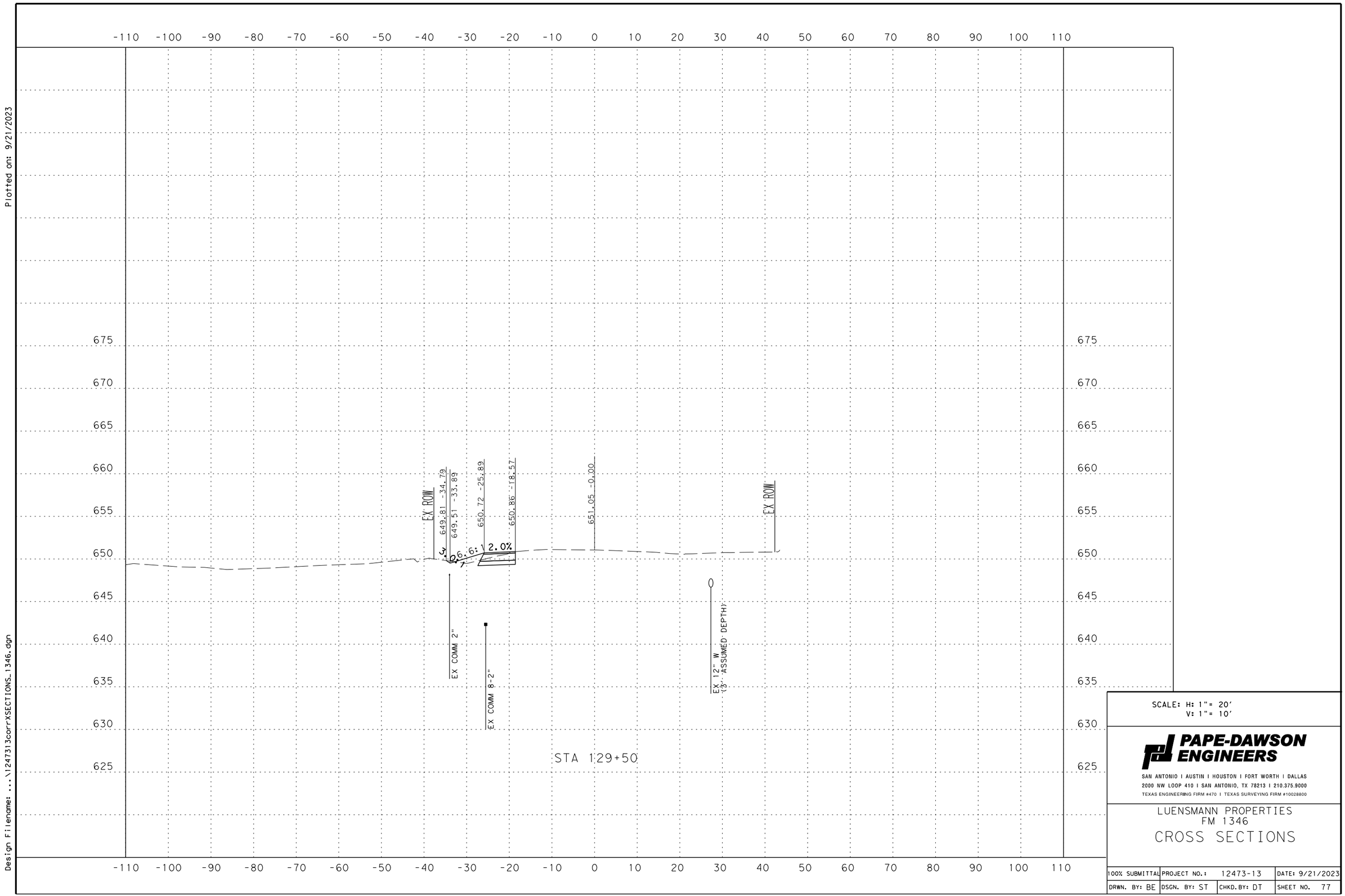

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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
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FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 77

Plotted on: 9/21/2023

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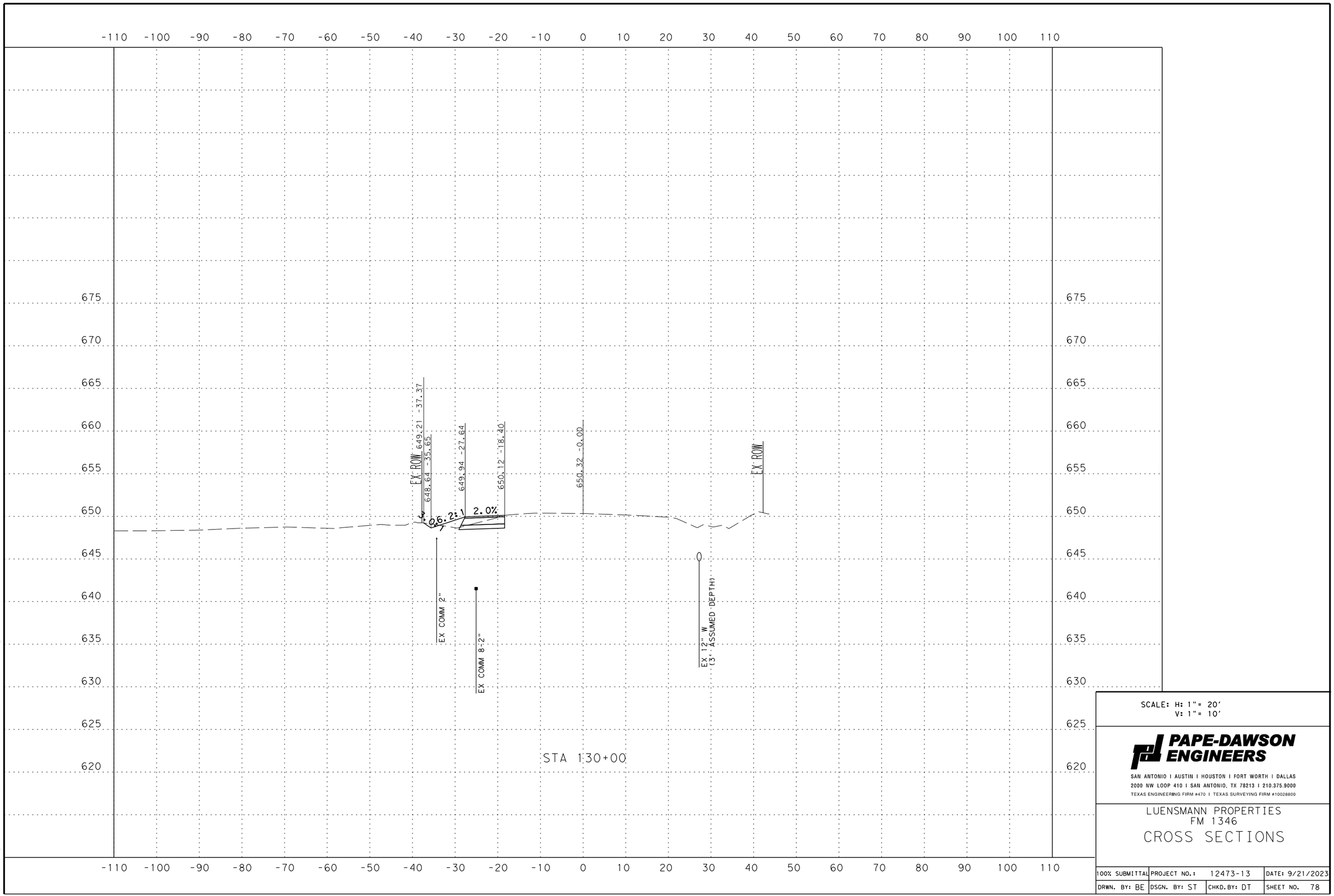

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2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

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100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 78

Plotted on: 9/21/2023

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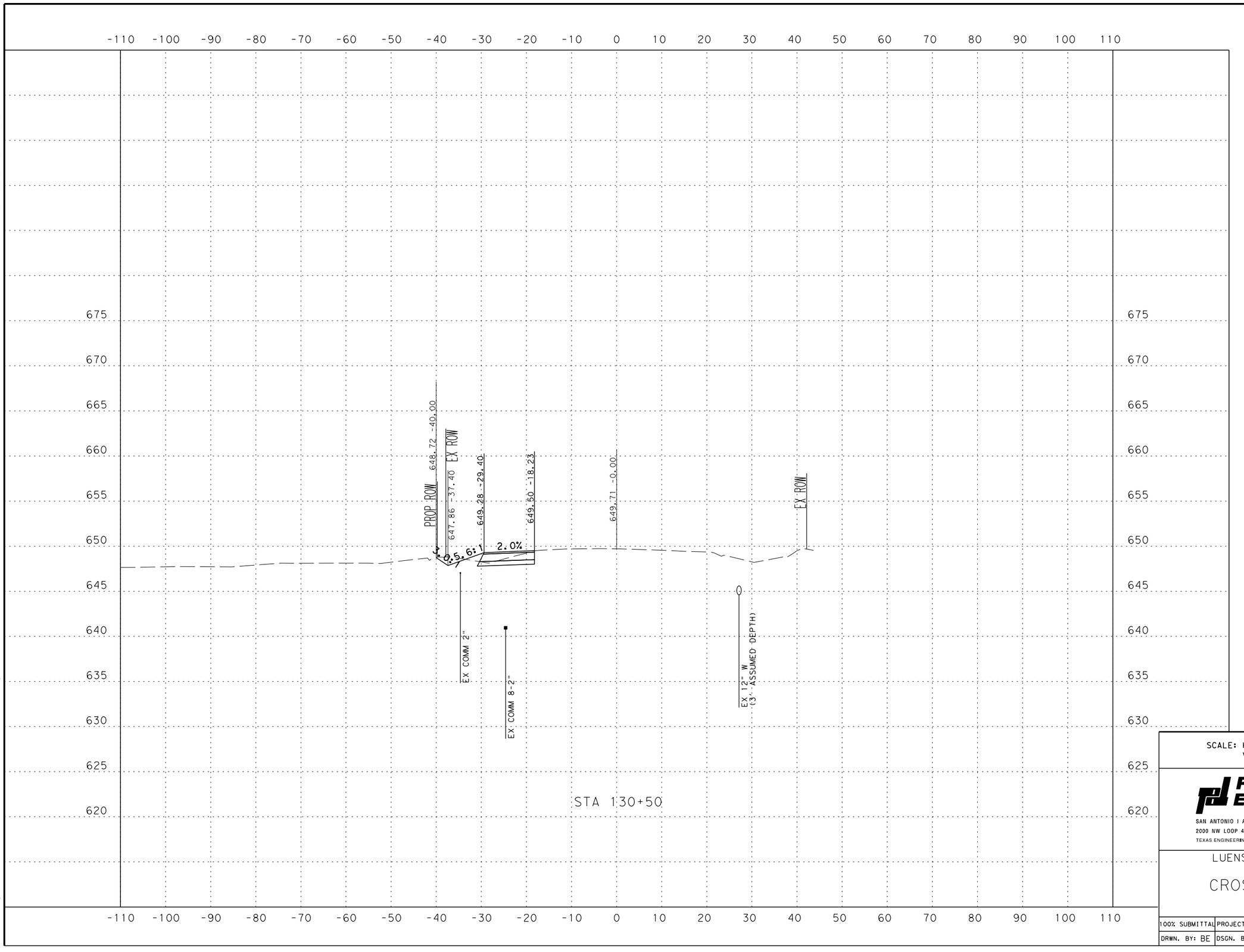

SCALE: H: 1"= 20'
V: 1"= 10'

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FM 1346
CROSS SECTIONS

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DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 79

Plotted on: 9/21/2023

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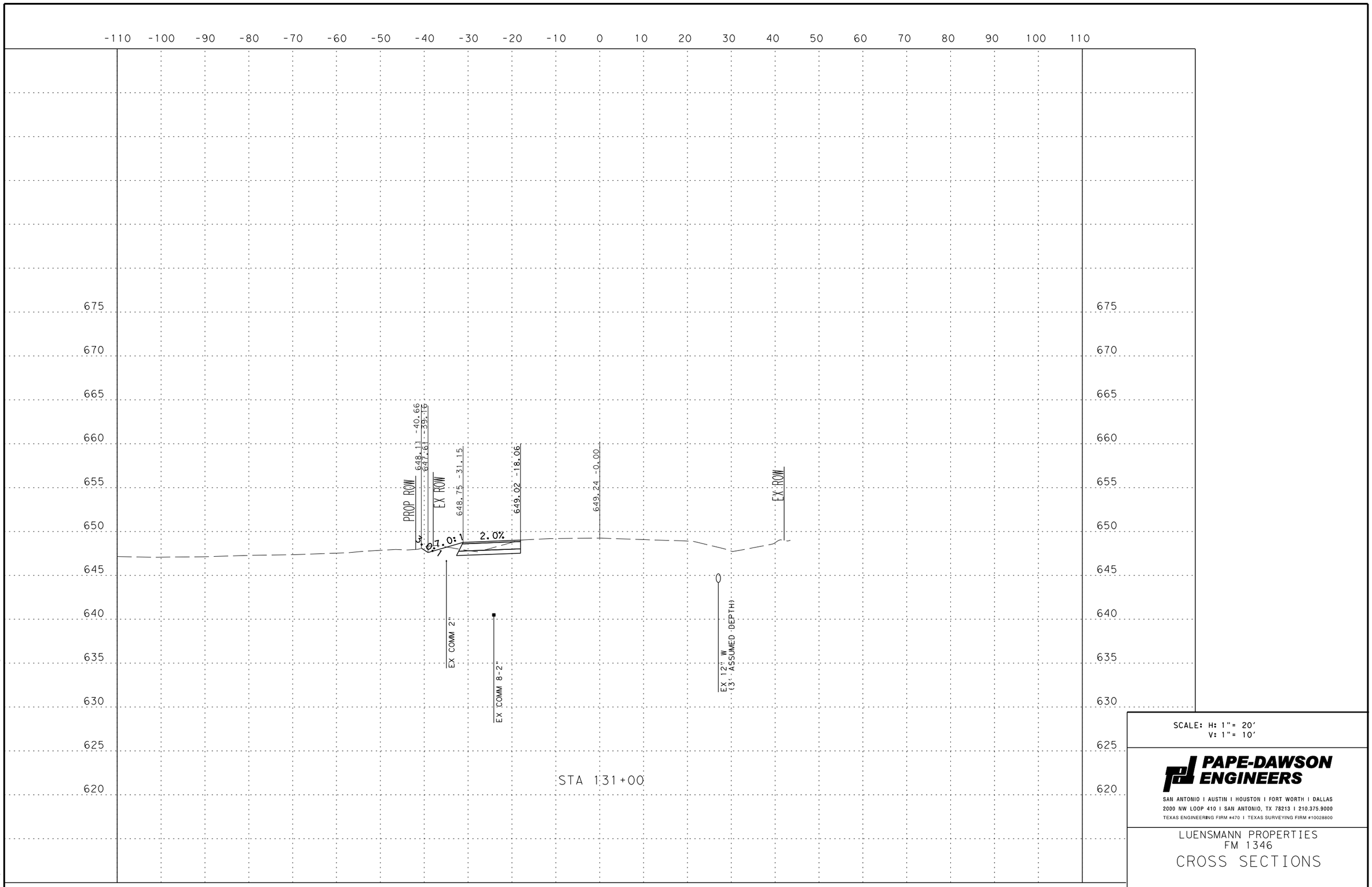

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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346

CROSS SECTIONS

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Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn

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675
670
665
660
655
650
645
640
635
630
625
620

PROP ROW
647.66 -40.91
EX ROW
647.36 -40.00
648.42 -32.00
648.70 -17.88
648.96 -0.00
EX ROW
3
0.7
6:1
2.0%
EX COMM 2"
EX COMM 8-2"
EX 12" W
13' ASSUMED DEPTH

STA 131+50

SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS
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FM 1346
CROSS SECTIONS

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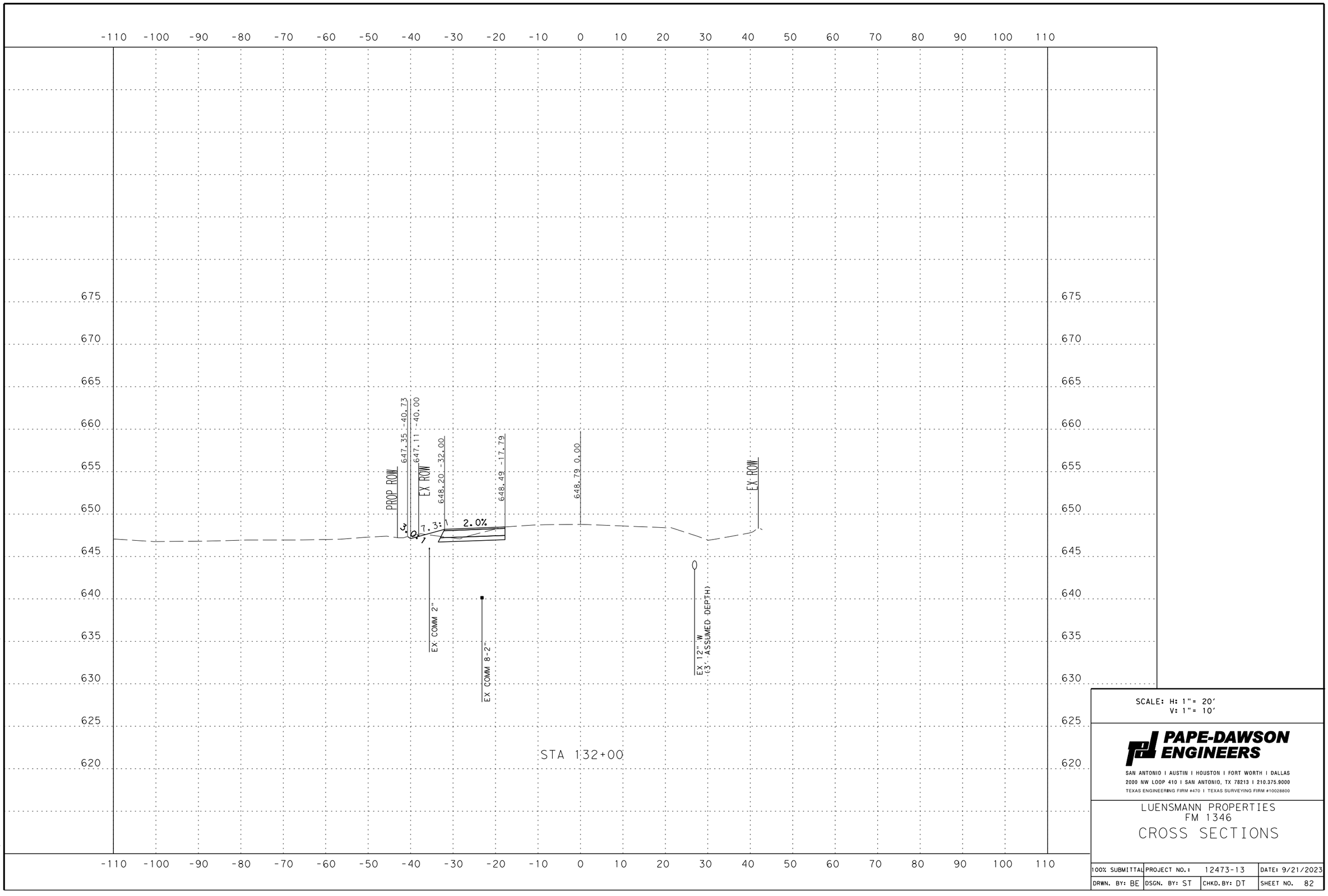
Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

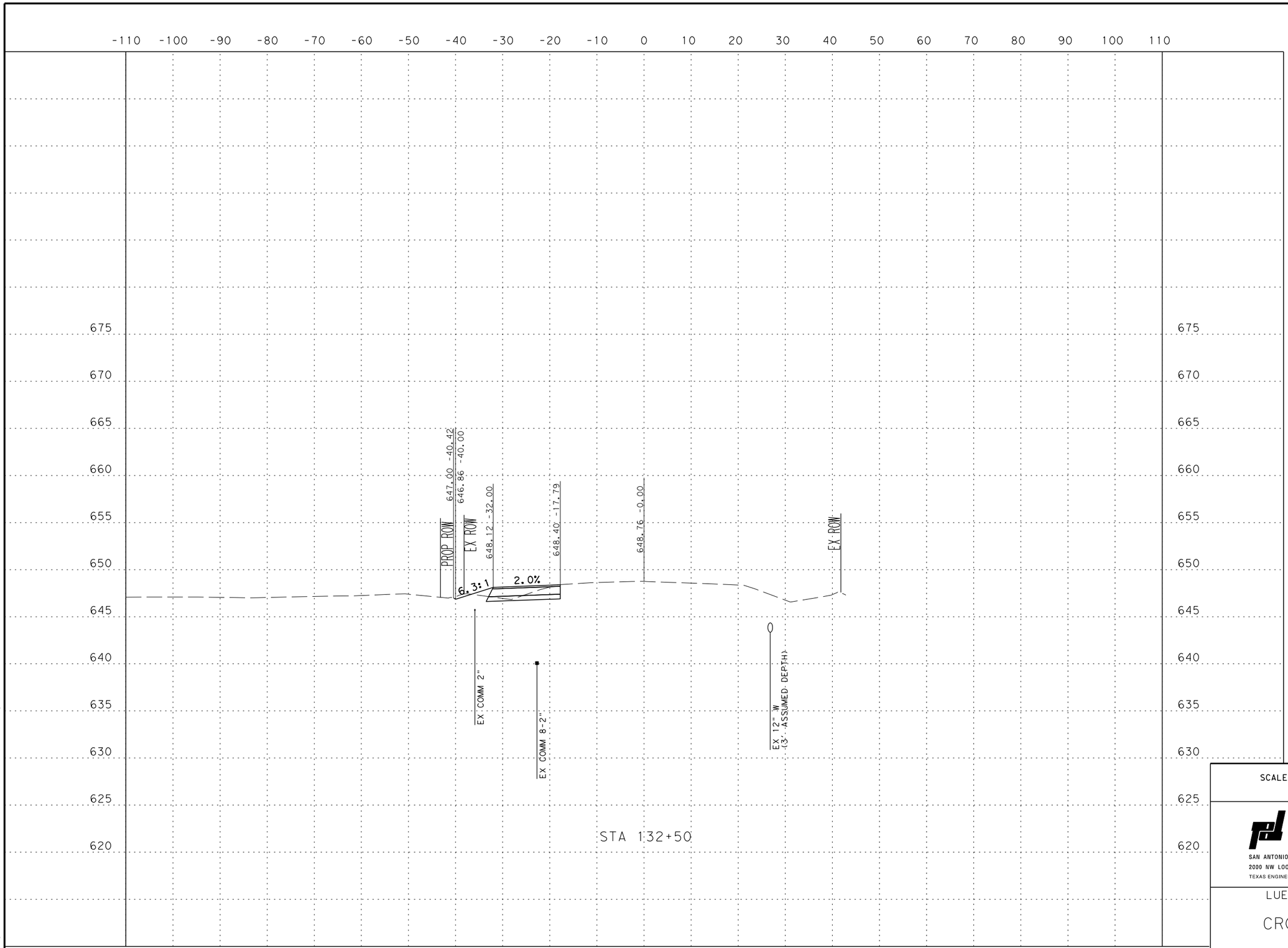
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 82

Plotted on: 9/21/2023

Design Filename: ...\12473\13corr\XSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

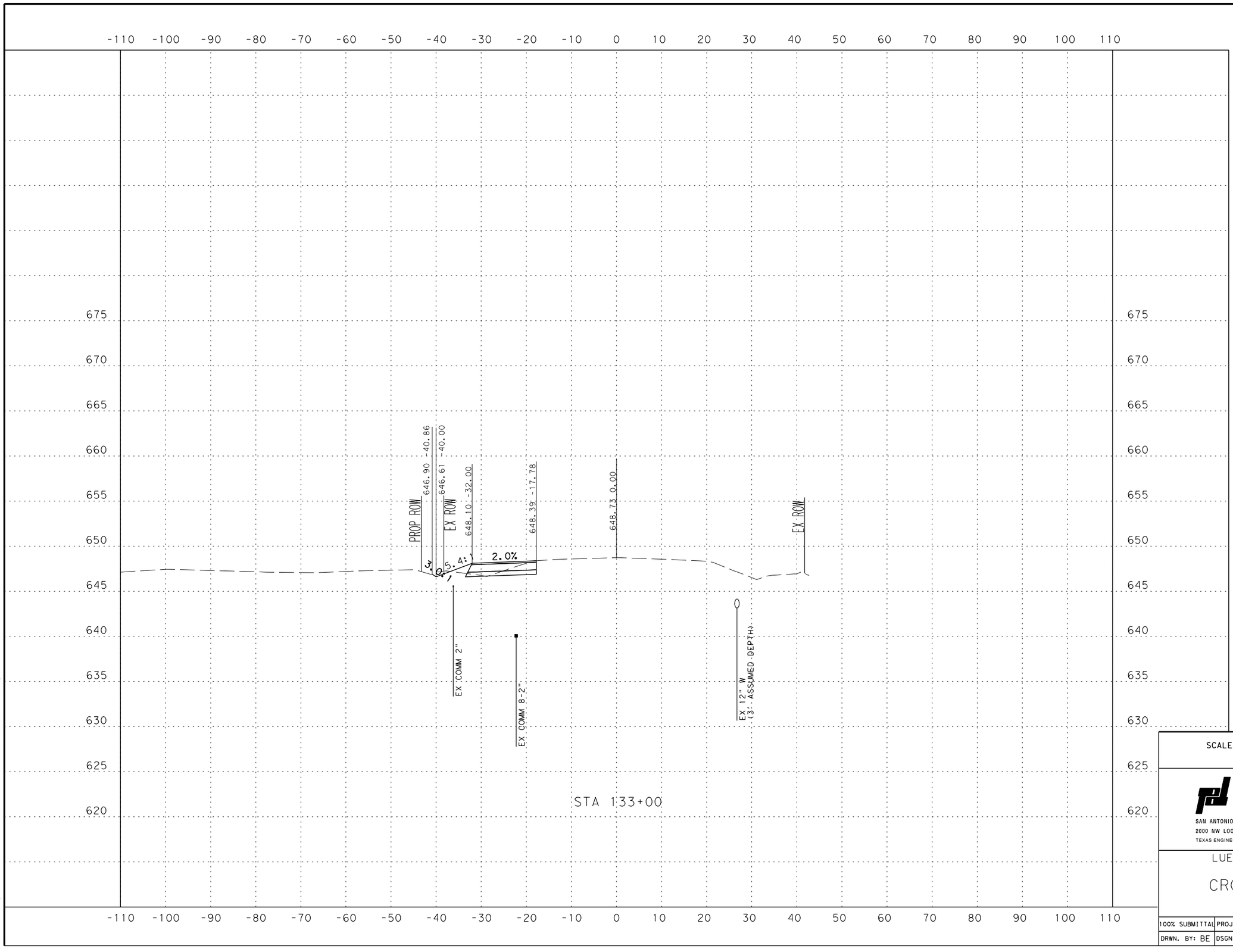
LUENSMANN PROPERTIES
FM 1346

CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 83

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

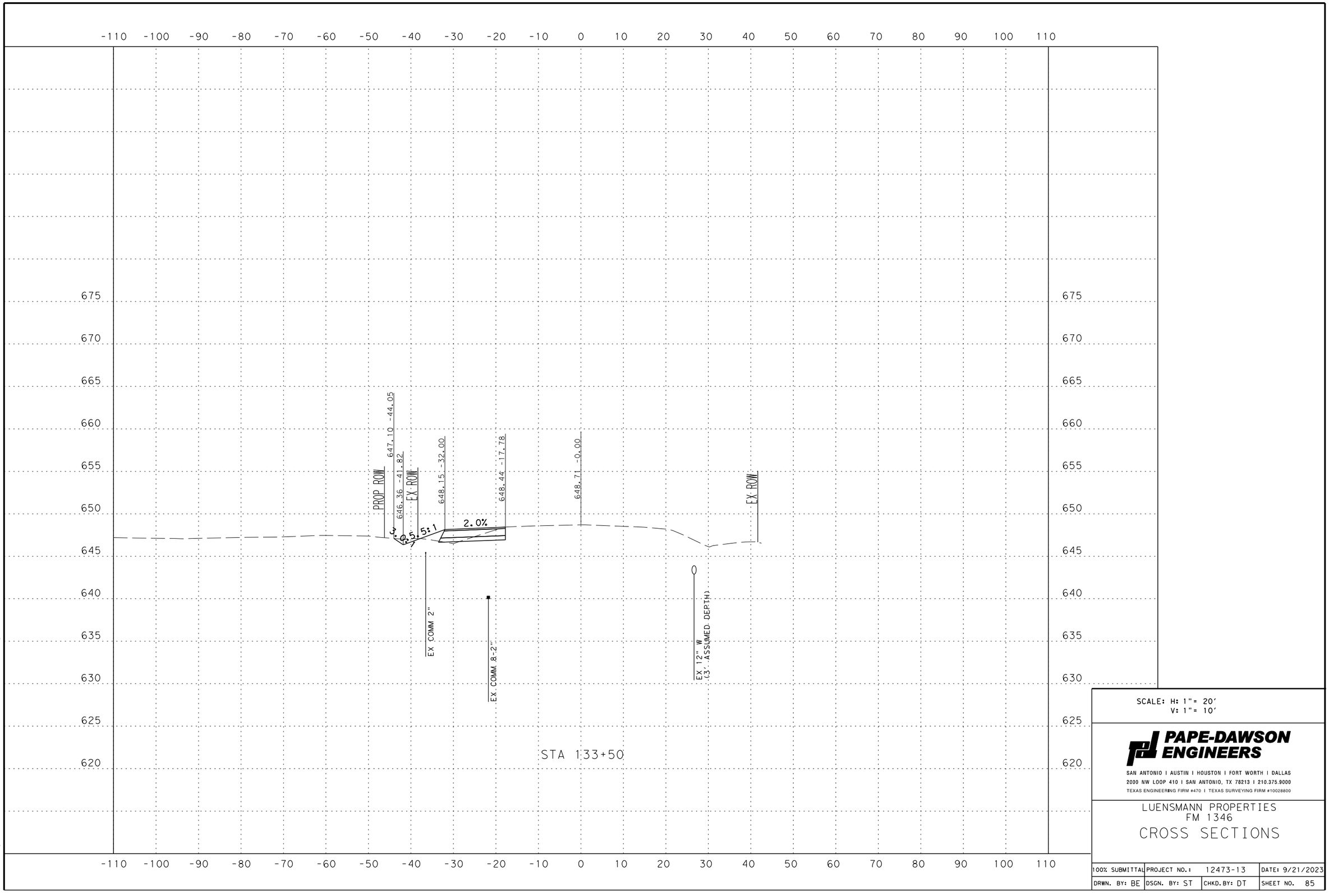
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 84

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

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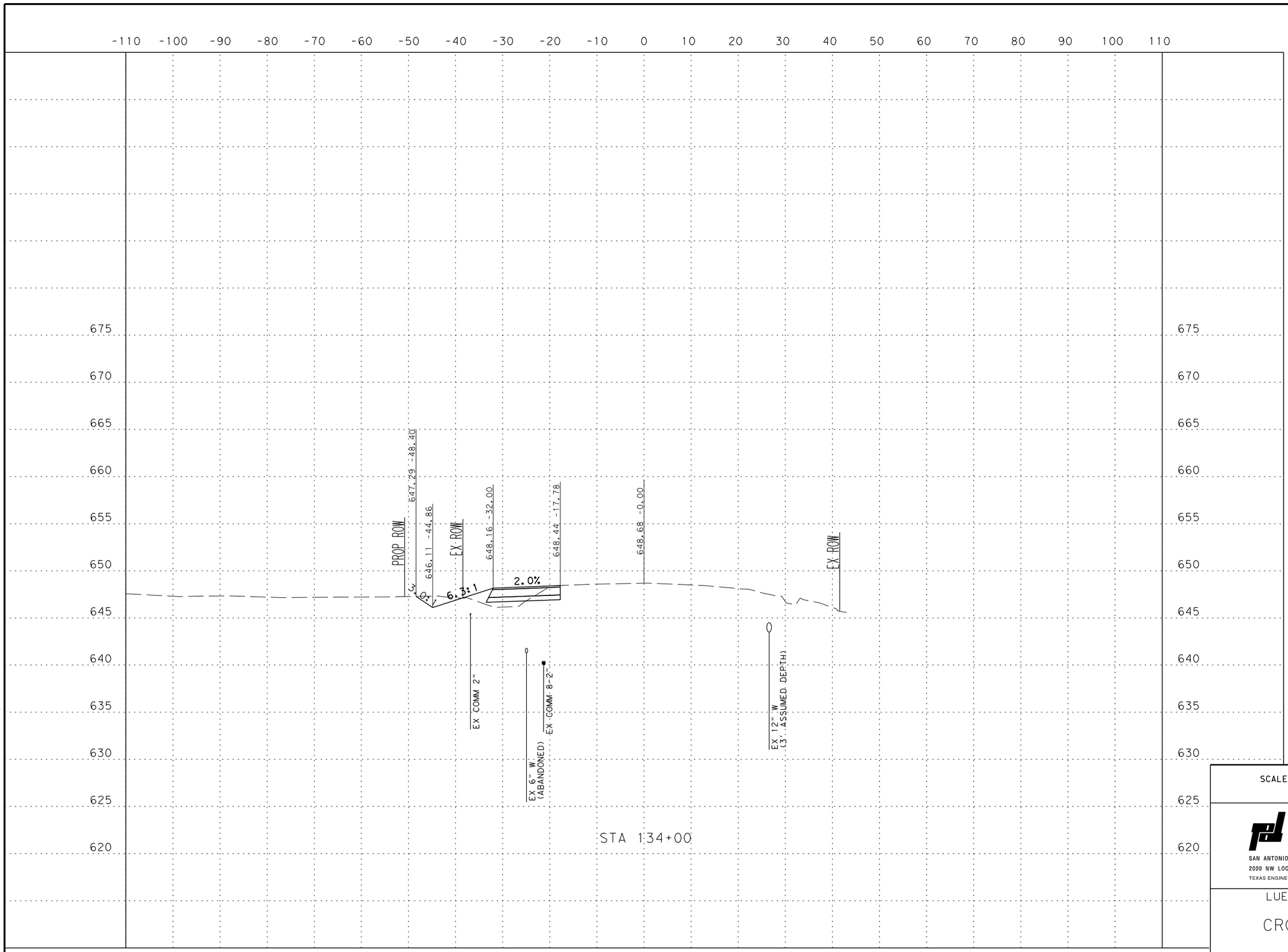
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 85

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

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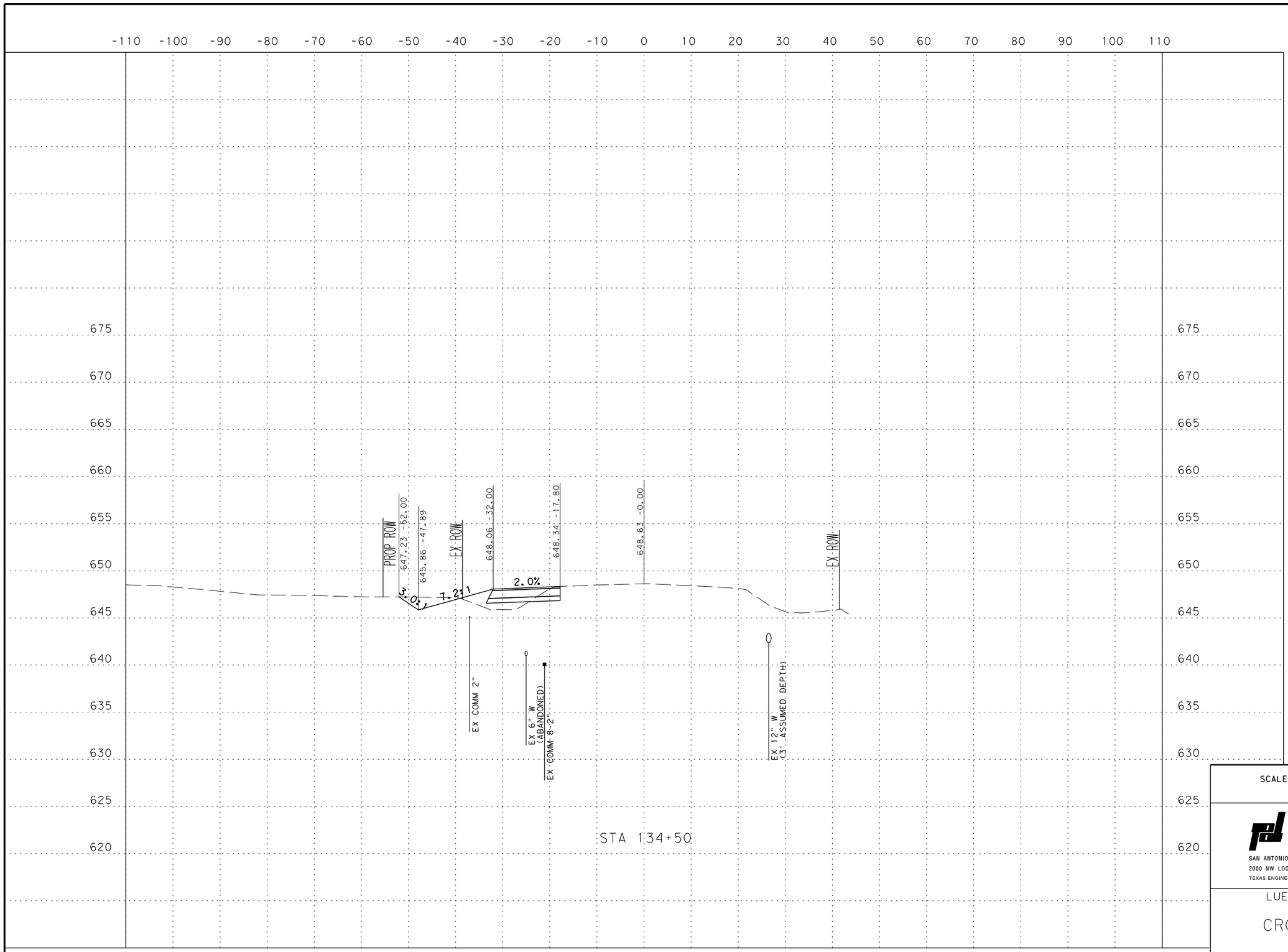
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 86

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

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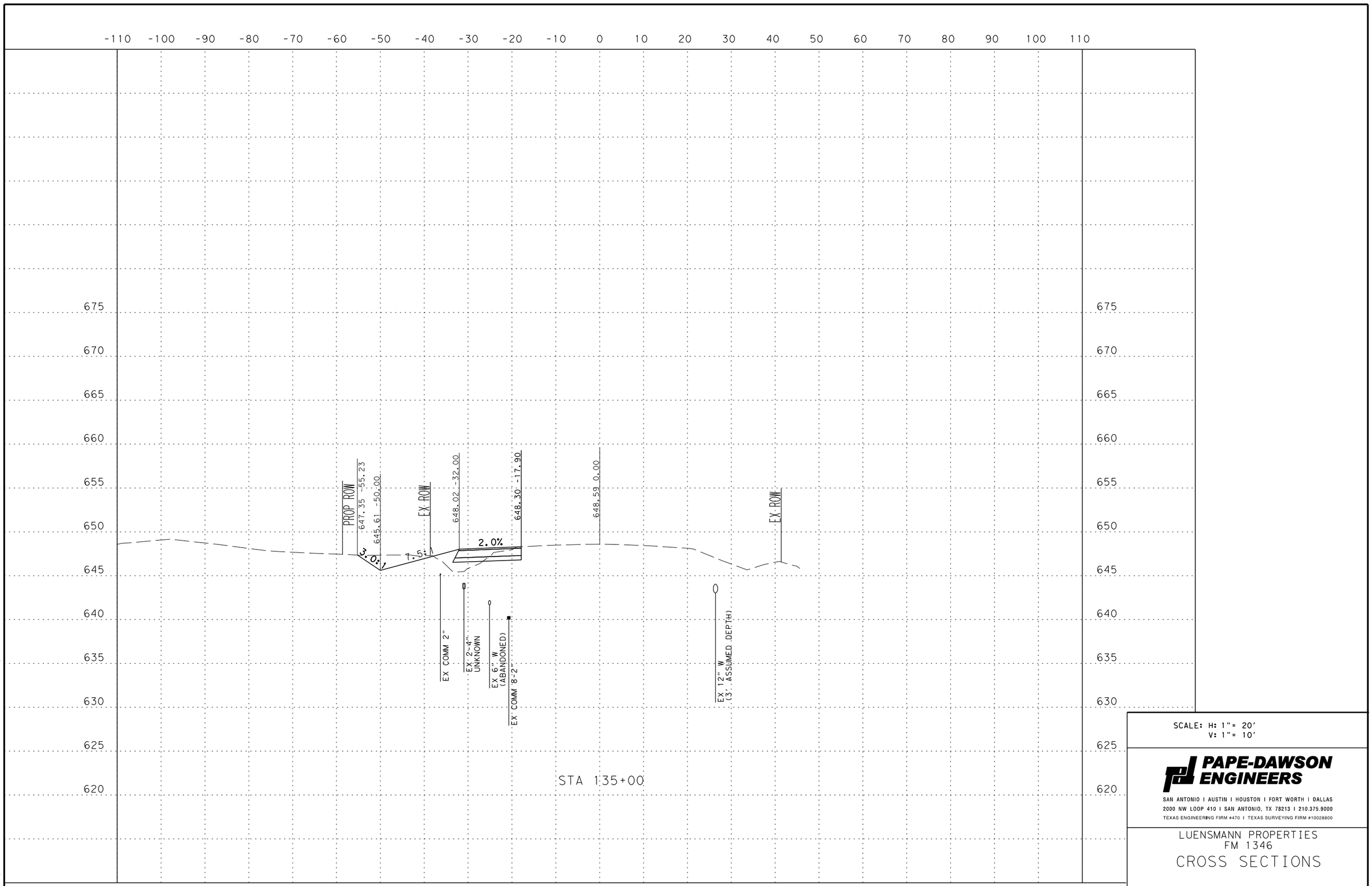
LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 87

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

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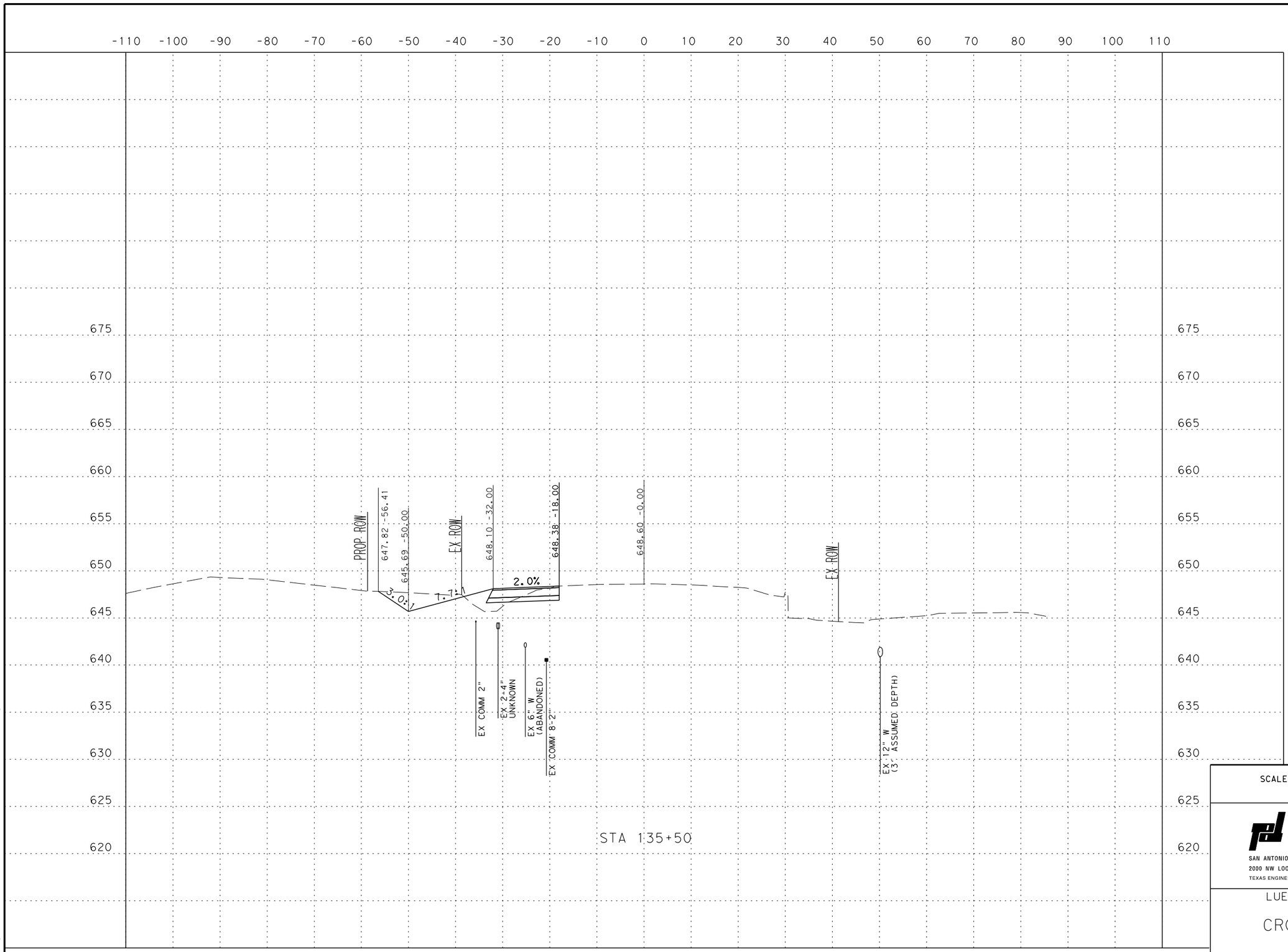
LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 88

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

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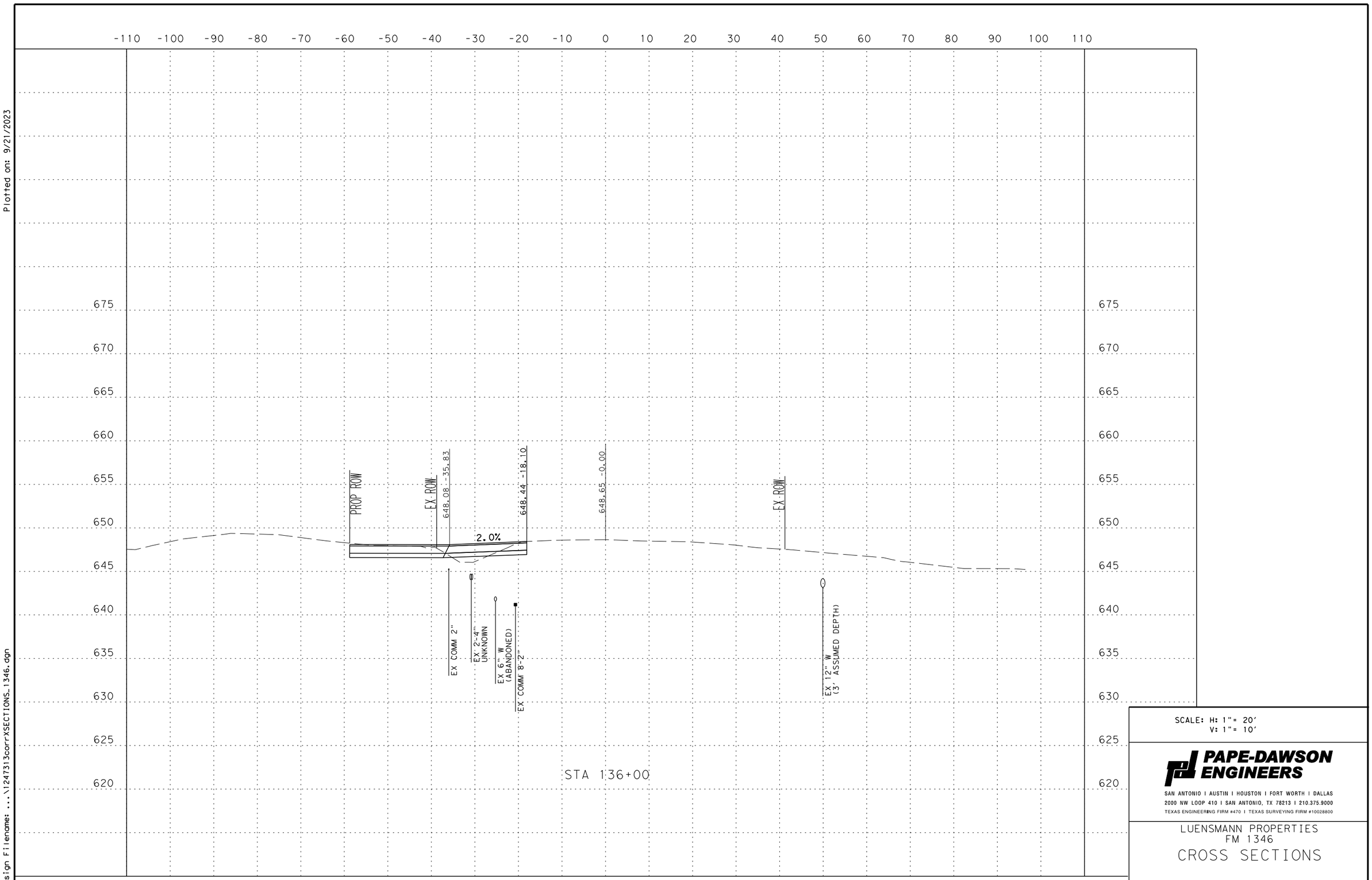
FM 1346

CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 89

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

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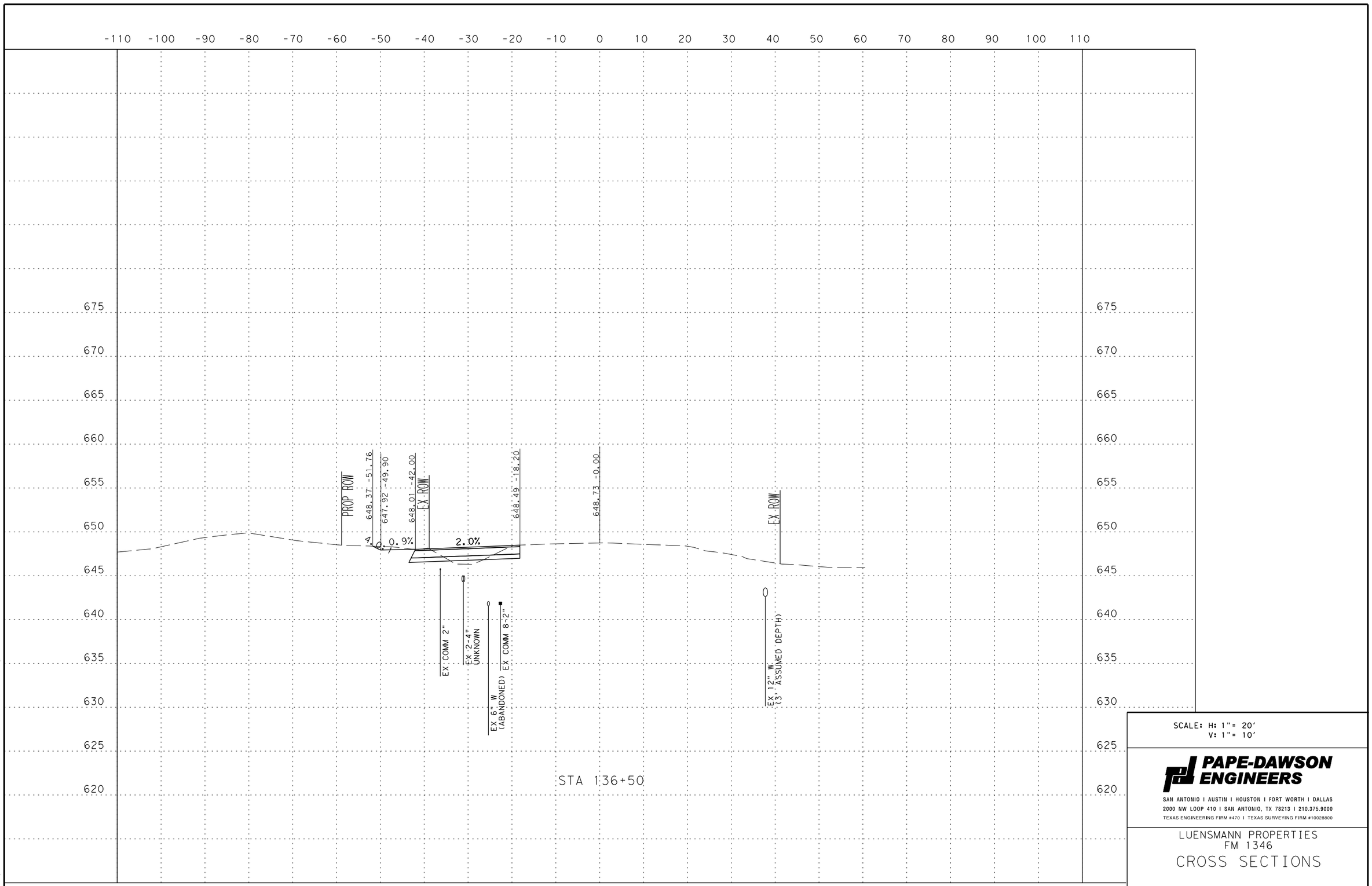
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 90

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

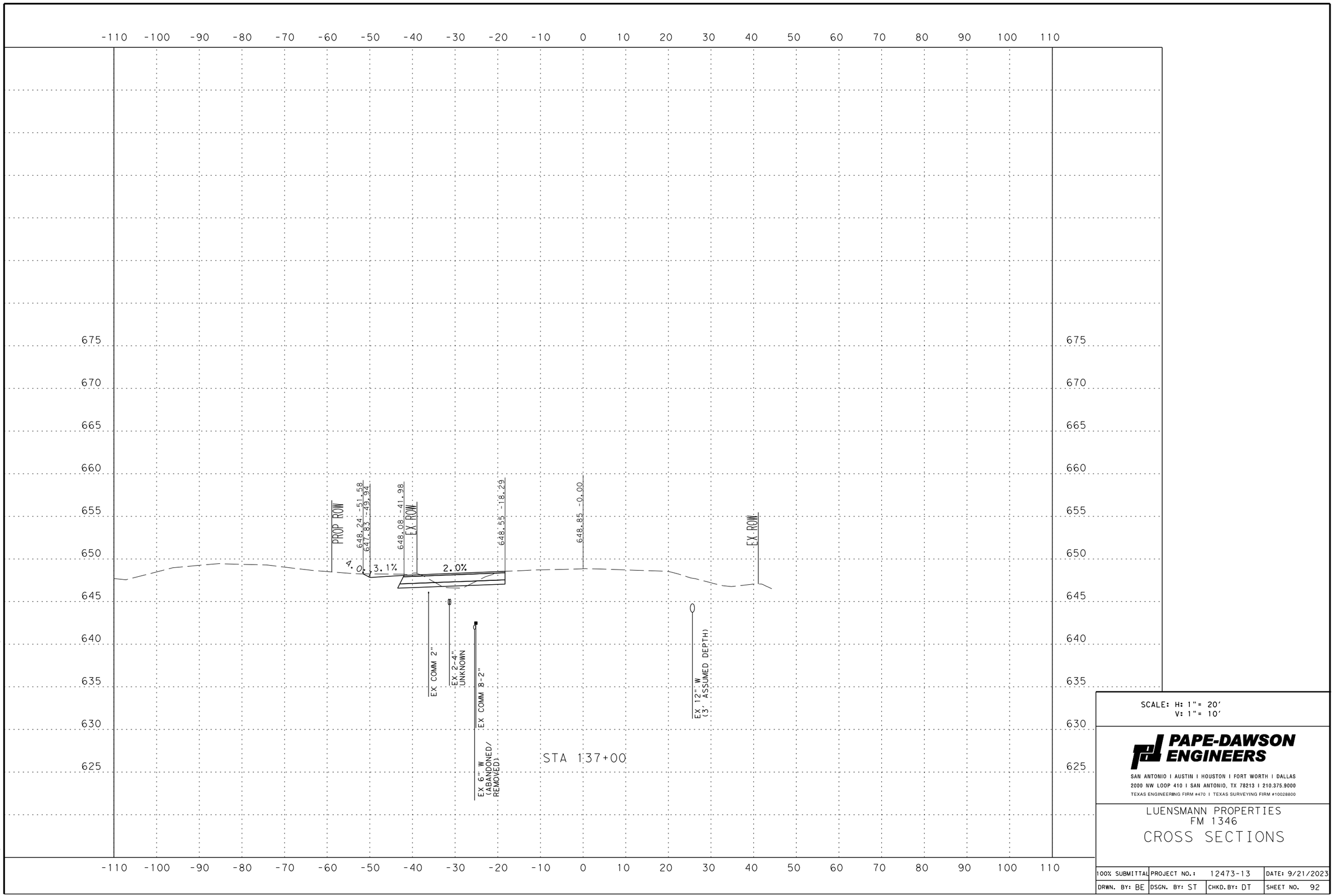
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 91

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
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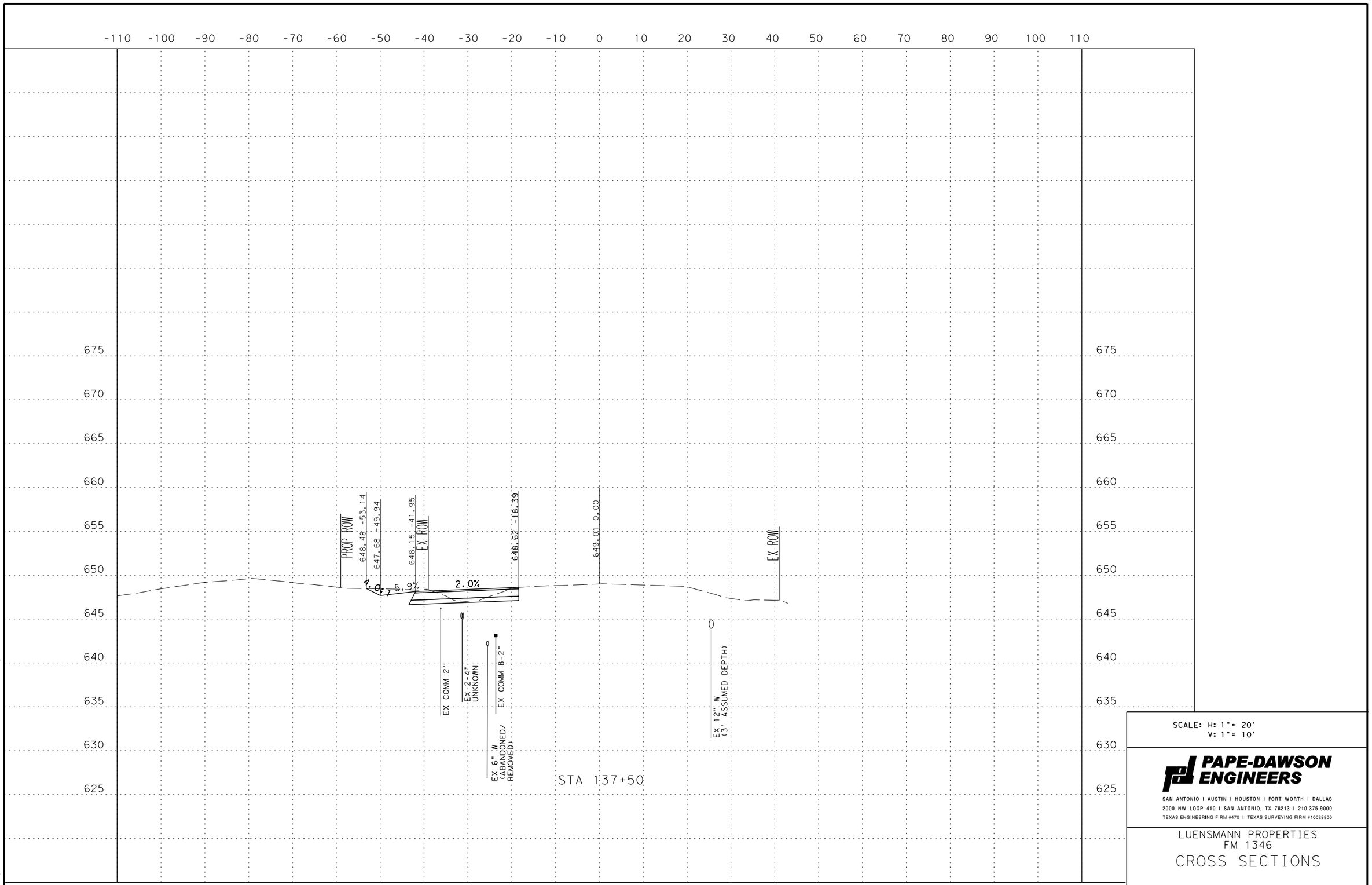
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 92

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
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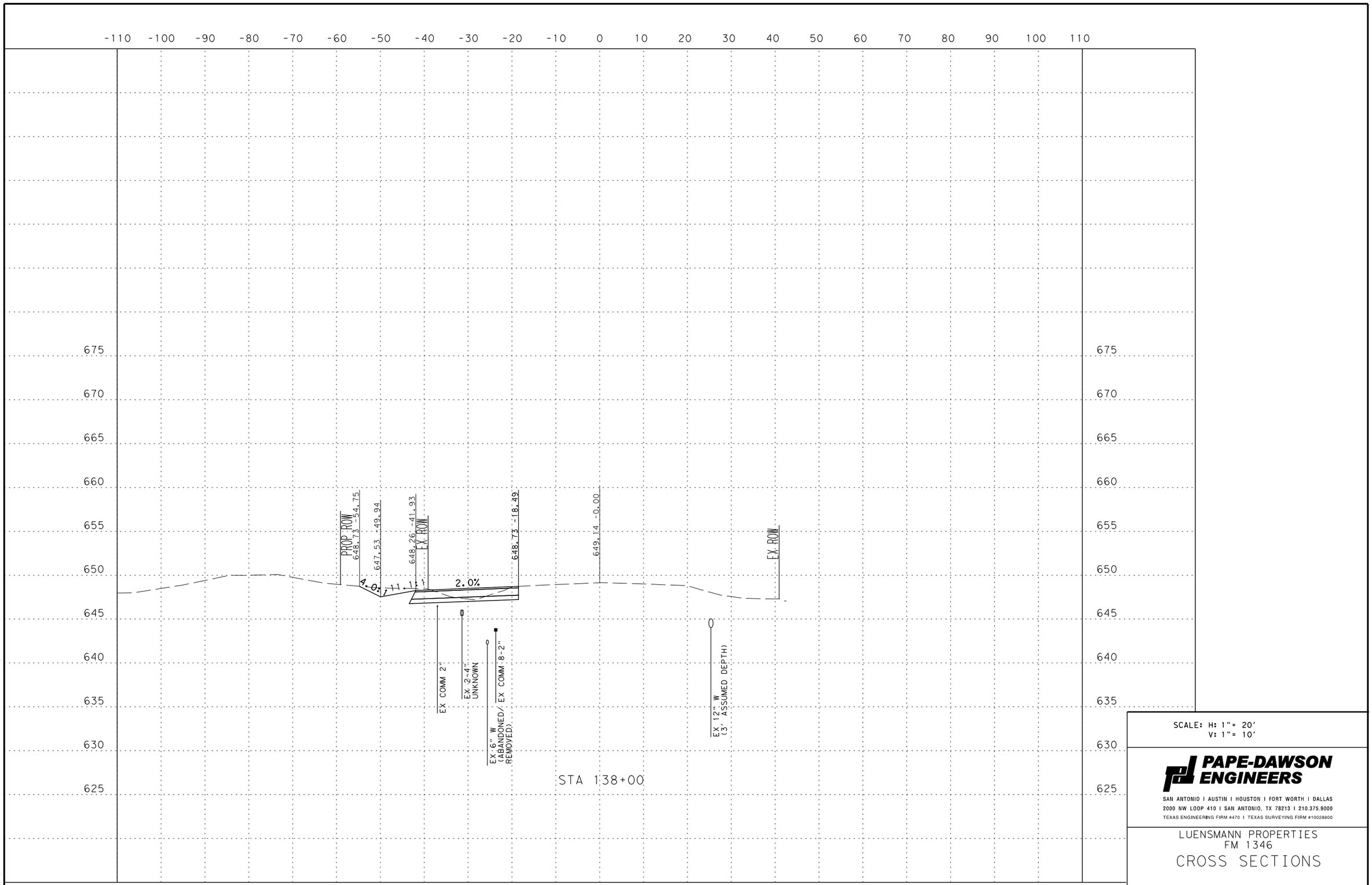
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 93

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
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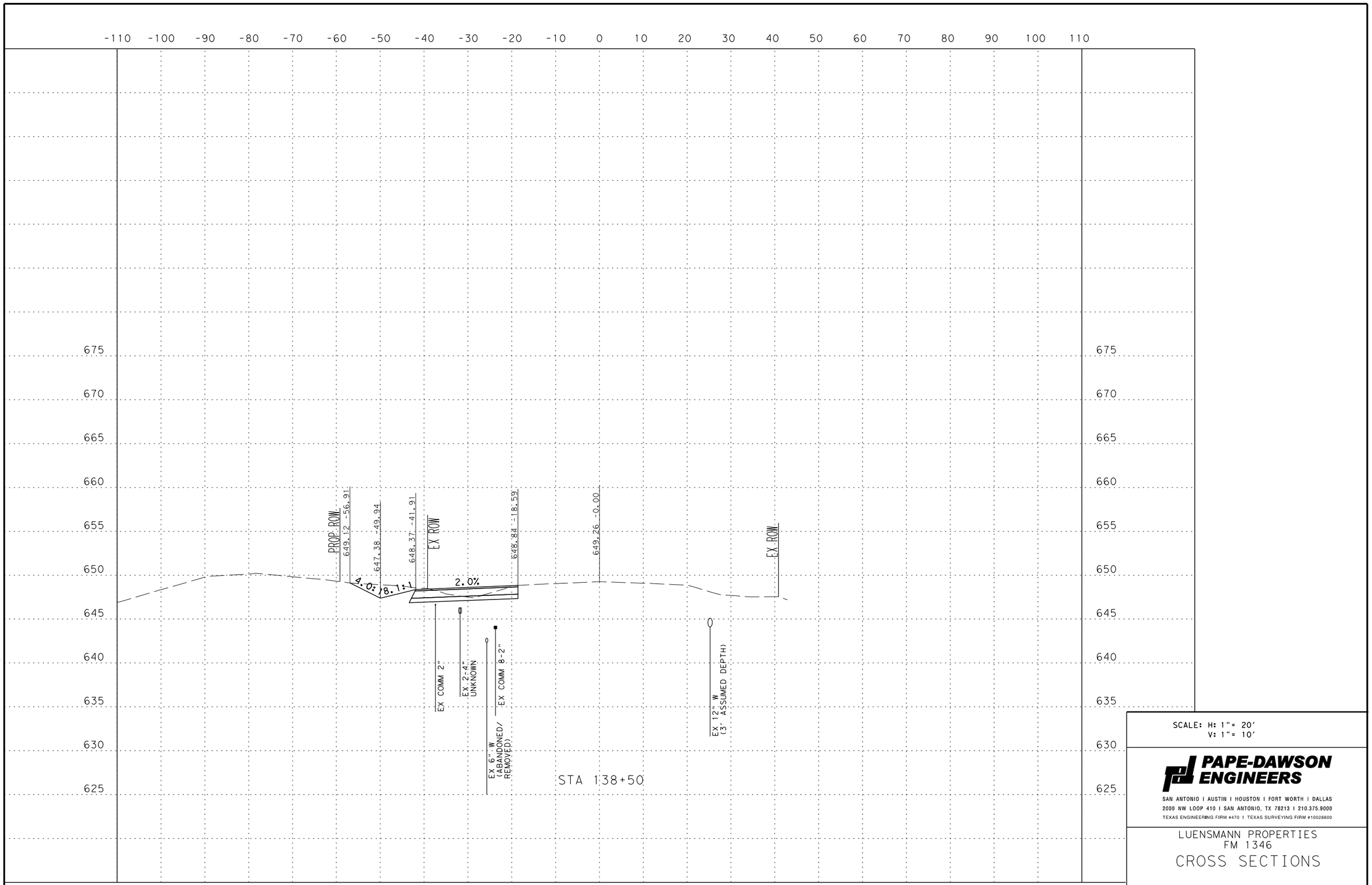
LUENSMANN PROPERTIES
FM 1346

CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 94

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

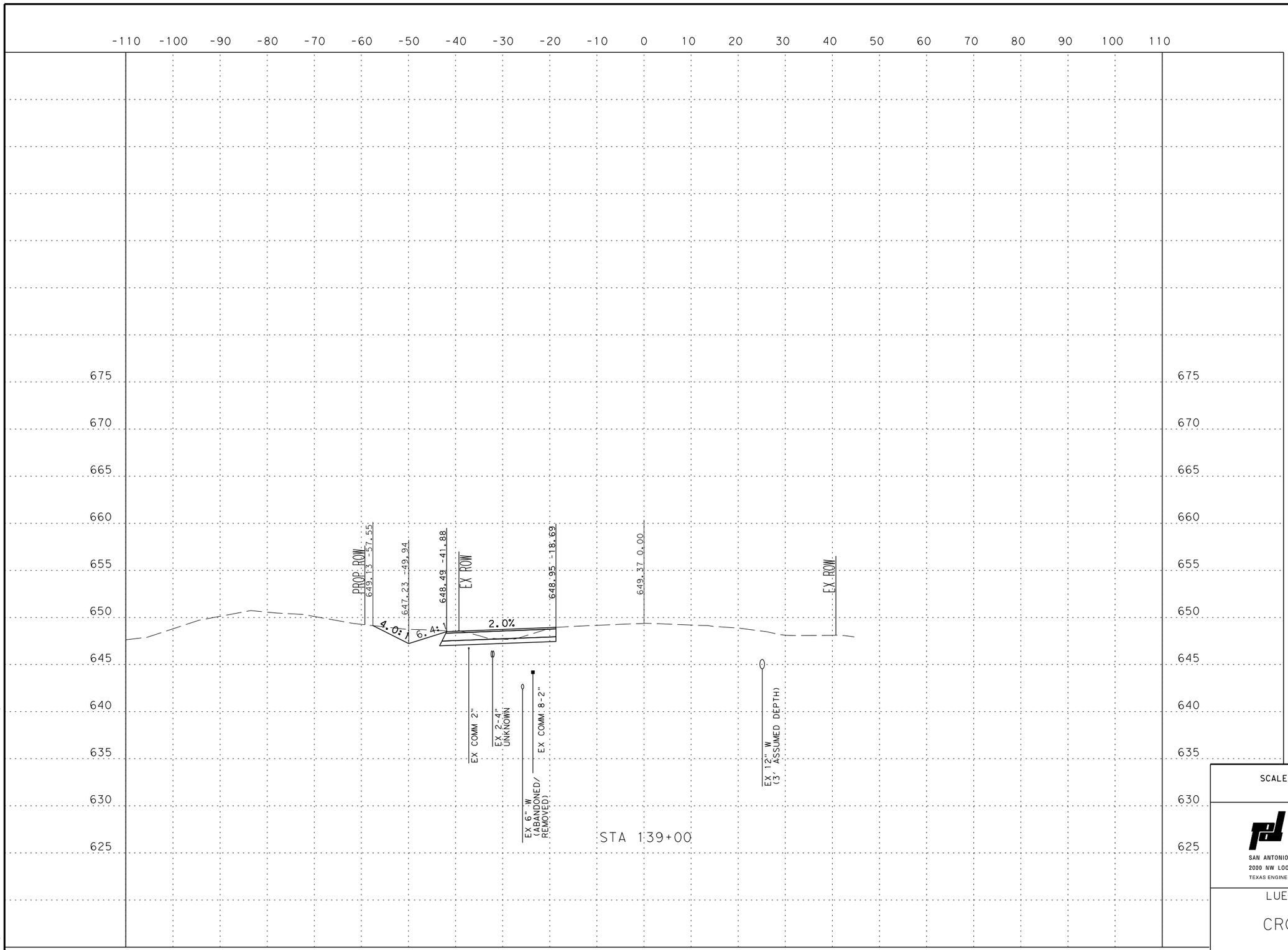
LUENSMANN PROPERTIES
FM 1346

CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 95

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

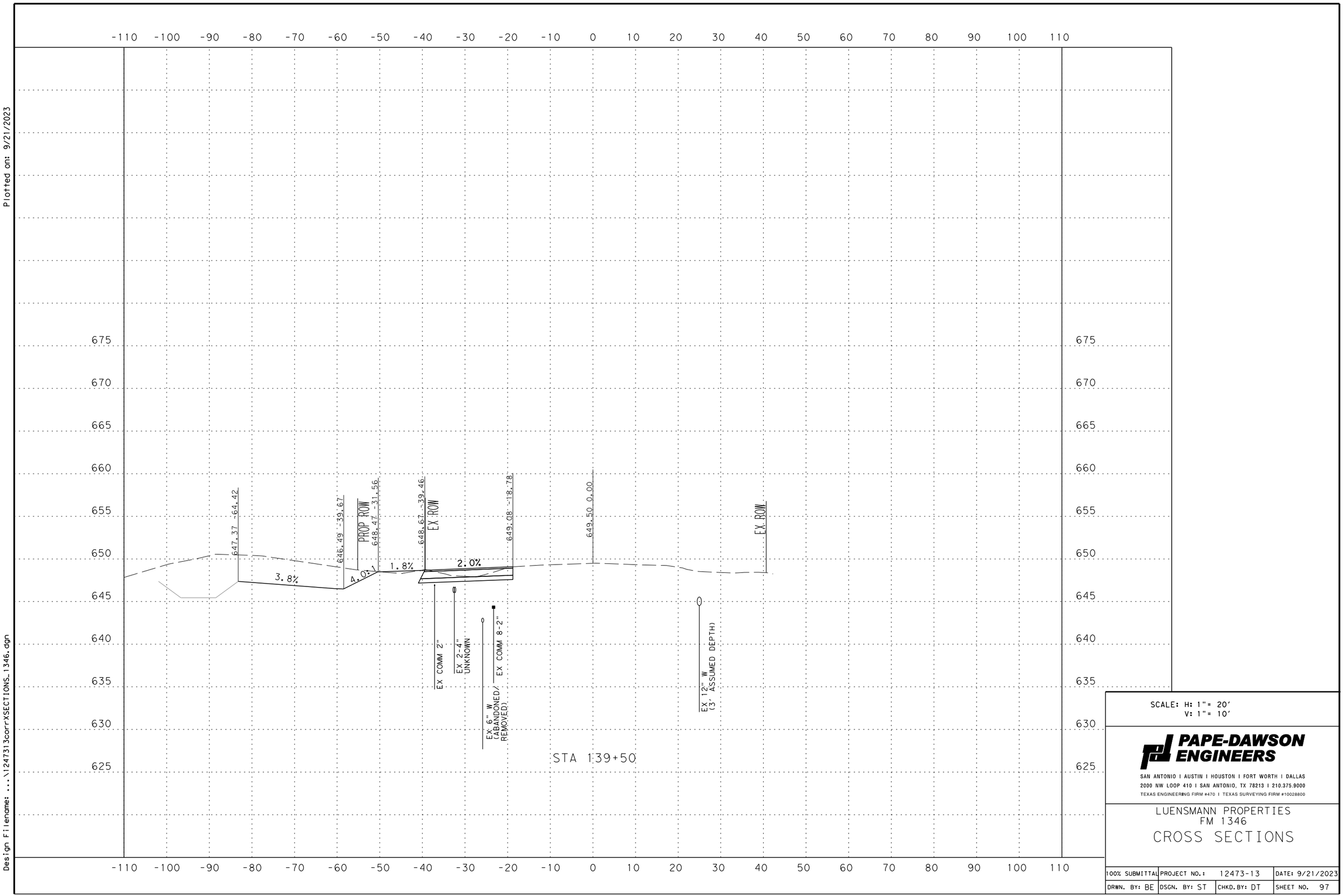
PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 96

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

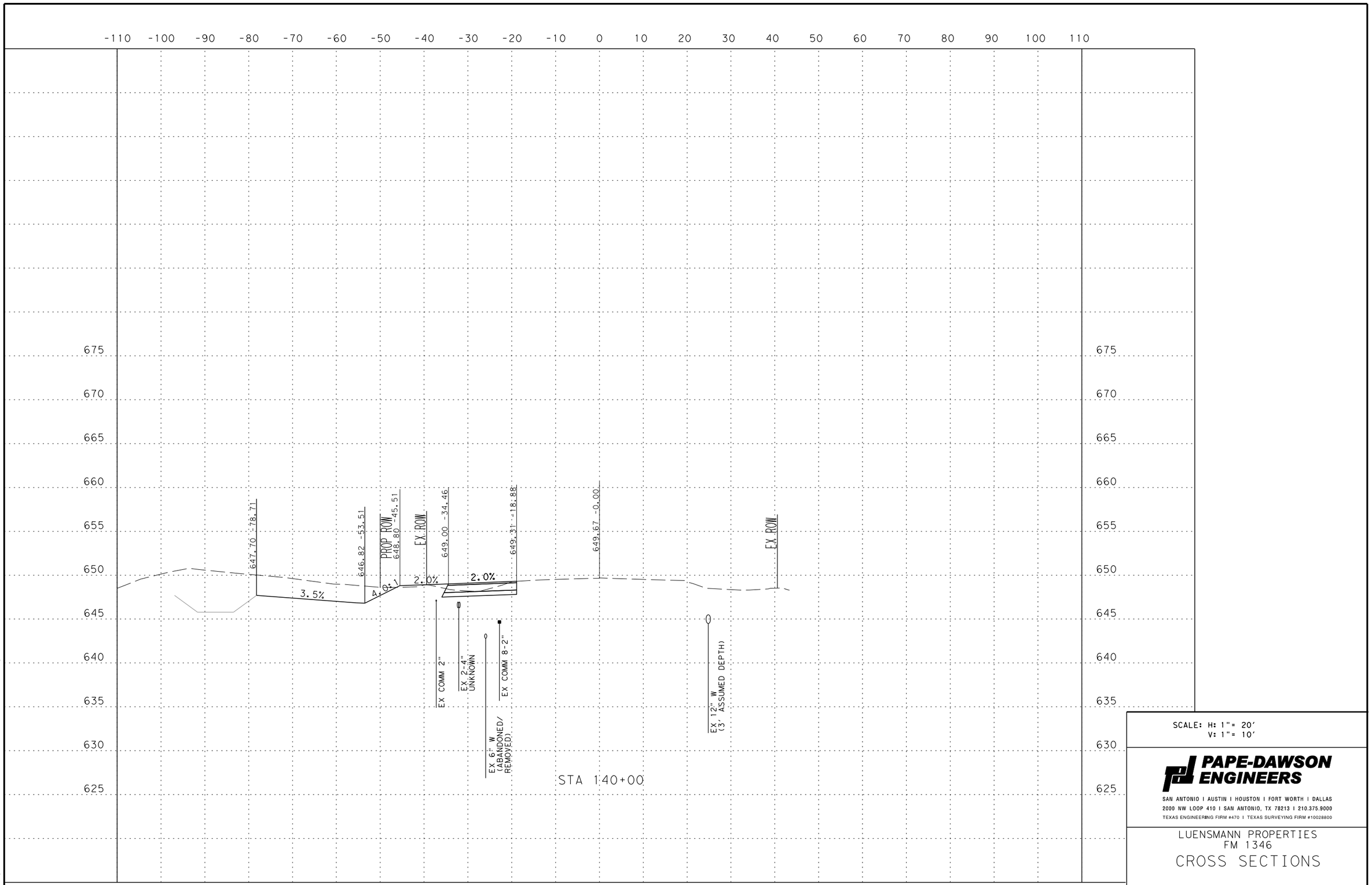
LUENSMANN PROPERTIES
FM 1346

CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 97

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

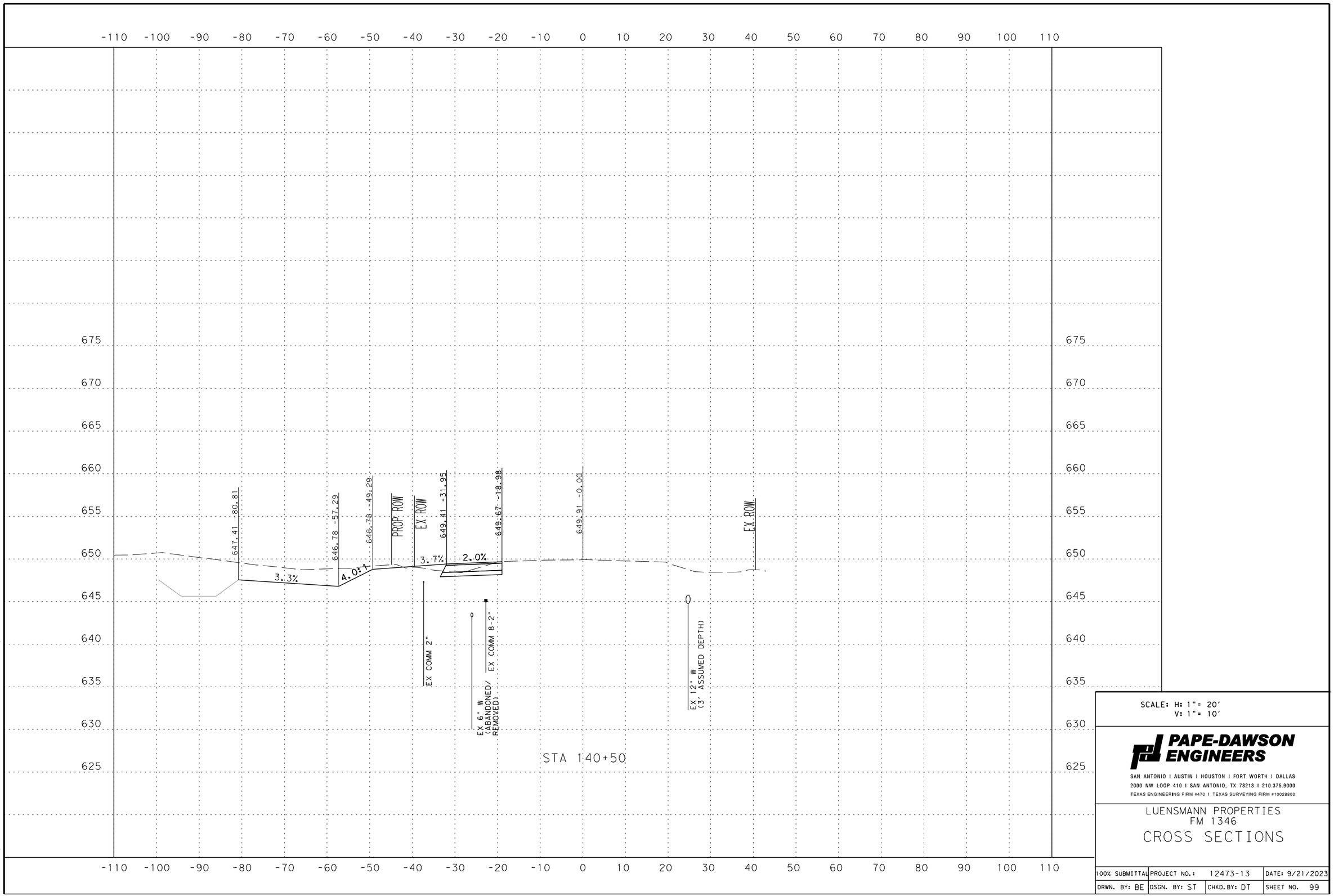
LUENSMANN PROPERTIES
FM 1346

CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 98

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

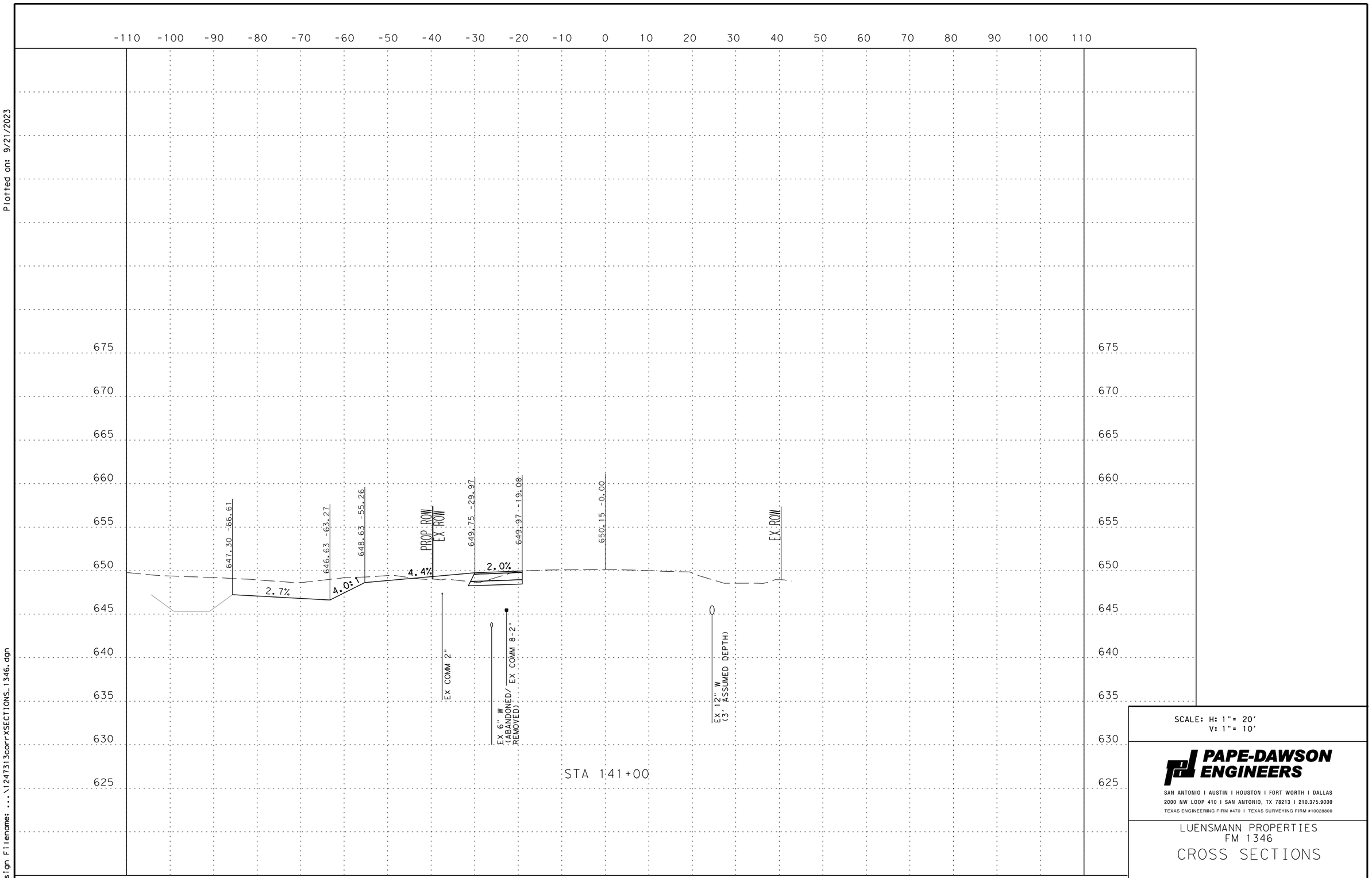
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 99

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

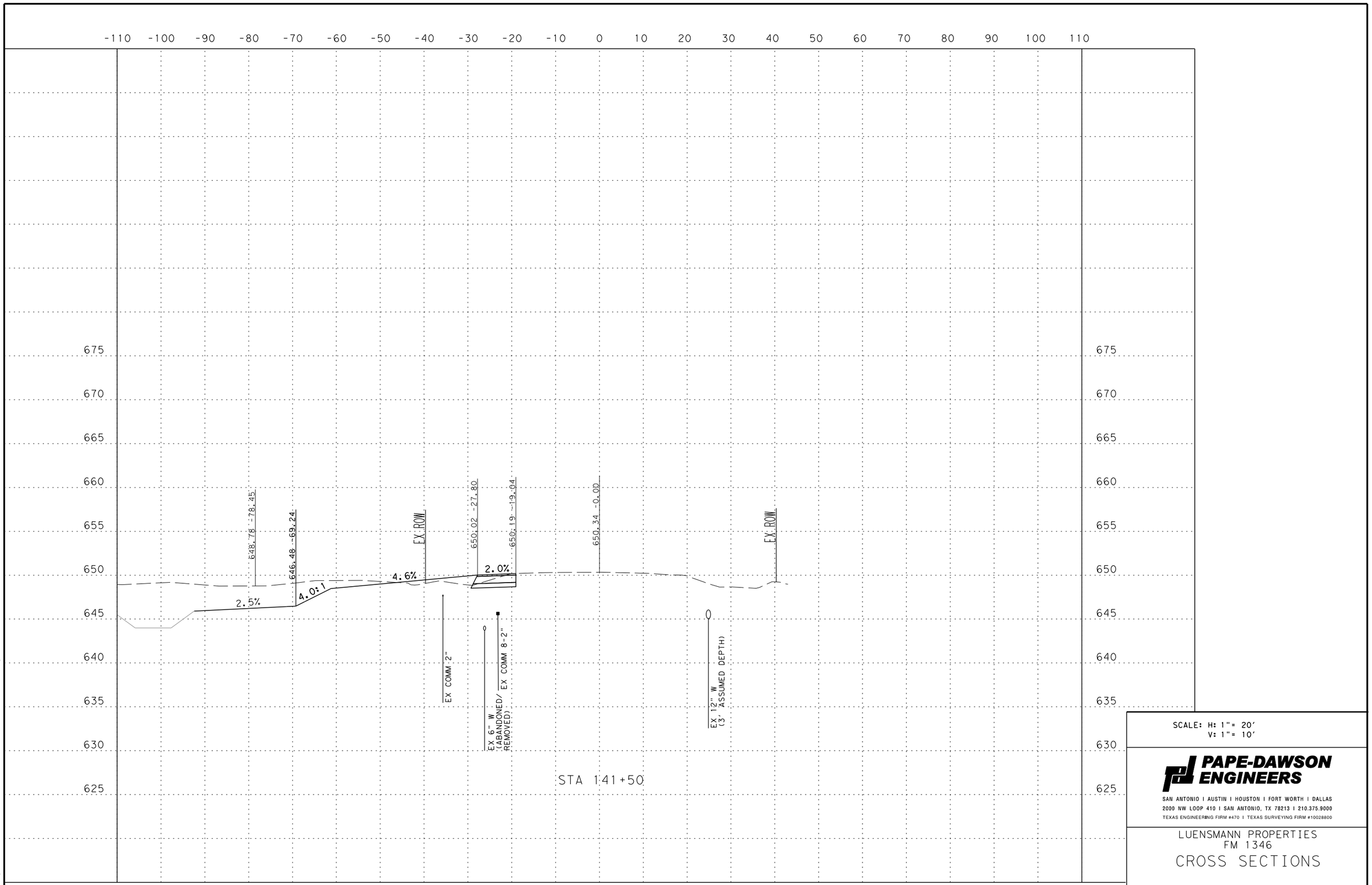
LUENSMANN PROPERTIES
FM 1346

CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 100

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

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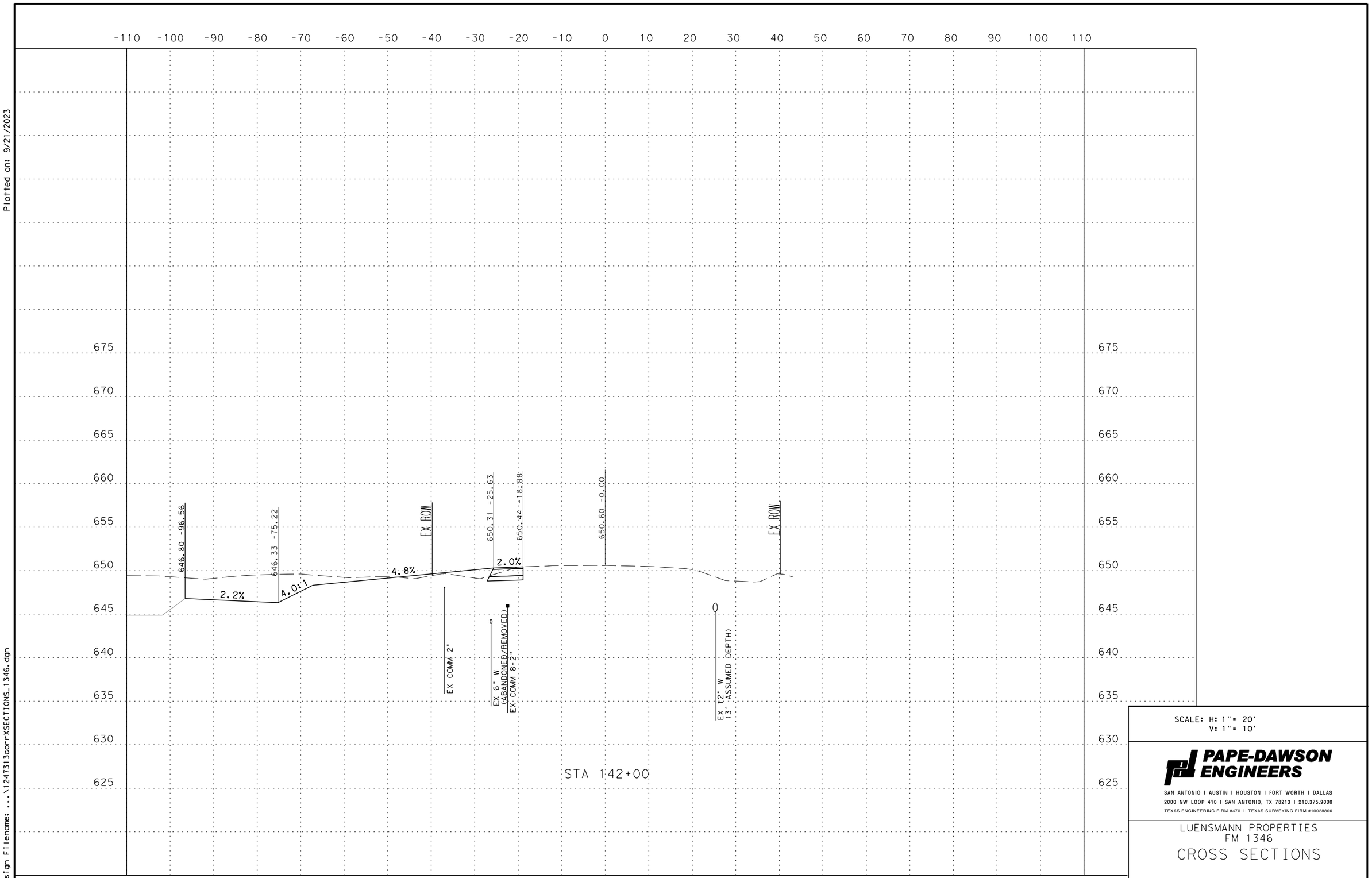
FM 1346

CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 101

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

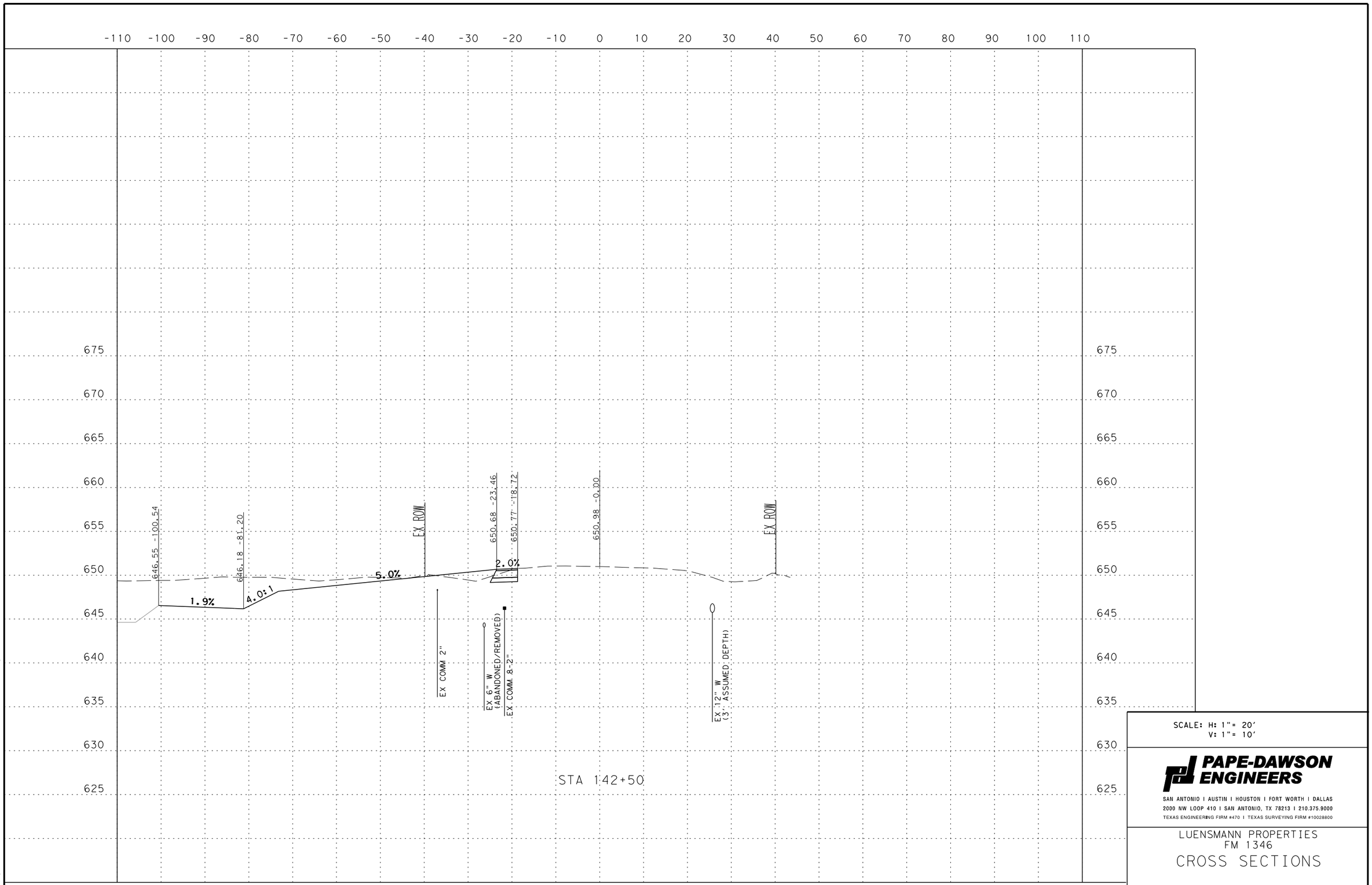
PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 102

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

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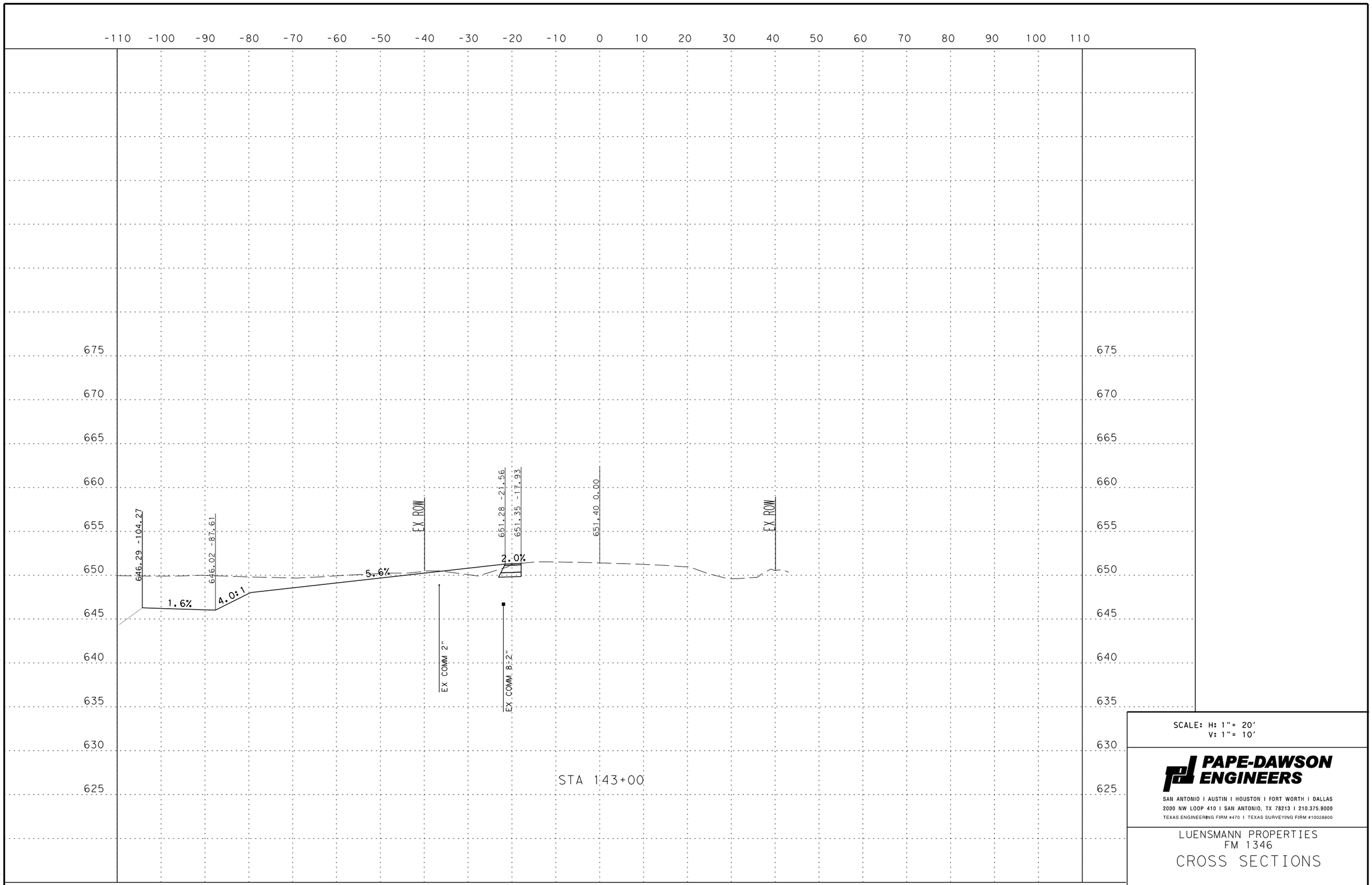
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 103

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

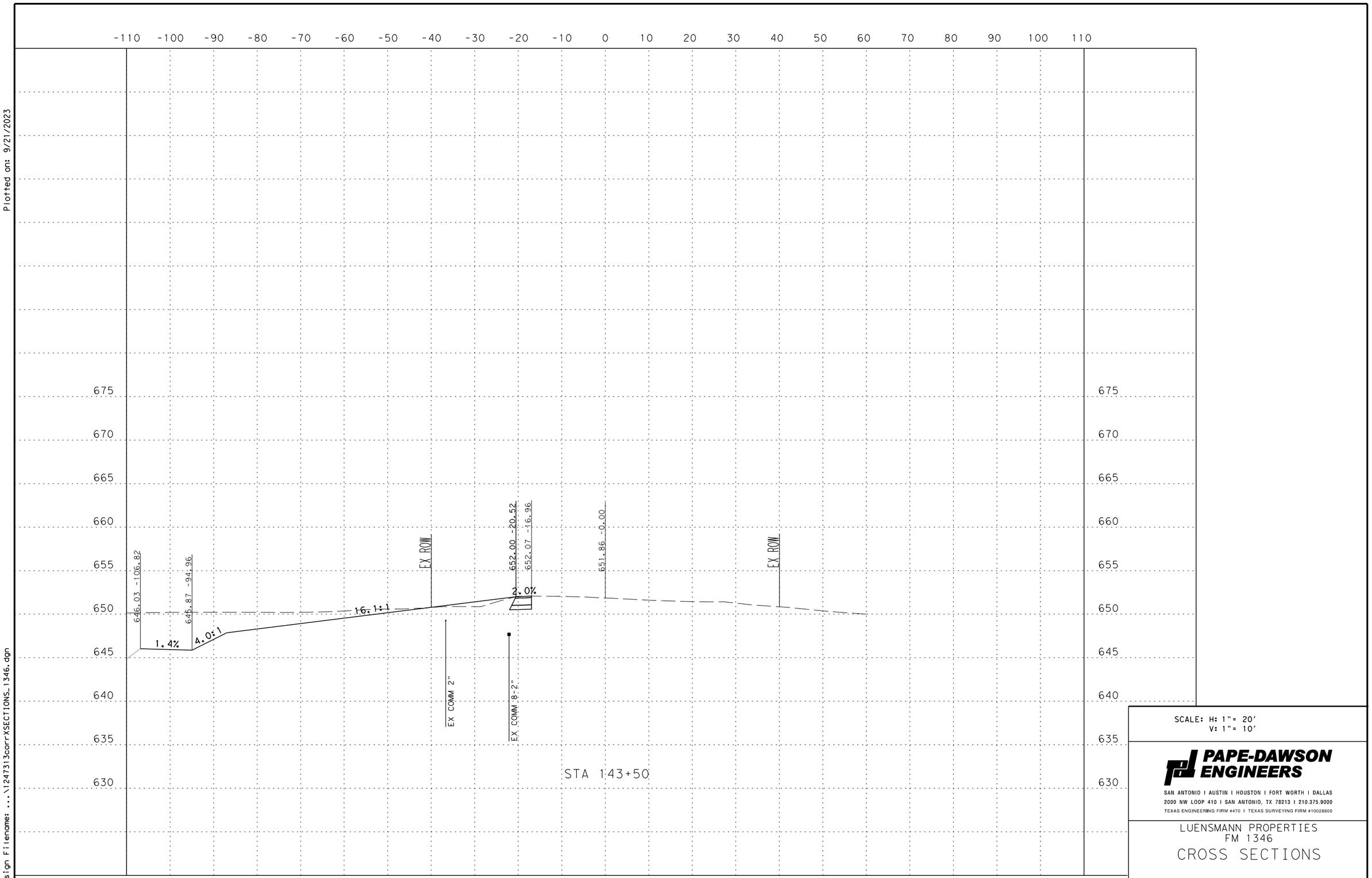
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

LUENSMANN PROPERTIES
FM 1346
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 104

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

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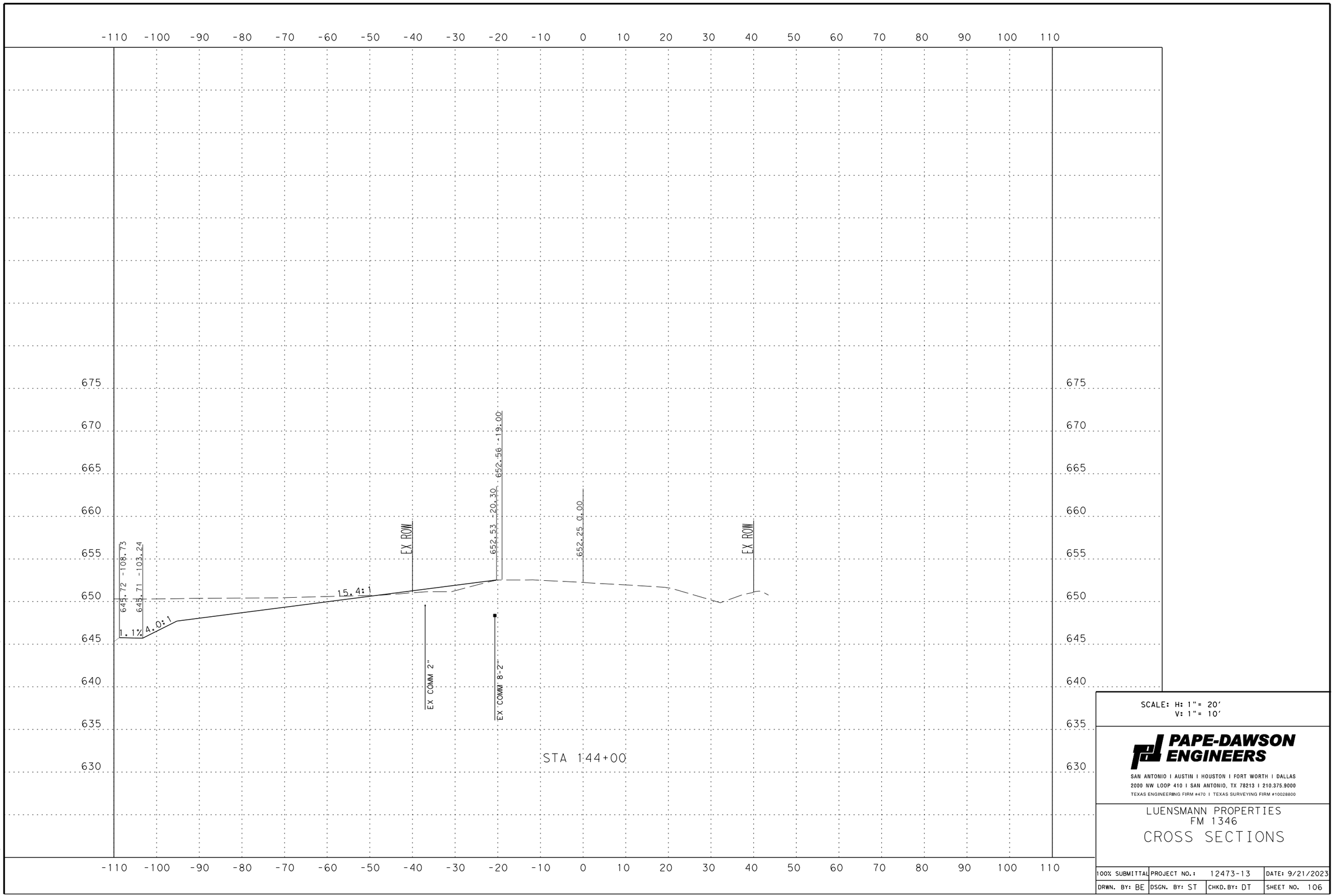
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 105

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

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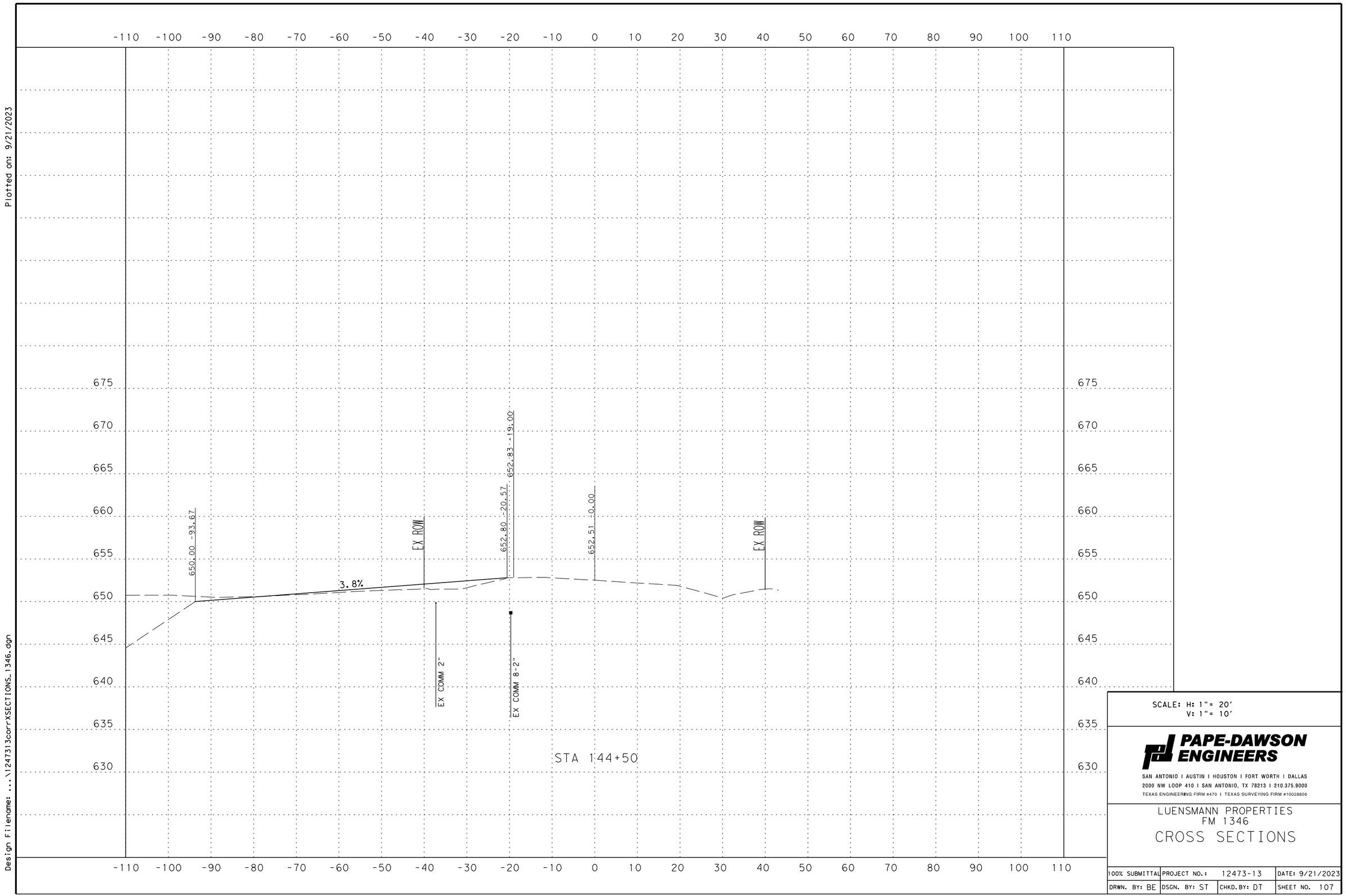
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 106



Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn

SCALE: H: 1"= 20'
V: 1"= 10'

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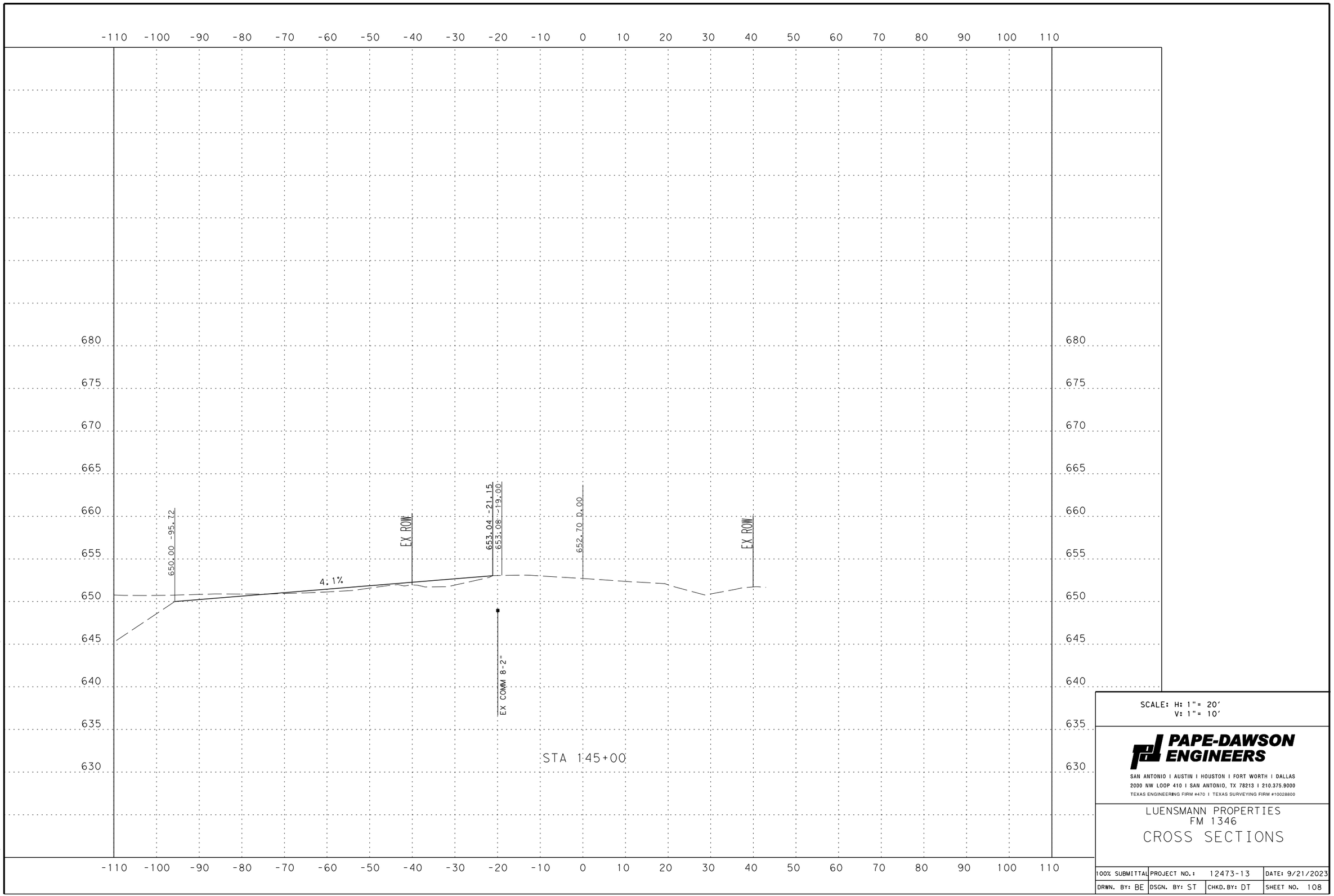
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD. BY: DT	SHEET NO. 107

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
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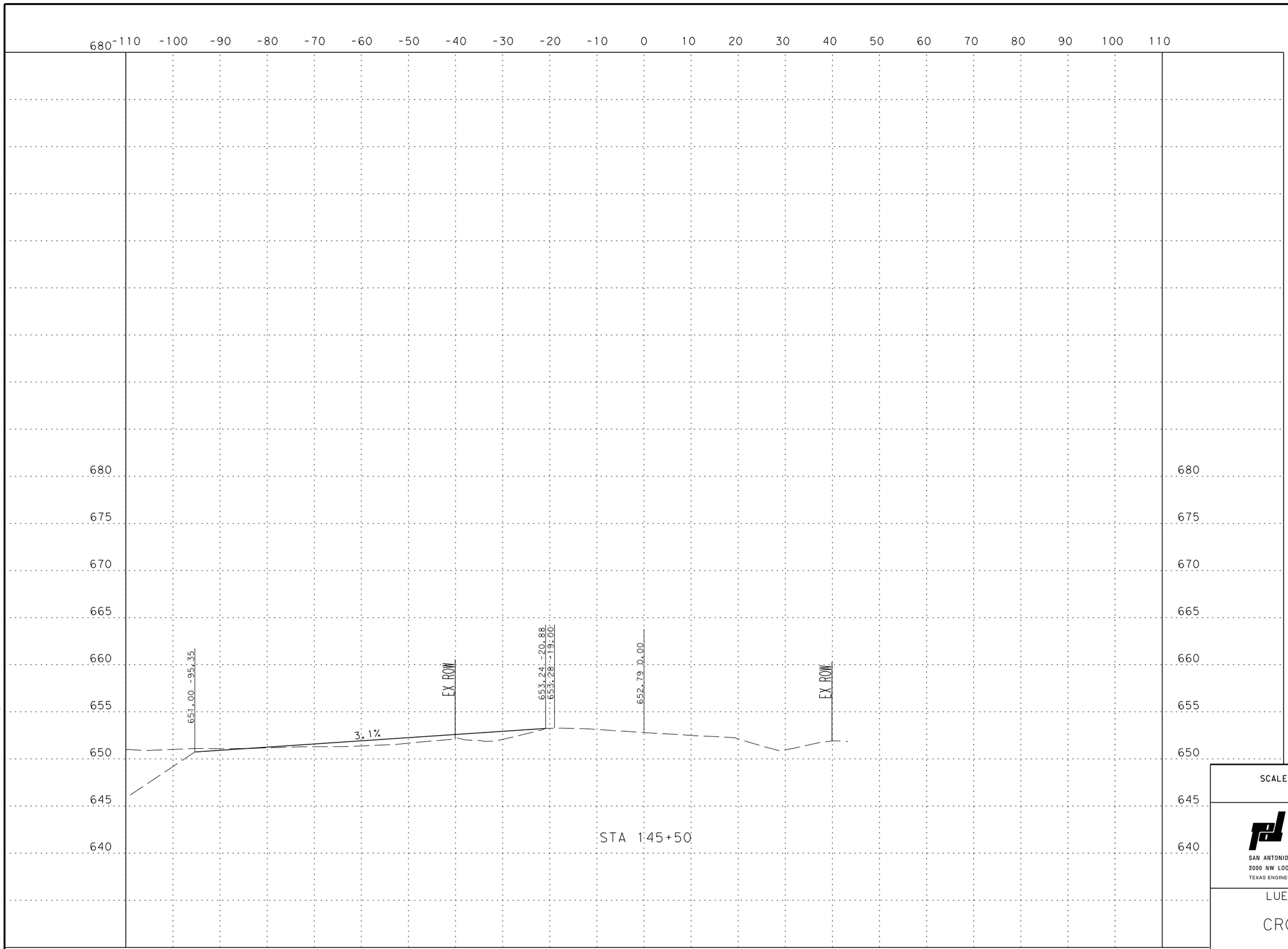
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 108

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

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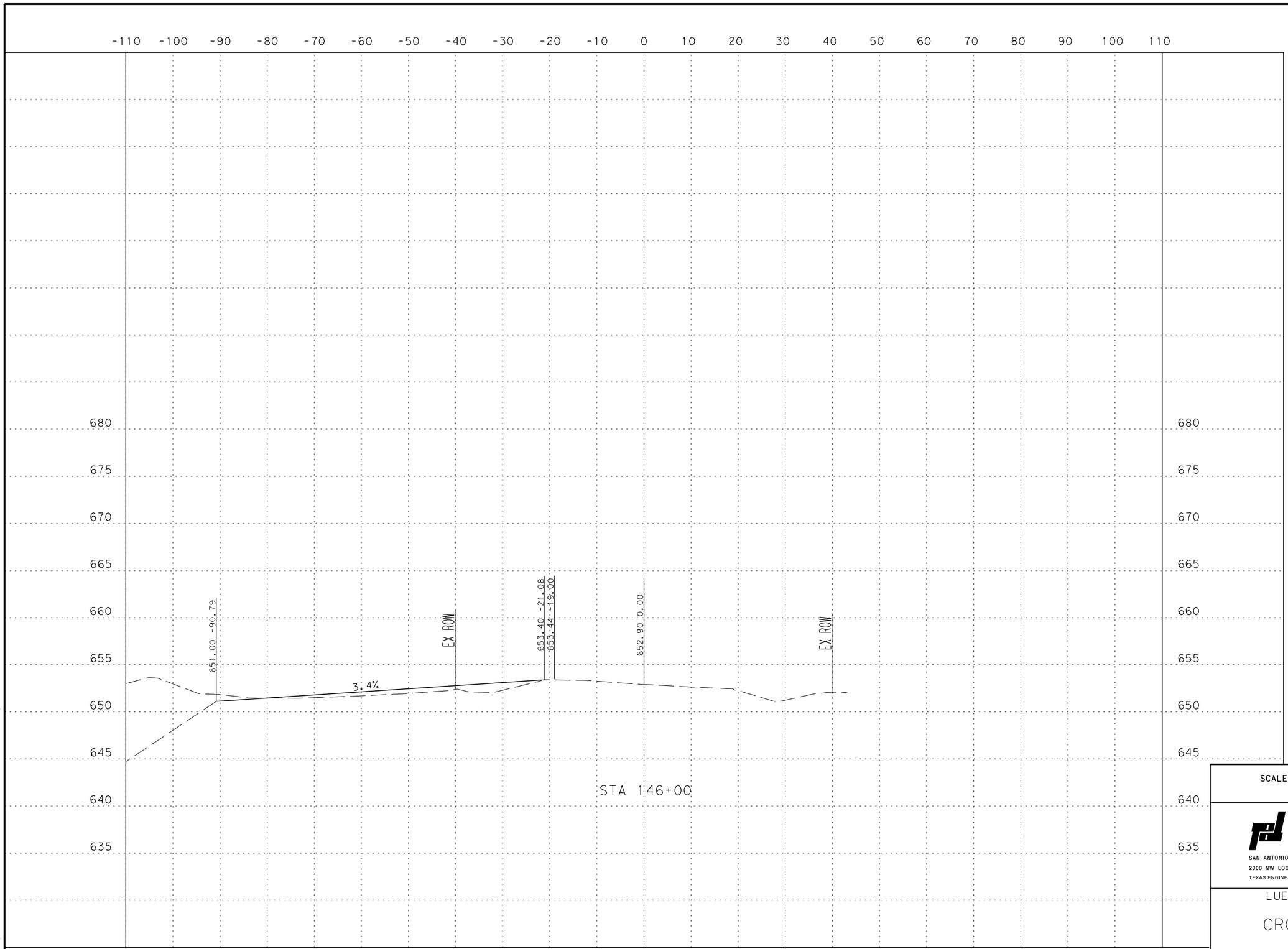
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 109

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

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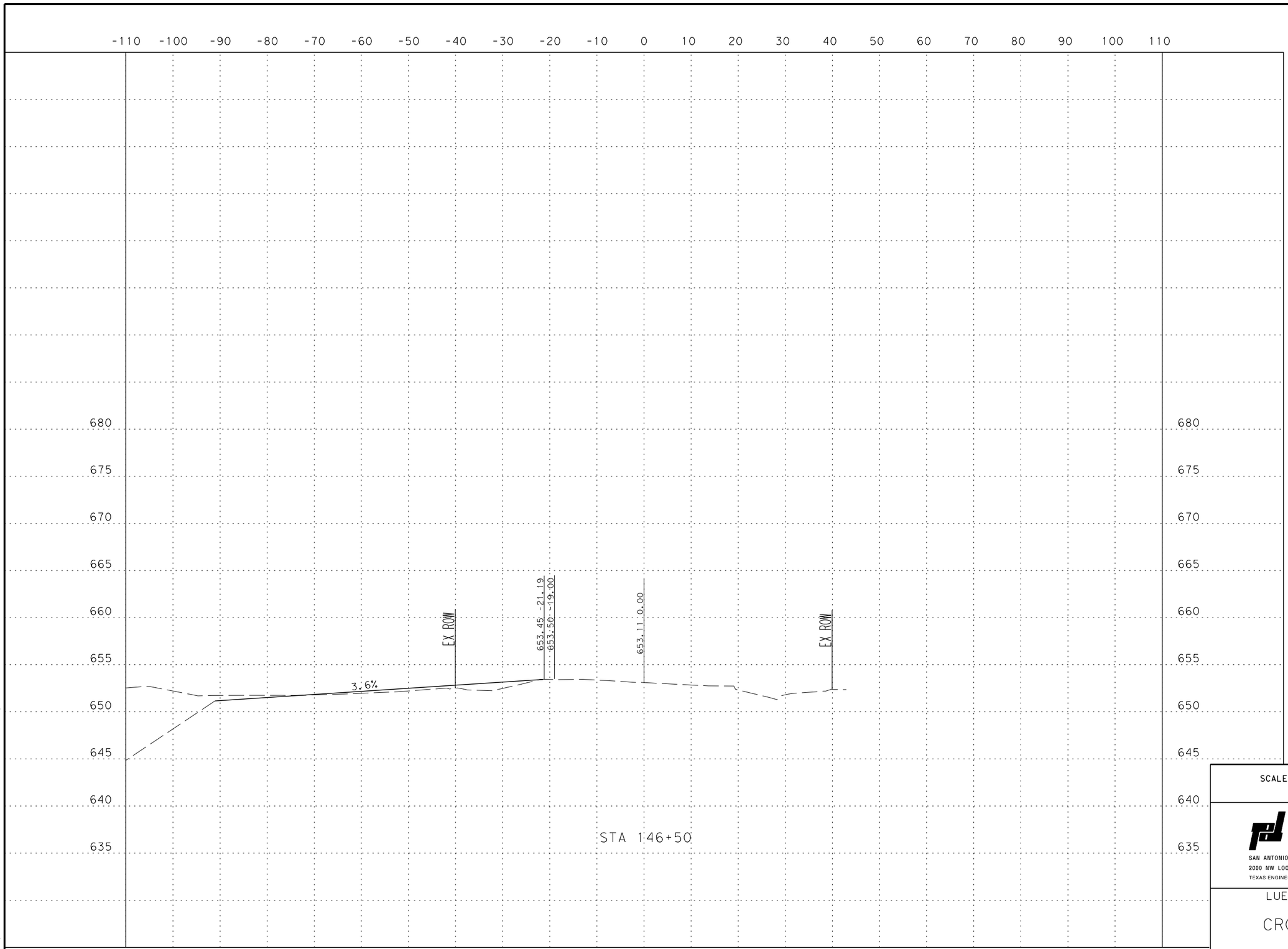
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 110

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

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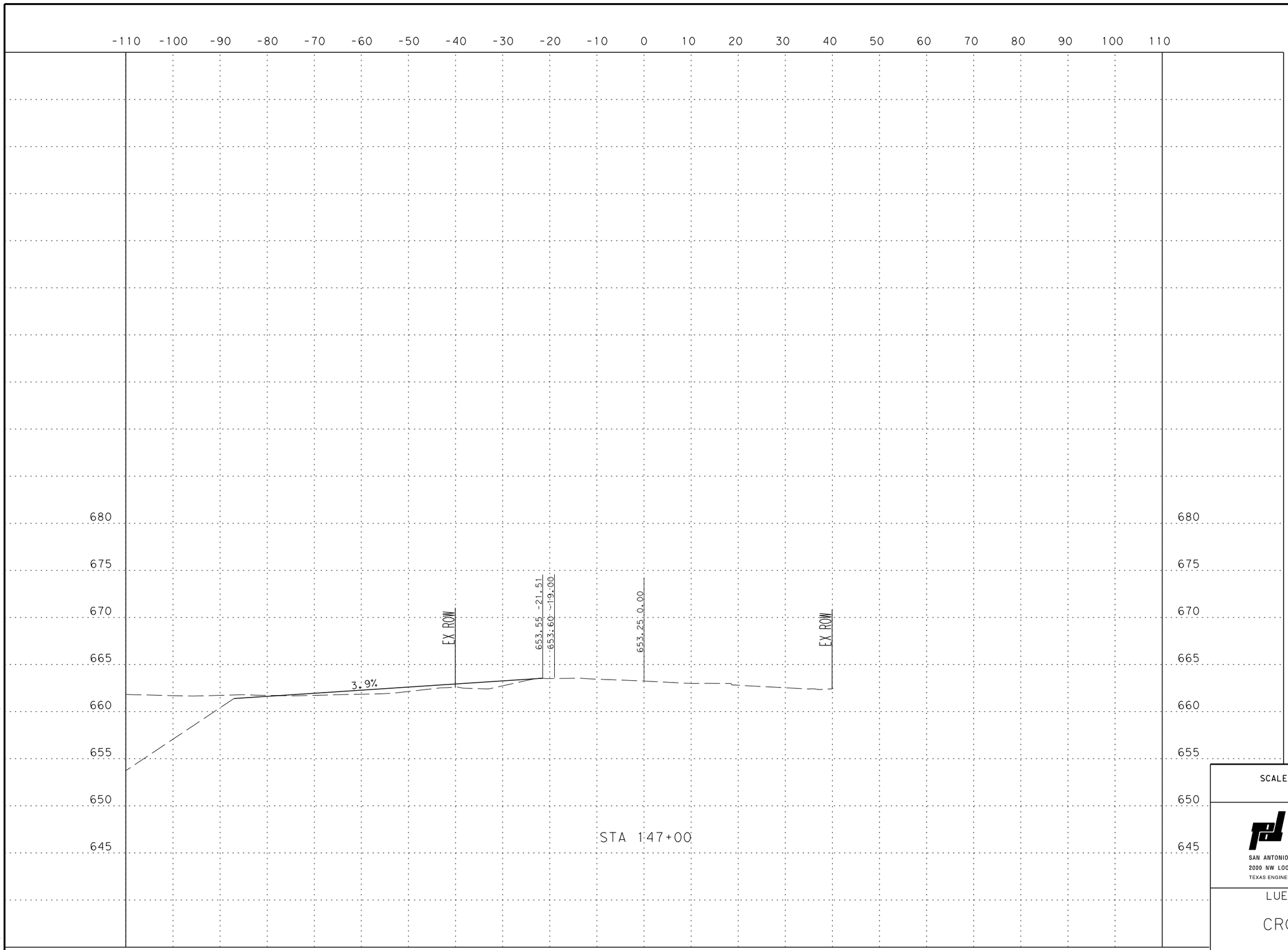
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 111

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

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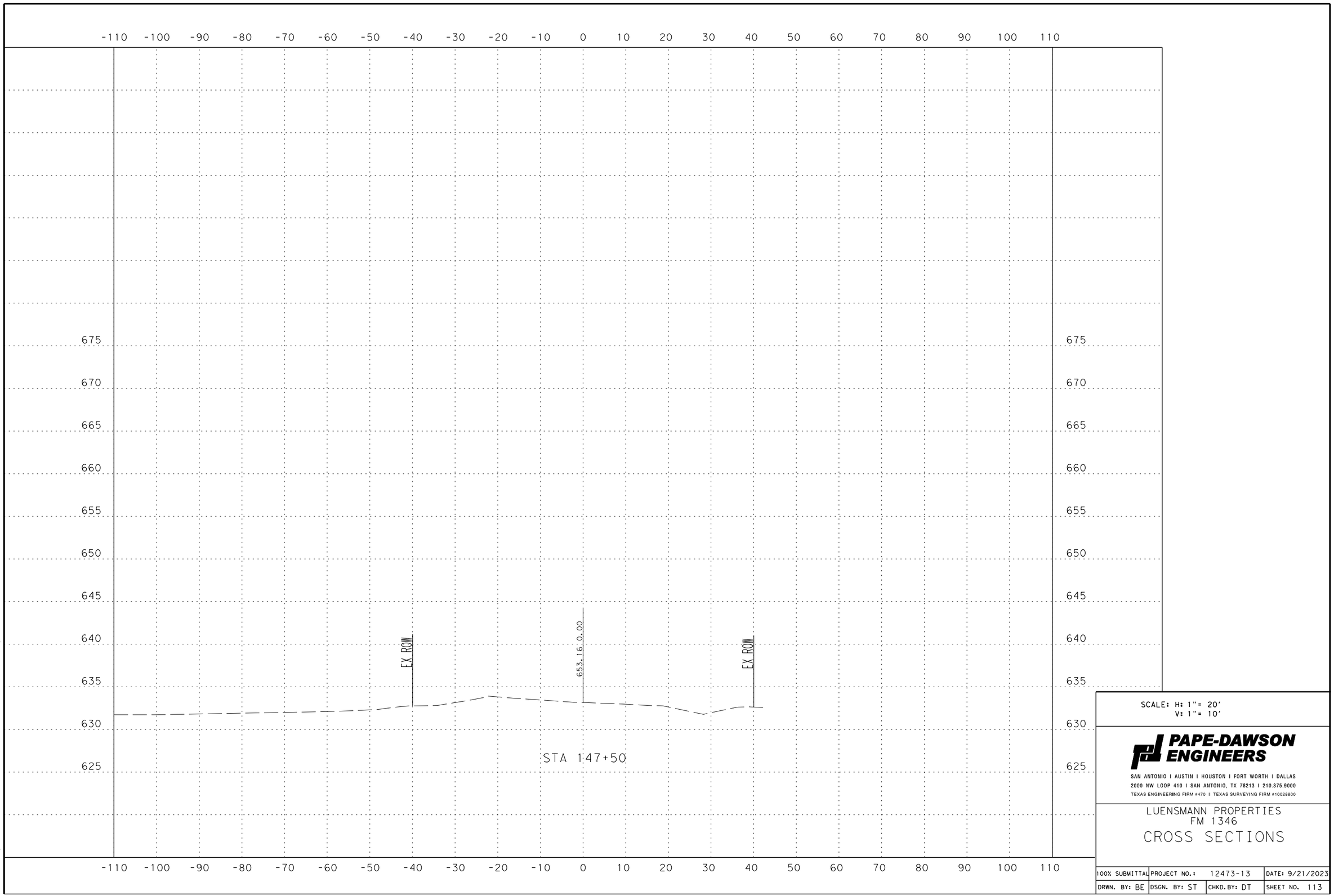
CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 112

Plotted on: 9/21/2023

Design Filename: ...\1247313corrXSECTIONS_1346.dgn



SCALE: H: 1"= 20'
V: 1"= 10'

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CROSS SECTIONS

100% SUBMITTAL	PROJECT NO.: 12473-13		DATE: 9/21/2023
DRWN. BY: BE	DSGN. BY: ST	CHKD.BY: DT	SHEET NO. 113