



GENERAL NOTES:

1. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE MANNER ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR HIS REPRESENTATIVE (ENGINEER). THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE WHICH MIGHT OCCUR DUE TO THE CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
2. THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 4TH EDITION, OCTOBER 2004, ARE HEREAFTER, COLLECTIVELY REFERRED TO AS "THE STANDARD SPECIFICATIONS".
3. IN THE EVENT AN ITEM IS NOT COVERED WITHIN THESE PLANS AND SPECIFICATIONS, THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS (NCTCOG) STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION SHALL APPLY.
4. THE CONTRACTOR SHALL CONTACT THE ENGINEER SHOULD ANY DISCREPANCIES BE FOUND IN THE CONSTRUCTION PLANS AND/OR THE SPECIAL PROVISIONS. THE CONTRACTOR WILL NOT BE COMPENSATED FOR ANY WORK NOT AUTHORIZED BY THE CITY.
5. CONSTRUCTION OBSERVATION AND MATERIALS TESTING WILL BE PERFORMED BY REPRESENTATIVES OF THE OWNER, ENGINEER AND REVIEW AUTHORITIES AND AGENCIES. UNRESTRICTED ACCESS SHALL BE PROVIDED TO THESE REPRESENTATIVES AT ALL TIMES. THE CONTRACTOR IS RESPONSIBLE FOR UNDERSTANDING THE REQUIRED INSPECTIONS AND ALLOWING FOR THEM IN HIS SCHEDULE OF OPERATIONS. CONTRACTOR WILL NOT BE ALLOWED ANY ADDITIONAL CONTRACT DAYS OR COMPENSATION AS A RESULT OF HIS FAILURE TO ADEQUATELY PROVIDE FOR AUTHORIZED INSPECTIONS.
6. THE CONTRACTOR SHALL NOT PLACE FILL OR WASTE MATERIAL ON ANY PRIVATE PROPERTY WITHOUT A WRITTEN AGREEMENT WITH THE PROPERTY OWNER AND APPROVAL BY CITY. A COPY OF THIS AGREEMENT SHALL BE PROVIDED TO THE CITY.
7. TRENCH SAFETY DESIGN SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL SUBMIT A TRENCH SAFETY DESIGN PLAN, SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF TEXAS, FOR REVIEW PRIOR TO THE START OF CONSTRUCTION.
8. THE CONTRACTOR SHALL PROTECT THE EXISTING TREES, BUSHES, LANDSCAPING PLANTS, SPRINKLERS, AND LAWNS UNLESS SHOWN OTHERWISE ON THE CONSTRUCTION DRAWINGS. ANY DAMAGE TO THE EXISTING TREES, BUSHES, LANDSCAPING PLANTS, SPRINKLERS, AND LAWNS CAUSED BY THE CONSTRUCTION SHALL BE REPLACED TO THE SATISFACTION OF THE PROPERTY OWNER AND THE CITY AT THE CONTRACTOR'S SOLE EXPENSE.
9. THE CONTRACTOR SHALL PROTECT ALL UNDERGROUND IRRIGATION SYSTEMS. ADJUSTMENT OR RELOCATION OF IRRIGATION SYSTEM SHALL BE INSTALLED BY AN IRRIGATOR LICENSED IN THE STATE OF TEXAS AND, IF REQUIRED, SHALL BE INCIDENTAL TO RIGHT OF WAY PREPARATION.
10. THE CONTRACTOR SHALL RESTORE ALL AREAS DISTURBED BY THE CONSTRUCTION TO THE ORIGINAL CONDITION OR BETTER. RESTORED AREAS INCLUDE BUT NOT LIMITED TO TRENCH BACKFILL, SIDE SLOPES, FENCES, IRRIGATION SYSTEMS, DRIVEWAYS, PRIVATE YARDS, SIGNS AND ROADWAYS. DISTURBED ROADWAY CLEAR ZONES SHALL BE HYDRO MULCHED, WATERED & ESTABLISHED. DISTURBED CHANNEL SIDE SLOPES SHALL BE RESTORED WITH SOLID BLOCK SOD, WATERED, FERTILIZED & ESTABLISHED. THE ESTABLISHMENT OF GRASS IN DISTURBED AREAS SHALL BE DETERMINED BY THE CITY OF PARKER.
11. TEMPORARY FENCING SHALL BE PLACED PRIOR TO ANY FENCE REMOVAL FOR CONSTRUCTION. TEMPORARY FENCING SHALL MATCH THE EXISTING FENCE. PAYMENT FOR TEMPORARY FENCE SHALL BE SUBSIDIARY TO THE REMOVAL AND REPLACEMENT OF THE FENCE.
12. NO SEPARATE PAY IS PROVIDED FOR THE TREE REMOVAL. TREE REMOVAL SHALL BE CONSIDERED SUBSIDIARY TO R.O.W. PREPARATION.

PAVING NOTES

1. THE CONTRACTOR SHALL KEEP STREETS ADJACENT TO THE PROJECT FREE OF MUD AND DEBRIS FROM THE CONSTRUCTION.
2. CONCRETE FOR ALL STREETS SHALL BE IN ACCORDANCE WITH NCTCOG CLASS "P1" CONCRETE (4,000 P.S.I. COMPRESSIVE @ 28 DAYS MINIMUM 6 SACK MIX).
3. THE CONTRACTOR SHALL PROVIDE ACCESS TO PRIVATE PROPERTY AT ALL TIMES. DRIVEWAYS WILL BE REPLACED AS DIRECTED BY THE ENGINEER. TEMPORARY DRIVEWAYS SHALL BE CONSTRUCTED IMMEDIATELY AFTER THE CONTRACTOR HAS DISTURBED OR ALTERED THE ADJACENT PROPERTY OWNERS ACCESS TO HIS PROPERTY.
4. DRIVEWAY LOCATIONS IF ANY SHOWN ARE SUBJECT TO CHANGE TO SUIT ACTUAL FIELD CONDITIONS AT THE TIME OF CONSTRUCTION AND MAY BE SHIFTED AS DIRECTED BY THE ENGINEER.
5. DRIVEWAYS CONSTRUCTED OFF RIGHT-OF-WAY SHALL MATCH THE EXISTING DRIVE CONSTRUCTION MATERIALS, OR AS DIRECTED BY THE ENGINEER, WHERE APPLIES.
6. WHEN EXCAVATION IS REQUIRED NEXT TO A PAVEMENT LANE CARRYING TRAFFIC AND WIDENING IS NOT COMPLETED WITHIN FORTY EIGHT (48) HOURS, SUFFICIENT BACKFILL SHALL BE PLACED AGAINST THE EDGE OF PAVEMENT TO PROVIDE A USUAL 3:1 SLOPE.
7. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC ROADWAYS ON OR ACROSS PAVEMENT, HE SHALL PROTECT THE PAVEMENT FROM DAMAGE. ANY DAMAGE TO PAVEMENT SHALL BE REPLACED AT THE CONTRACTOR'S SOLE EXPENSE.
8. THE CONTRACTOR SHALL NOT COMMENCE WORK ON THE ROADWAY BEFORE 7:00 AM AND SHALL ARRANGE HIS WORK SO THAT NO MACHINERY OR EQUIPMENT SHALL BE CLOSER THAN 30 FEET TO THE TRAVELED ROADWAY AFTER SUNSET EXCEPT AS APPROVED BY THE ENGINEER. UNLESS OTHERWISE APPROVED BY THE CITY, WORKING HOURS SHALL BE 7AM-6PM MON.-FRI. AND 8AM-5PM ON SATURDAYS. NO WORK SHALL BE DONE ON CITY HOLIDAYS OR SUNDAYS WITHOUT WRITTEN PERMISSION FROM THE CITY.
9. WHERE PROPOSED REINFORCED CONCRETE PAVEMENT CONNECT TO EXISTING REINFORCED CONCRETE PAVEMENT, THE CONTRACTOR SHALL MATCH AT SAME TOP CONCRETE ELEVATION WITH A SMOOTH TRANSITION INCLUDING AT CONCRETE CURB CONNECTIONS. SEE LONGITUDINAL BUTT JOINT DETAIL FOR TYPICAL CONNECTION.
10. THIS PROJECT WILL NOT BE CONSIDERED COMPLETE UNTIL THE ENGINEER DETERMINES THAT ALL CURBS, PAVEMENT AND SIDEWALKS HAVE BEEN SWEEPED CLEAN OF ALL DIRT AND DEBRIS.

PAVEMENT MARKINGS AND SIGNS

1. ALL PAVEMENT MARKINGS, SIGN MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE LATEST ADDITIONS OF THE STANDARD HIGHWAY DEPARTMENT SIGN DESIGN FOR TEXAS, THE TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD) UNLESS NOTED OTHERWISE.
2. SIGN LOCATIONS SHOWN ON THE PLANS ARE DIAGRAMMATIC.
3. PAYMENT FOR EACH SIGN SHALL INCLUDE MOUNTING HARDWARE, THE SIGN POLE AND GROUND MOUNTING SYSTEM. ALL GROUND MOUNTED SIGNS SHALL BE GALVANIZED 12-GAUGE YIELDING BREAKAWAY GROUND MOUNTED SIGN SYSTEMS. THE SYSTEM SHALL CONSIST OF THE FOLLOWING THREE ELEMENTS:
  - a) 12-FOOT LONG 2-INCH SQUARE POLES WITH HOLES
  - b) 30-INCH LONG 2.25-INCH SQUARE BASE
  - c) 18-INCH LONG 2.5-INCH SQUARE SLEEVE
4. SIGNS SHALL BE PLACED IN CONFORMANCE WITH THE LATEST EDITION OF TMUTCD.
5. REFLECTORIZED PAVEMENT MARKINGS SHALL BE THERMOPLASTIC, PER TXDOT STANDARD SPECIFICATIONS, ITEM 666. PAVEMENT MARKERS SHALL COMPLY WITH TXDOT STANDARD SPECIFICATIONS, ITEM 672.
6. ANY SIGNS TEMPORARILY REMOVED BY THE CONTRACTOR SHALL BE REPLACED. PAYMENT FOR THE REPLACEMENT OF SIGNS NOT CALLED OUT IN THE CONSTRUCTION PLANS AND INCLUDED IN THE BID SCHEDULE SHALL BE SUBSIDIARY TO THE PROJECT.

TRAFFIC CONTROL

1. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE TRAFFIC CONTROL DURING THE PROJECT. ALL TRAFFIC CONTROL WORK SHALL BE IN ACCORDANCE WITH THE LATEST VERSION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).
2. ALL TRAFFIC CONTROL PLANS MUST BE SUBMITTED BY THE CONTRACTOR FOR REVIEW A MINIMUM OF SEVEN WORKING DAYS PRIOR TO ANTICIPATED LANE CLOSURES. THE TRAFFIC CONTROL PLAN MUST BE APPROVED BY THE CITY PRIOR TO BEGINNING CONSTRUCTION ACTIVITY. TRAFFIC CONTROL PLANS MAY BE REQUIRED ON OTHER ROADWAYS AS DETERMINED BY THE CITY OR THE ENGINEER. ALL TRAFFIC CONTROL PLANS MUST BE PREPARED BY AN INDIVIDUAL CERTIFIED IN THEIR PREPARATION IN THE STATE OF TEXAS.
3. BARRICADES AND SIGNS SHALL BE PLACED IN SUCH A MANNER AS NOT TO INTERFERE WITH SIGHT DISTANCE OF DRIVERS ENTERING THE ROADWAY OR SIDE STREETS.
4. ALL TEMPORARY TRAFFIC CONTROL DEVICES SHALL BE REMOVED AS SOON AS PRACTICAL OR MOVED AS APPROPRIATE WHEN THEY ARE NO LONGER NEEDED.

UTILITY NOTES

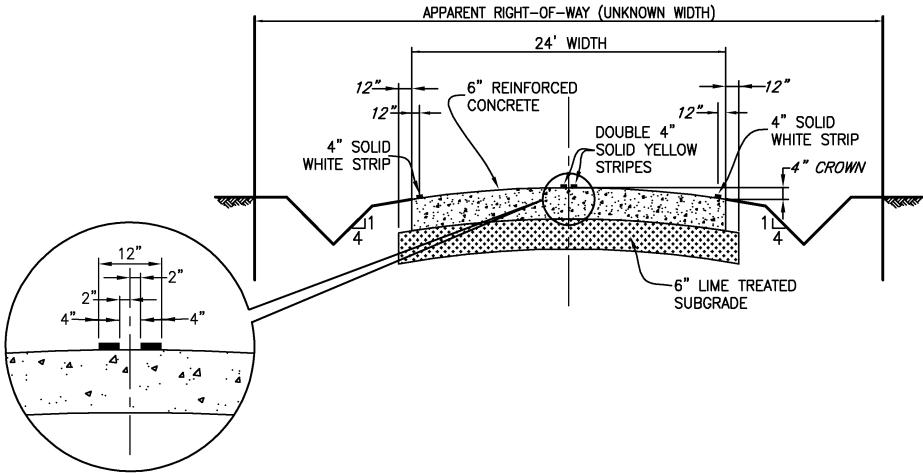
1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING PUBLIC AND PRIVATE UTILITIES THROUGHOUT THE CONSTRUCTION ON THIS PROJECT. THE CONTRACTOR SHALL CONTACT THE APPROPRIATE UTILITY COMPANY FOR LINE RESPONSIBILITY AND IS LIABLE TO THESE COMPANIES FOR ANY DAMAGE CAUSED TO THEIR FACILITIES.
2. THE CONTRACTOR SHALL TAKE EXTREME CARE WHEN EXCAVATING IN THE VICINITY OF UTILITIES. THE CONTRACTOR MAY BE REQUIRED TO PROBE OR EXPOSE THESE FACILITIES. THE CONTRACTOR WILL BE RESPONSIBLE FOR DAMAGE TO THESE UTILITIES CAUSED BY THE CONTRACTOR.
3. ERECTION OF POLES AND STRUCTURES LOCATED NEAR ANY OVERHEAD OR UNDERGROUND UTILITIES SHALL BE ACCOMPLISHED USING ESTABLISHED INDUSTRY SAFETY AND UTILITY SAFETY PRACTICES.
4. THE CONTRACTOR SHALL COORDINATE WITH GCEC TO ALLOW FOR AN OPEN CUT INSTALLATION ACROSS THE PAVEMENT AT 980 WINNINGKOFF ROAD.

STORM WATER POLLUTION PREVENTION NOTES

1. PRIOR TO COMMENCING ANY CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL PROVIDE A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) TO THE CITY.
2. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR IMPLEMENTING ALL THE VARIOUS STORM WATER POLLUTION PREVENTION MEASURES AND SHALL BE REQUIRED TO COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL EROSION, CONSERVATION, AND SANITATION ORDINANCES.
3. IF THESE STORM WATER POLLUTION PREVENTION SYSTEMS, AS APPROVED, CANNOT CONTROL EROSION, THE SWPPP WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED ON SITE AT NO ADDITIONAL COST TO THE CITY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYMENT OF ALL ASSOCIATED FEES, INCLUDING BUT NOT LIMITED TO THE N.O.I. (NOTICE OF INTENT) APPLICATION FEE AND WATER QUALITY FEE.
5. PERIMETER CONTROLS SUCH AS SILT CONTROL FENCE OR HAY BALES SHALL BE INSTALLED AT ALL DOWN SLOPE BOUNDARIES AND AS REQUIRED WHERE PAVEMENT REMOVAL, UTILITY CONSTRUCTION, GRADING, OR OTHER CONSTRUCTION ACTIVITIES ARE TO BE PREFORMED. THE CONTRACTOR SHALL TAKE SUCH MEASURES AT ALL TIMES TO MINIMIZE SITE TRACKING OR TRANSPORT OF SEDIMENT AND DEBRIS OFF-SITE.
6. DAMAGES TO ADJACENT PROPERTY OR TO RECEIVING WATERS CAUSED BY IMPROPERLY INSTALLED OR POORLY MAINTAINED EROSION CONTROL MEASURES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
7. THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF SILT AND SEDIMENT FROM EROSION CONTROL DEVICES WHEN THE EFFECTIVENESS OF THESE MEASURES IS REDUCED, OR AS DIRECTED BY THE ENGINEER.
8. THE CONTRACTOR SHALL PROVIDE ADEQUATE PROTECTION FOR THE EXISTING AND PROPOSED STORM DRAINAGE INLETS AND PREVENT THE ENTRY OF ANY SEDIMENT OR OTHER MATERIALS INTO THE DRAINAGE SYSTEM.
9. THE CONTRACTOR SHALL NOT ALLOW ANY CONSTRUCTION DEBRIS OUTSIDE THE PROJECT BOUNDARIES. ANY DEBRIS (MUD, GRAVEL, ORGANIC MATERIAL, ETC.) THAT FALLS ONTO ADJACENT PROPERTY OR EXISTING PAVEMENT SHALL BE REMOVED IMMEDIATELY.
10. THE CONTRACTOR SHALL REMOVE ALL TEMPORARY EROSION CONTROL DEVICES UPON COMPLETION OF CONSTRUCTION ACTIVITIES.
11. INSPECTION INTERVAL REQUIREMENTS TO BE SENT TO CITY.

DRAINAGE NOTES

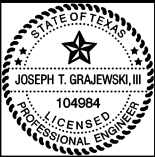
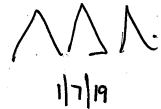
1. ALL DRAINAGE PIPES SHALL INTERSECT STRUCTURES AT THE CENTERLINE OF THE STRUCTURE INSIDE WALL FACE, UNLESS NOTED OTHERWISE.
2. ALL R.C.P. AND R.C.B. BEND AND INTERSECTIONS SHALL BE CONSTRUCTED UTILIZING PRECAST 45' OR 60' BENDS, WYES, UNLESS NOTED OTHERWISE AND SHALL BE SUBSIDIARY TO R.C.P. OR R.C.B. INSTALLATION.
3. ALL STORM SEWER SHALL BE ASTM C-76, CLASS III REINFORCED CONCRETE PIPE, UNLESS NOTED OTHERWISE.
4. ALL STORM SEWER INLETS, MANHOLES & EMBEDMENT SHALL BE AS PER THE DETAILS.



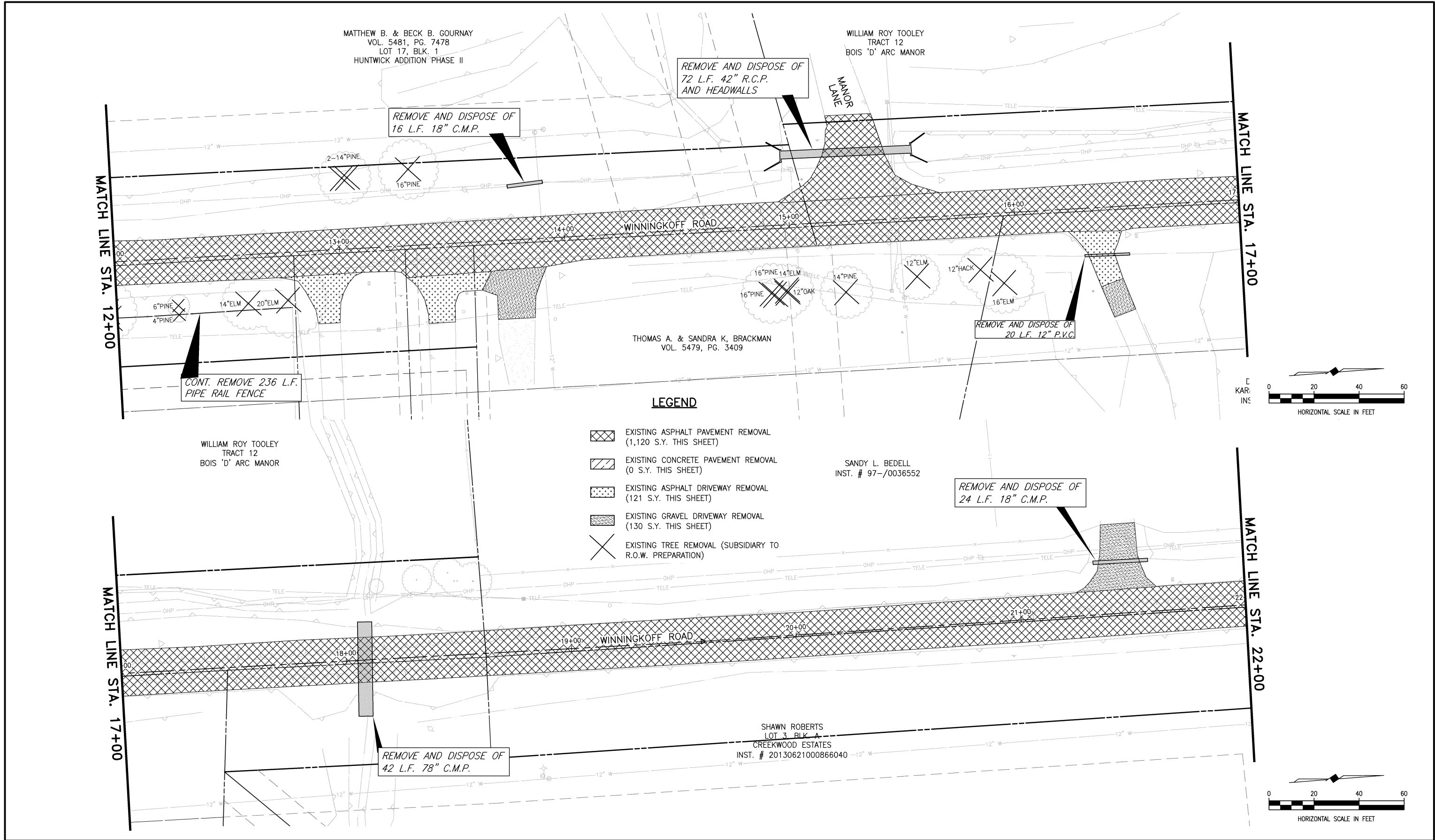
TYPICAL REINFORCED CONCRETE SECTION

SCOPE OF WORK

1. REMOVE EXISTING ASPHALT PAVEMENT. EXISTING ASPHALT IS 4-INCHES TO 6-INCHES IN DEPTH.
2. PREPARE 6-INCH LIME TREATED SUBGRADE IN ACCORDANCE WITH NCTCOG ITEM 301.2 USING A MINIMUM OF 6% HYDRATED LIME AND COMPACT TO A MINIMUM OF 98% STANDARD PROCTOR AT OPTIMUM MOISTURE TO OPTIMUM PLUS 2%.
3. FURNISH AND INSTALL 6-INCH CLASS 'P1' 4000 PSI CONCRETE REINFORCED WITH NO. 4 DEFORMED BARS ON 24-INCH CENTERS.

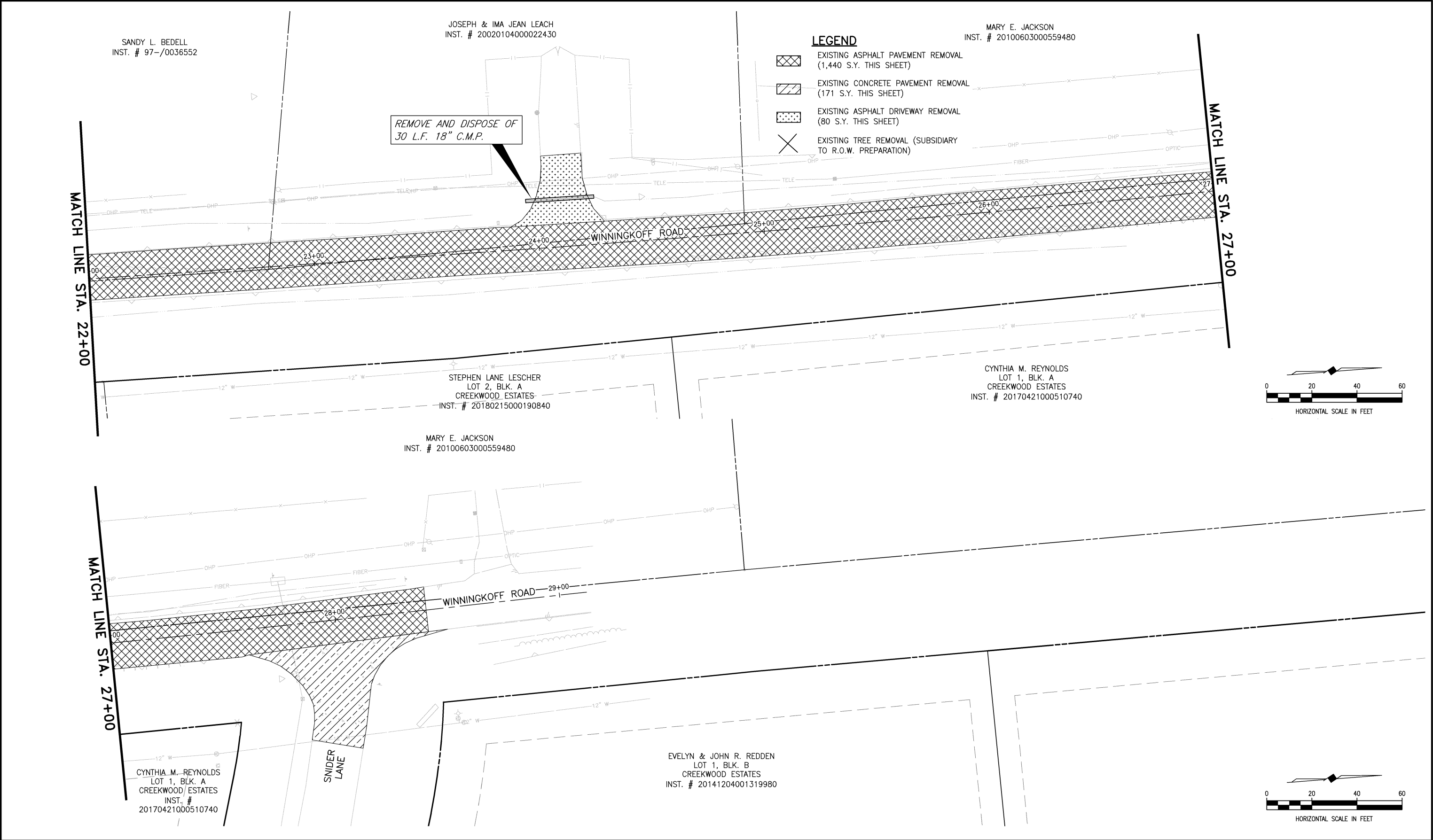
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|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |                                                                                       |                                                                                       | <b>GENERAL NOTES &amp; TYPICAL SECTION</b>                      |                                                     |                           |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |                                                                                       |                                                                                       |                                                                 |                                                     |                           |
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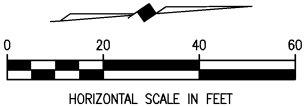
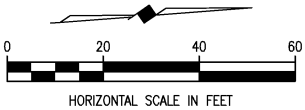
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|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                              |  |                                                     | <p><b>PROPOSED PAVING PLAN &amp; PROFILE</b><br/>STA. 12+00 TO STA. 22+00</p> |                                                              |                               |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                              |  |                                                     |                                                                               |                                                              |                               |





**LEGEND**

- EXISTING ASPHALT PAVEMENT REMOVAL (1,440 S.Y. THIS SHEET)
- EXISTING CONCRETE PAVEMENT REMOVAL (171 S.Y. THIS SHEET)
- EXISTING ASPHALT DRIVEWAY REMOVAL (80 S.Y. THIS SHEET)
- EXISTING TREE REMOVAL (SUBSIDIARY TO R.O.W. PREPARATION)



|                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |  |  |                                                                                                                                                 |                                                                                            |
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| <div></div> <div></div> <div></div> <div></div> <div></div> | <p>These plans and related specifications were prepared for construction of this specific project only. Reuse of these documents is not permitted without written authorization of Birkhoff, Hendricks &amp; Carter, L.L.P. If this drawing is converted to an electronic file, if any discrepancy occurs between the electronic file and the Birkhoff, Hendricks &amp; Carter, L.L.P. original document, the original document will govern in all cases.</p> | <p><b>BIRKHOFF, HENDRICKS &amp; CARTER, L.L.P.</b><br/>PROFESSIONAL ENGINEERS<br/>TBPE Firm No. 526; TBPLS Firm No. 10031800<br/>11910 Greenville Ave., Suite 600<br/>Dallas, Texas 75243 (214) 361-7900</p> |  |  | <p><b>CITY OF LUCAS, TEXAS</b><br/>WINNINGKOFF ROAD PHASE II</p> <p><b>PROPOSED PAVING PLAN &amp; PROFILE</b><br/>STA. 22+00 TO PROJECT END</p> | <p>BHC<br/>PROJECT NO.<br/>2017-156</p> <p>January, 2019</p> <p>SHEET NO.<br/><b>5</b></p> |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|

THERESA K. LAVERENZ &  
JAMES C. McGRORY  
INST. # 20131004001388990  
LOT 1, BLK. 2  
HUNTWICK ADDITION PHASE II

LOT 2, BLK. 2  
HUNTWICK ADDITION PHASE II

WILLIAM J.  
ELEIZABETH G. V  
VOL. 4577, PG.  
LOT 3, BLK.  
HUNTWICK ADDITION

Q CURVE DATA  
 $\Delta = 6'21'26''$   
 $R = 4275.00'$   
 $T = 237.41'$   
 $L = 474.34'$   
 $C.B. = N 3'17'57'' E$   
 $C.D. = 474.09'$

N 7087978.0278  
E 2559245.2037  
RELOCATE F.H.

REMOVE & REPLACE SIGN

N 7087635.4956  
E 2559270.1154  
STA. 1+70.00  
BEGIN PHASE II PAVING  
WINNINGKOFF ROAD

N 7087685.6030  
E 2559273.7688  
P.I. STA. 2+20.24  
 $\Delta = 2'18'27'' RT.$

P.C. 2+54.73

HDWL.

36" R.C.P.

PROPOSED 4'x4'  
WYE INLET

WYE INLET

WINNINGKOFF ROAD

SPEED  
LIMIT  
SIGN

PIPE RAIL FENCE

PROPOSED 25'  
R.O.W. EASEMENT  
(PHASE VI)

MATCH LINE STA. 6+00  
N 7088064.1374, E 2559302.7236

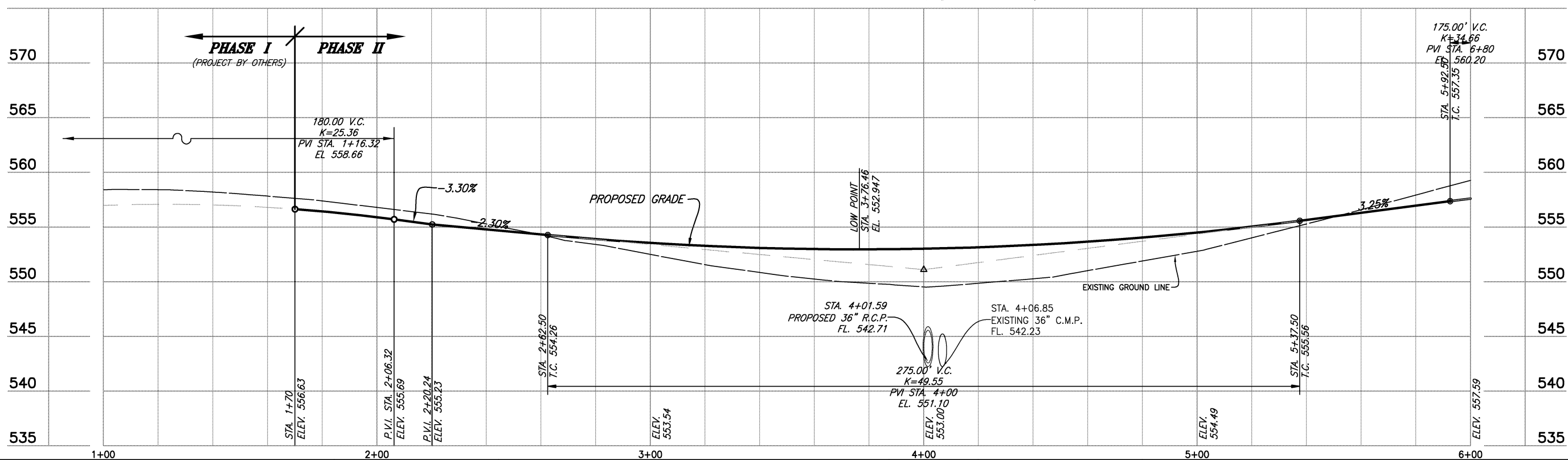
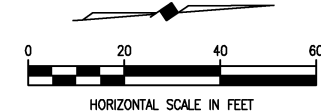
PROPOSED 36" STORM SEWER  
SEE SHEET 16 FOR  
PLAN AND PROFILE

PROPOSED VARIABLE WIDTH  
R.O.W. EASEMENT (PHASE II)

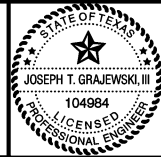
RONNIE W. STREBEK  
VOL. 1636, PG. 680

PROPOSED TXDOT  
TYPE FW-0 HEADWALL

RICHARD A. RIZOS  
INST. # 20110926001023650  
FURNISH & INSTALL:  
21' F. PIPE RAIL FENCE



**BIRKHOFF, HENDRICKS & CARTER, L.L.P.**  
PROFESSIONAL ENGINEERS  
TBPE Firm No. 526; TBPLS Firm No. 10031800  
11910 Greenville Ave., Suite 600  
Dallas, Texas 75243 (214) 361-7900

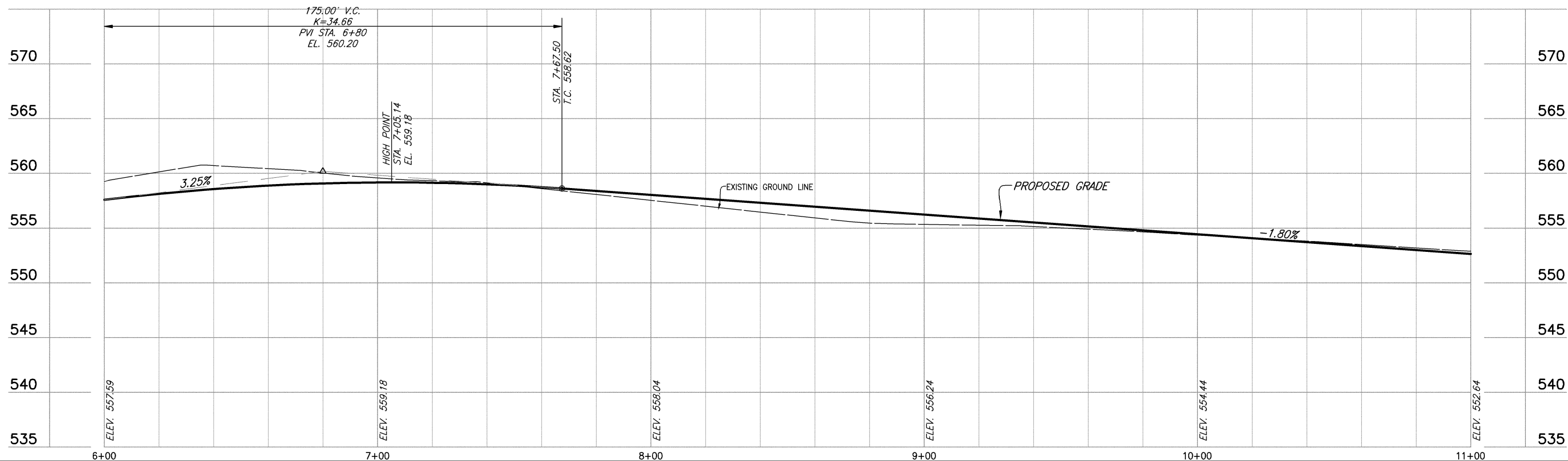
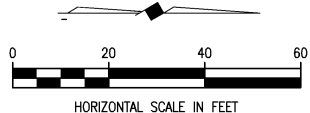
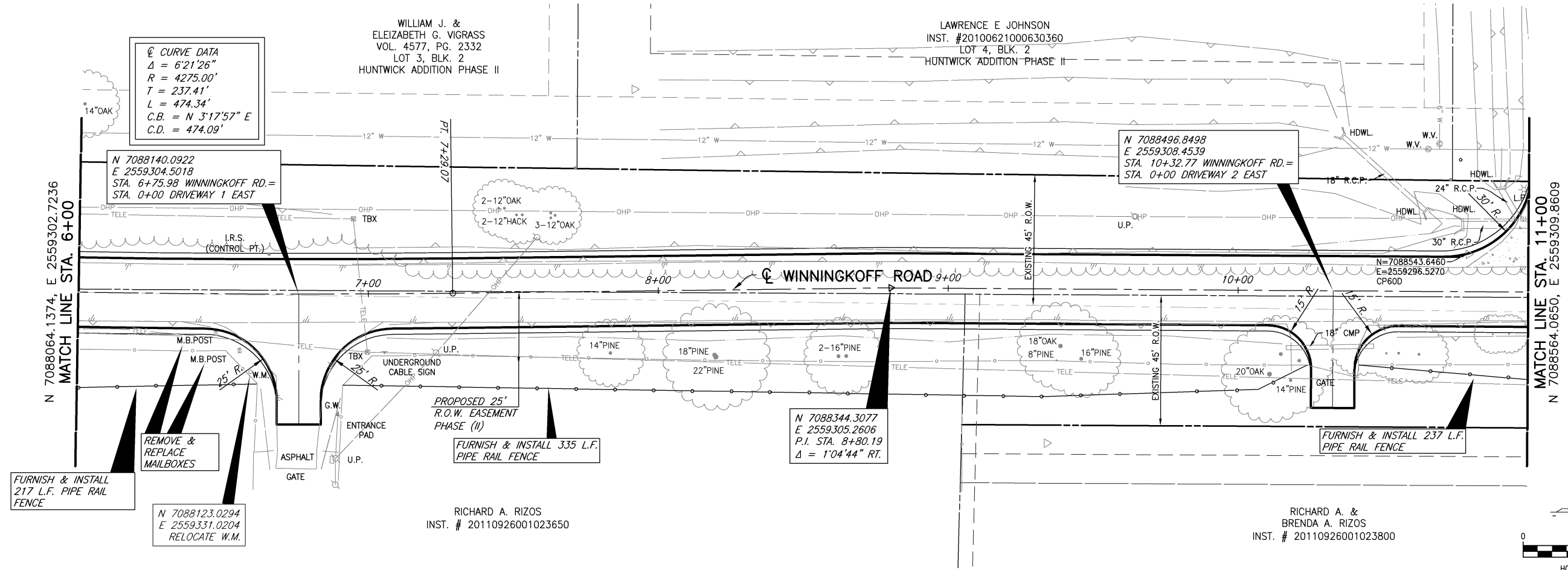


1/7/19

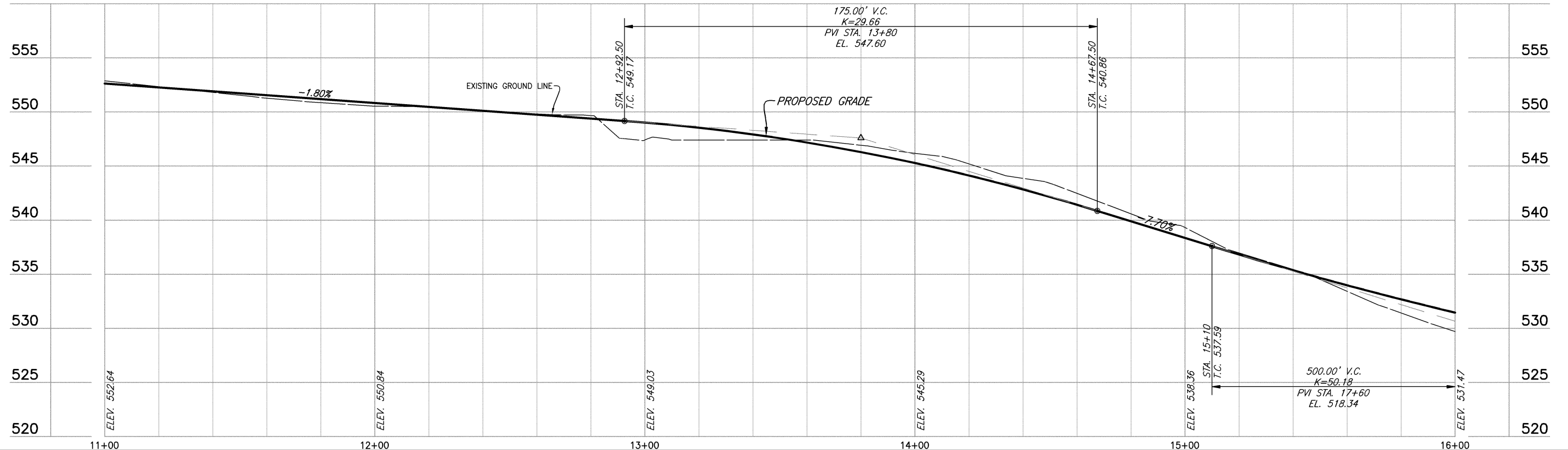
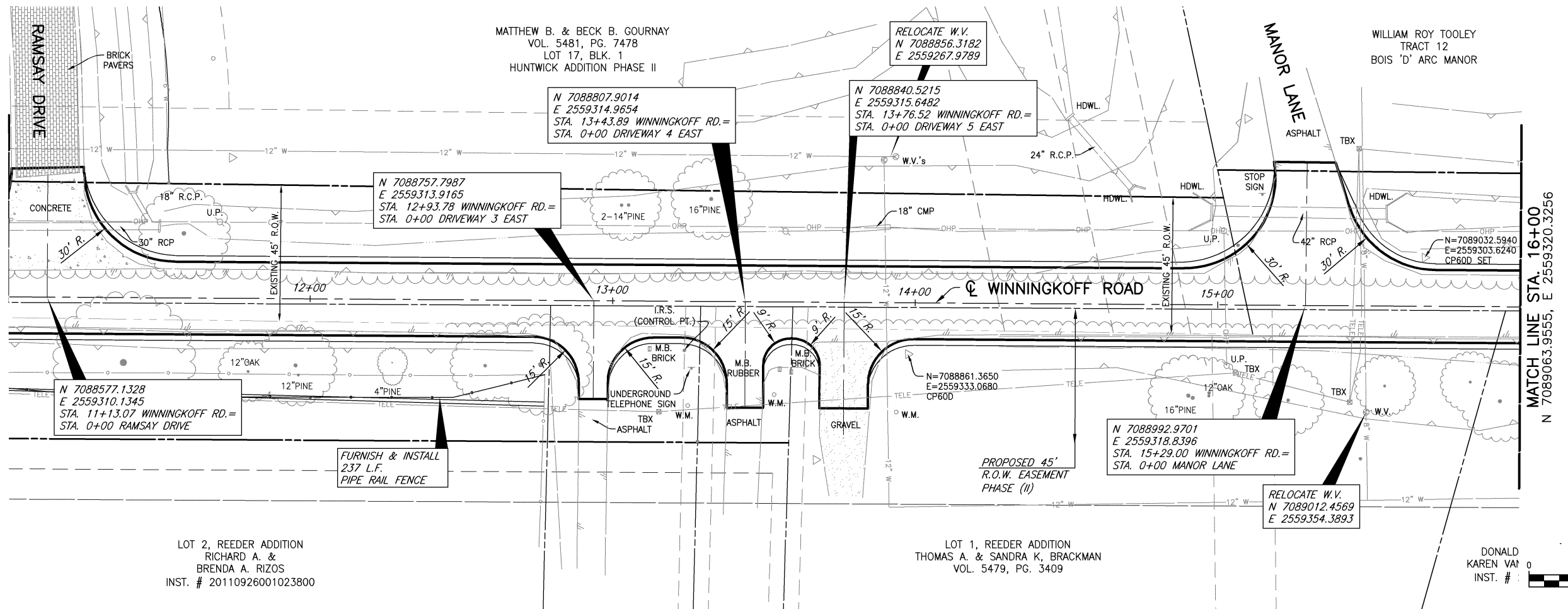
**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
PROPOSED PAVING PLAN & PROFILE  
STA. 2+20.24 TO STA. 6+00

BHC  
PROJECT NO.  
2017-156  
January, 2019

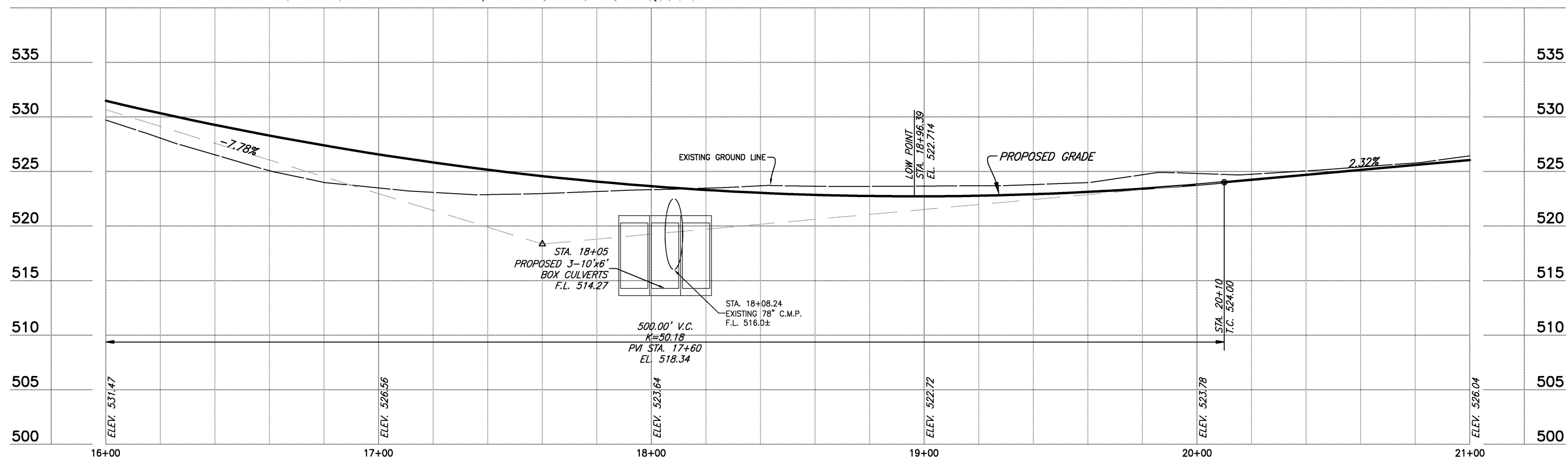
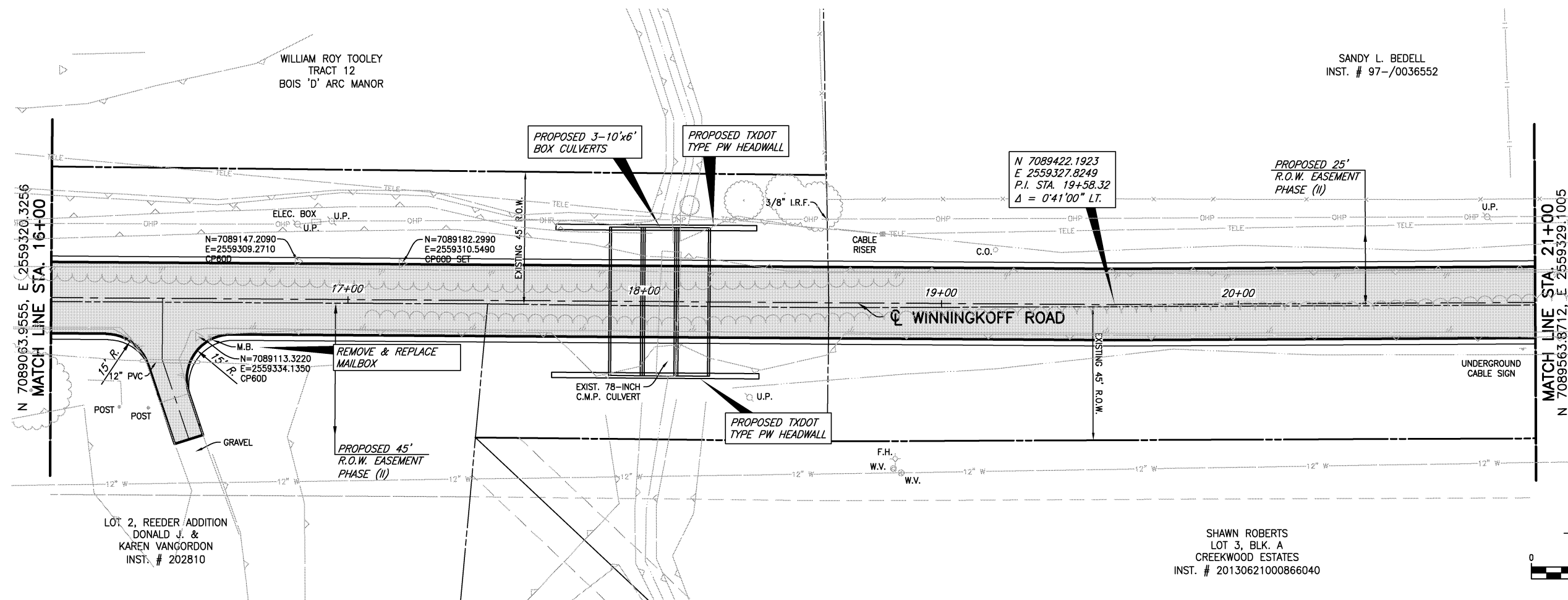
SHEET NO.  
**6**



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|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |  |  |                                                                                                                       |                                                 |                       |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |                                                                                                                                      |                                                           |                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------|
| <p>These plans and related specifications were prepared for construction of this specific project only. Reuse of these documents is not permitted without written authorization of Birkhoff, Hendricks &amp; Carter, L.L.P. If this drawing is converted to an electronic file, if any discrepancy occurs between the electronic file and the Birkhoff, Hendricks &amp; Carter, L.L.P. original document, the original document will govern in all cases.</p> | <p><b>BIRKHOFF, HENDRICKS &amp; CARTER, L.L.P.</b><br/>PROFESSIONAL ENGINEERS<br/>TBPE Firm No. 526; TBPLS Firm No. 10031800<br/>11910 Greenville Ave., Suite 600<br/>Dallas, Texas 75243 (214) 361-7900</p> | <p><b>CITY OF LUCAS, TEXAS</b><br/>WINNINGKOFF ROAD PHASE II<br/>PROPOSED PAVING PLAN &amp; PROFILE<br/>STA. 11+00 TO STA. 16+00</p> | <p>BHC<br/>PROJECT NO.<br/>2017-156<br/>January, 2019</p> | <p>SHEET NO.<br/><b>8</b></p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------|



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Dallas, Texas 75243 (214) 361-7900

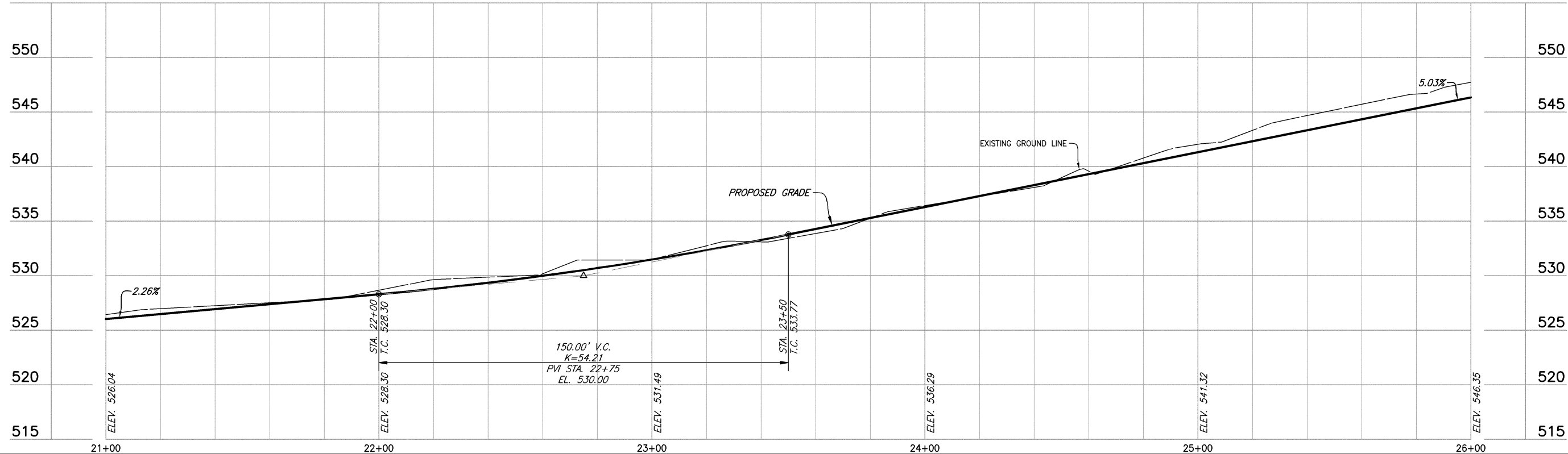
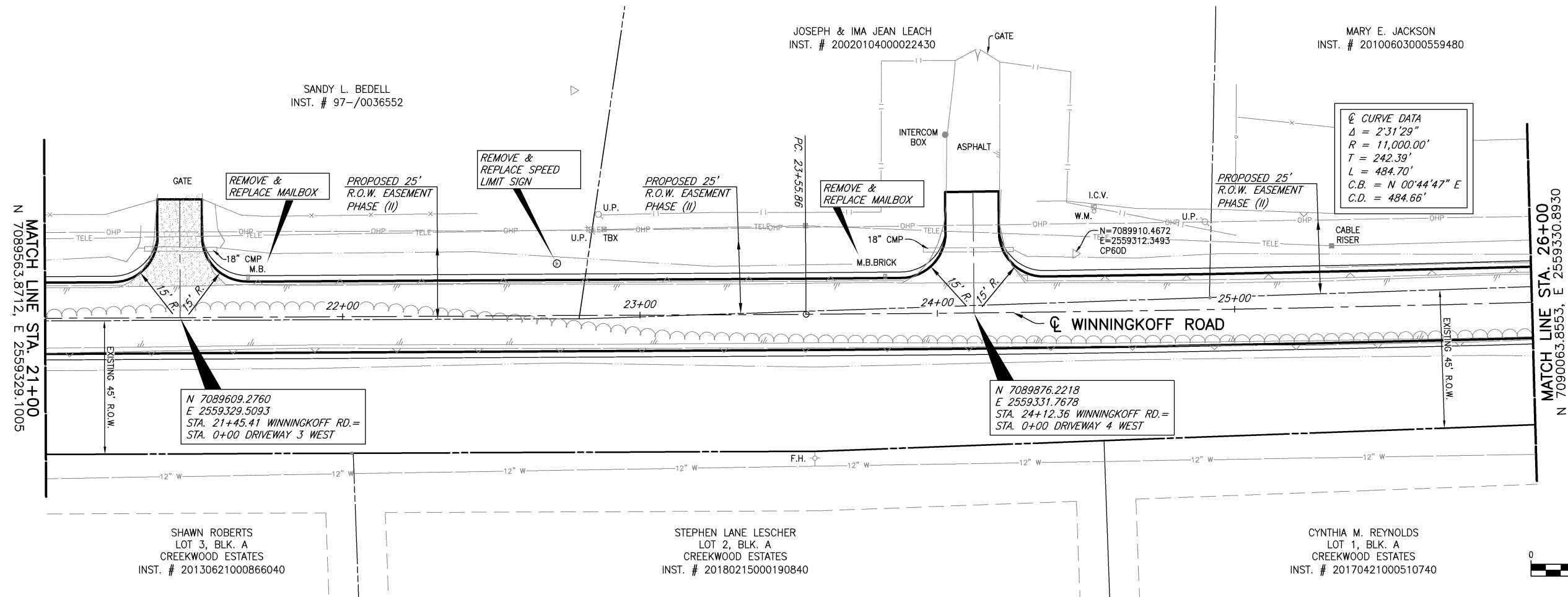


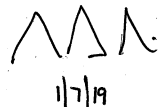
1/7/19

**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
PROPOSED PAVING PLAN & PROFILE  
STA. 16+00 TO STA. 21+00

BHC  
PROJECT NO.  
2017-156  
January, 2019

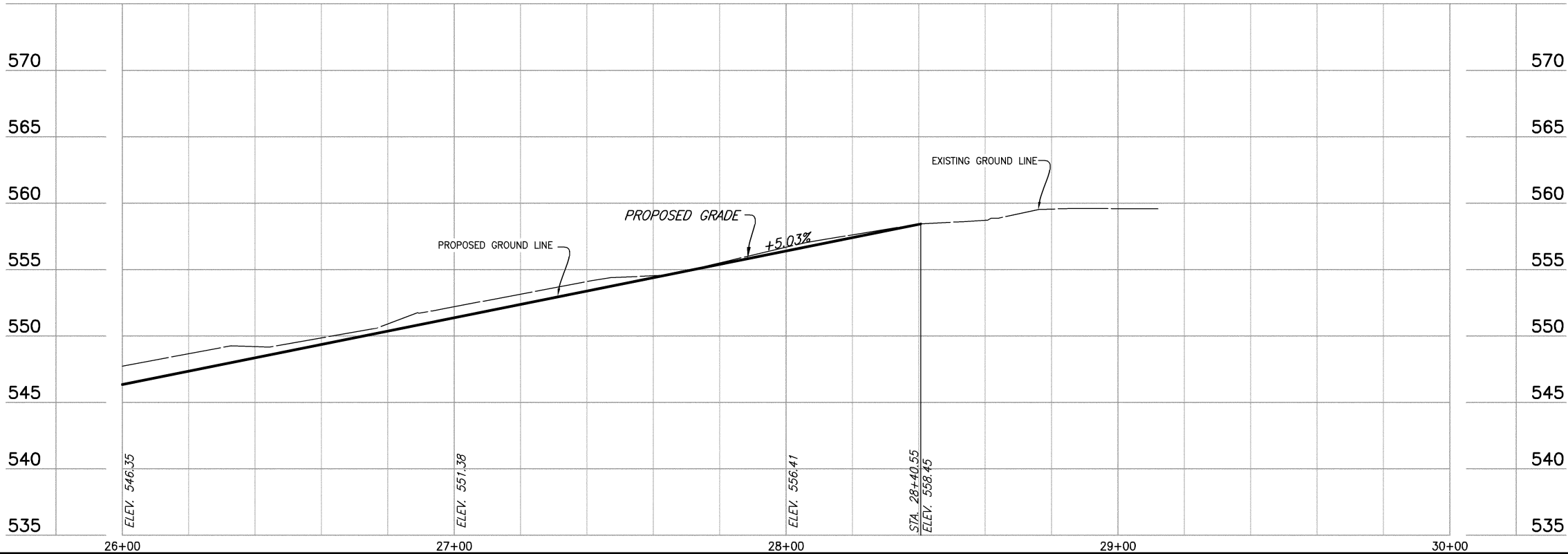
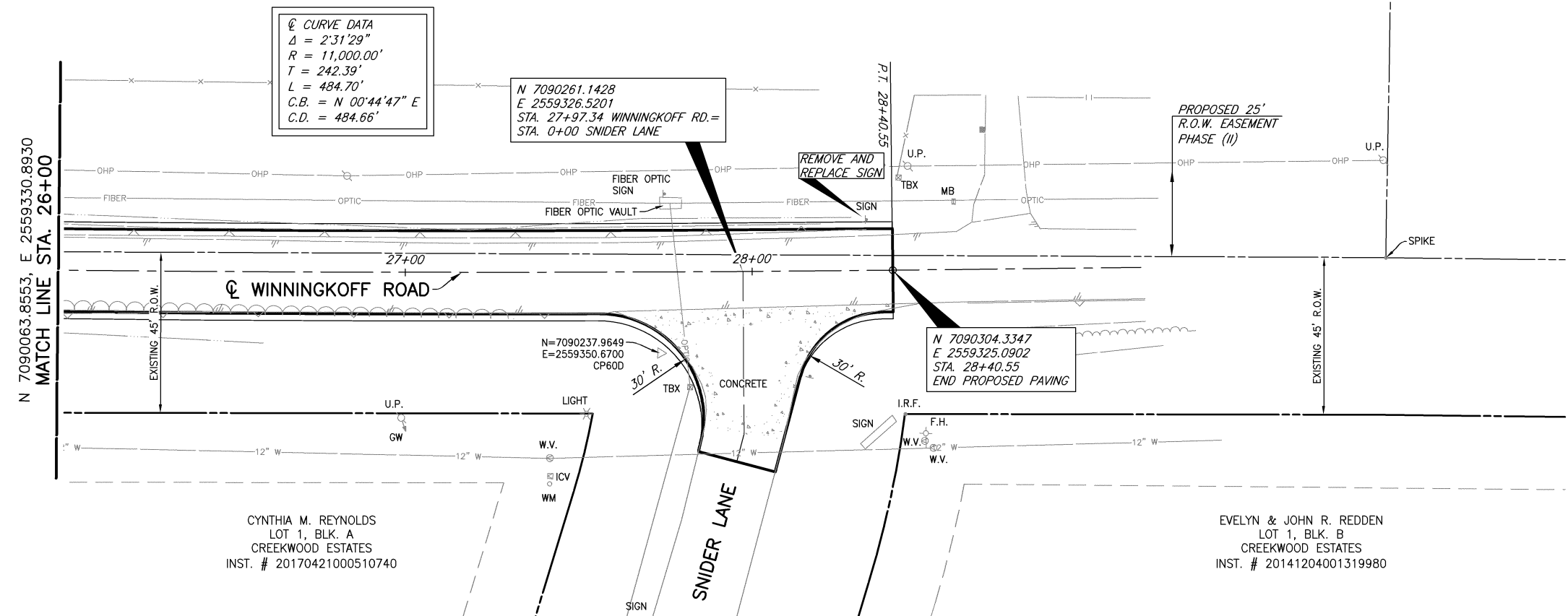
SHEET NO.  
**9**

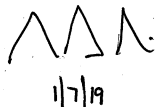


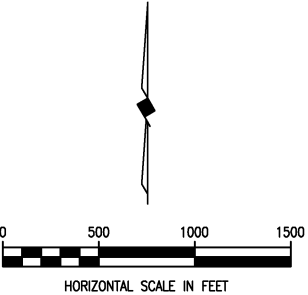
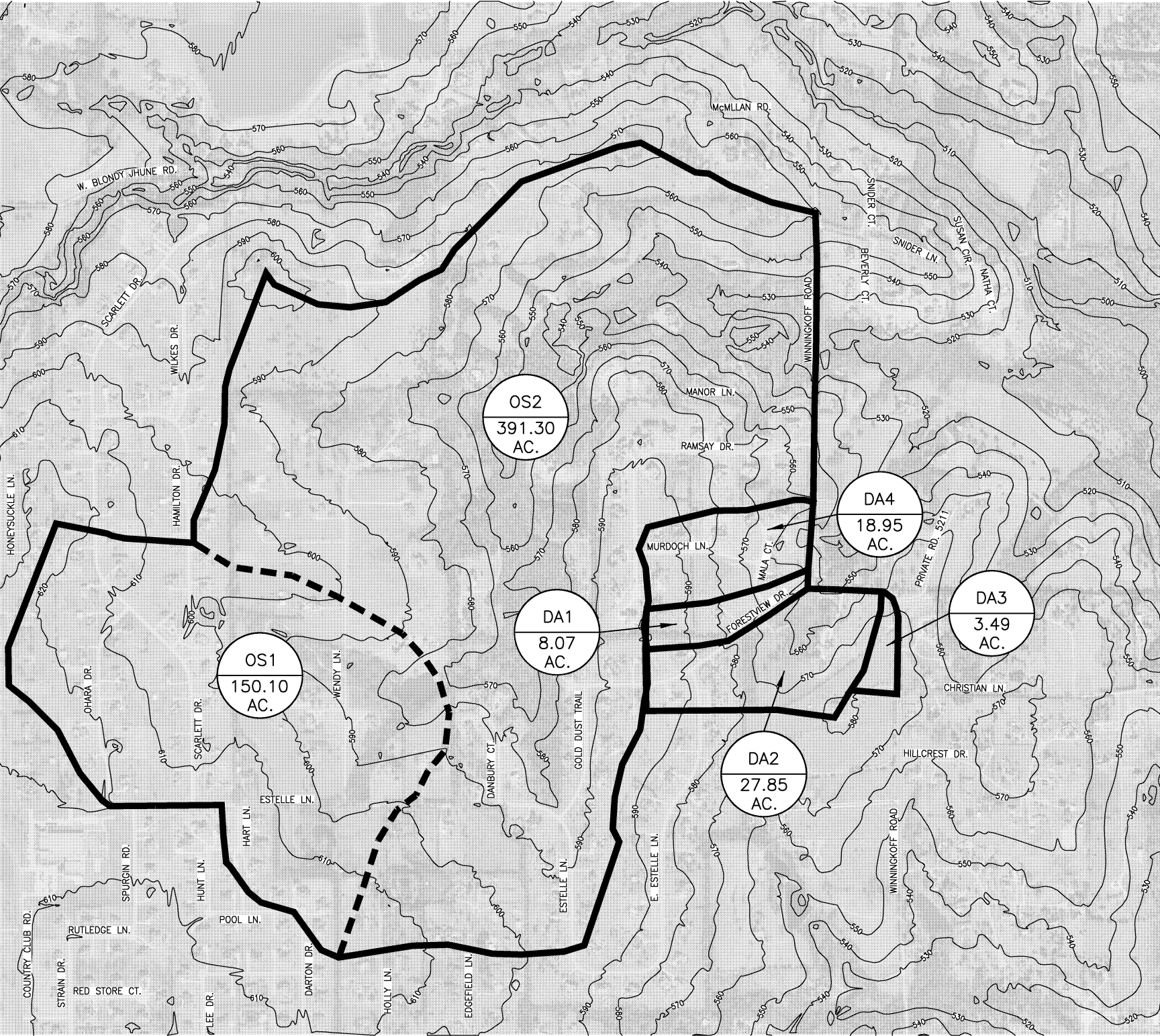
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| REVISED: 9/21/18 - KBURKS | H:\Projects\Lucas\2017156 Winningkoff Phase 2\Sheets\2017156 Paving PP05.dwg | BIRKHOFF, HENDRICKS & CARTER, L.L.P.<br>PROFESSIONAL ENGINEERS<br>TBPE Firm No. 526; TBPLS Firm No. 10031800<br>11910 Greenville Ave., Suite 600<br>Dallas, Texas 75243 (214) 361-7900 |  |  | CITY OF LUCAS, TEXAS<br>WINNINGKOFF ROAD PHASE II<br>PROPOSED PAVING PLAN & PROFILE<br>STA. 21+00 TO STA. 26+00 | BHC<br>PROJECT NO.<br>2017-156<br>January, 2019 | SHEET NO.<br><b>10</b> |
|                           |                                                                              |                                                                                                                                                                                        |                                                                                       |                                                                                       |                                                                                                                 |                                                 |                        |
|                           |                                                                              |                                                                                                                                                                                        |                                                                                       |                                                                                       |                                                                                                                 |                                                 |                        |
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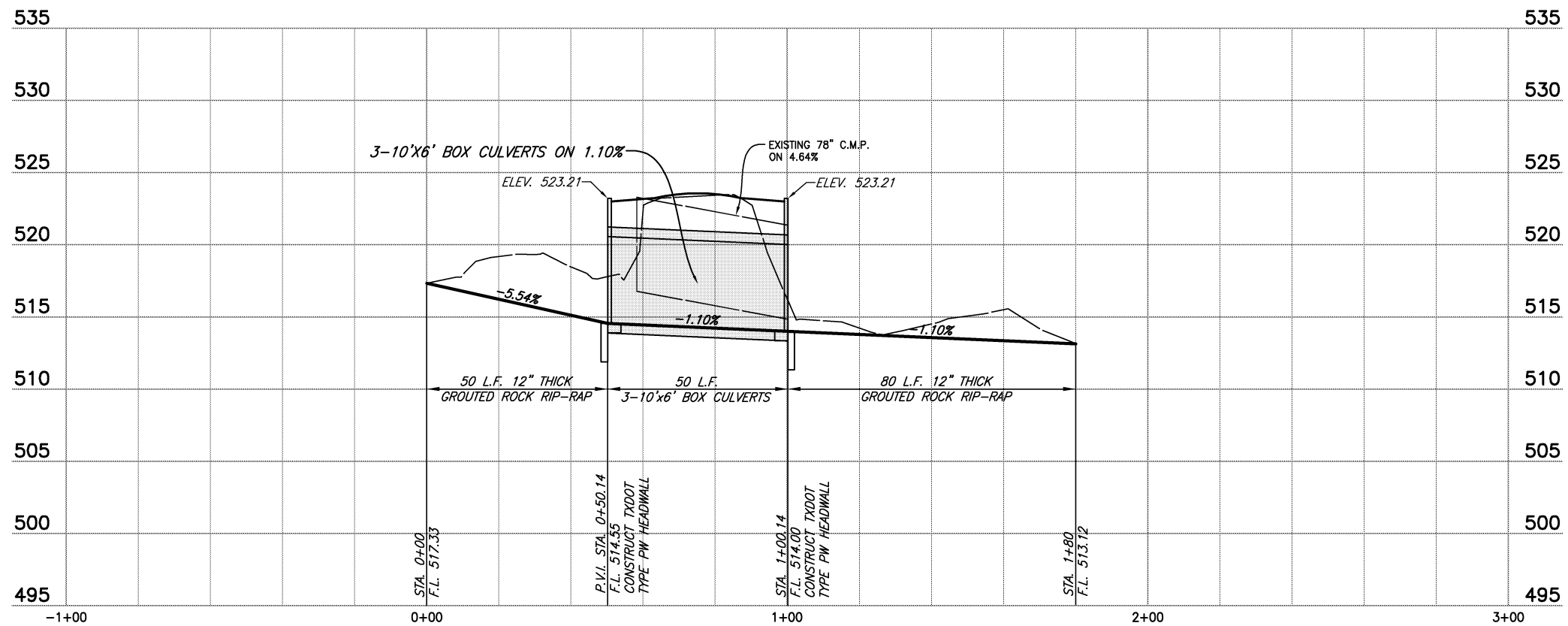
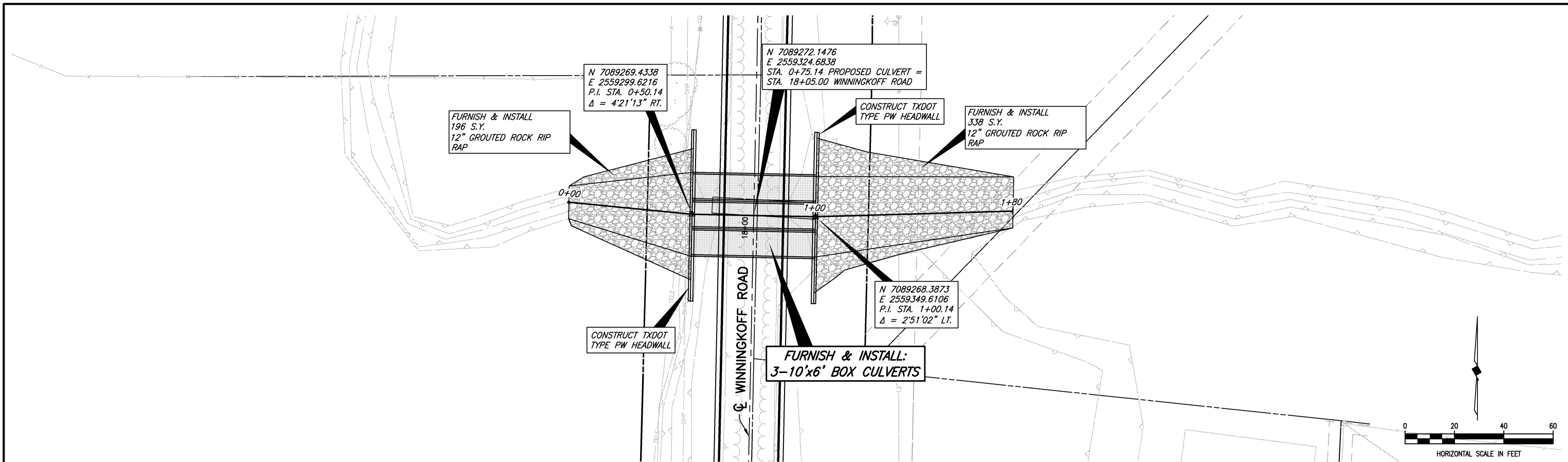


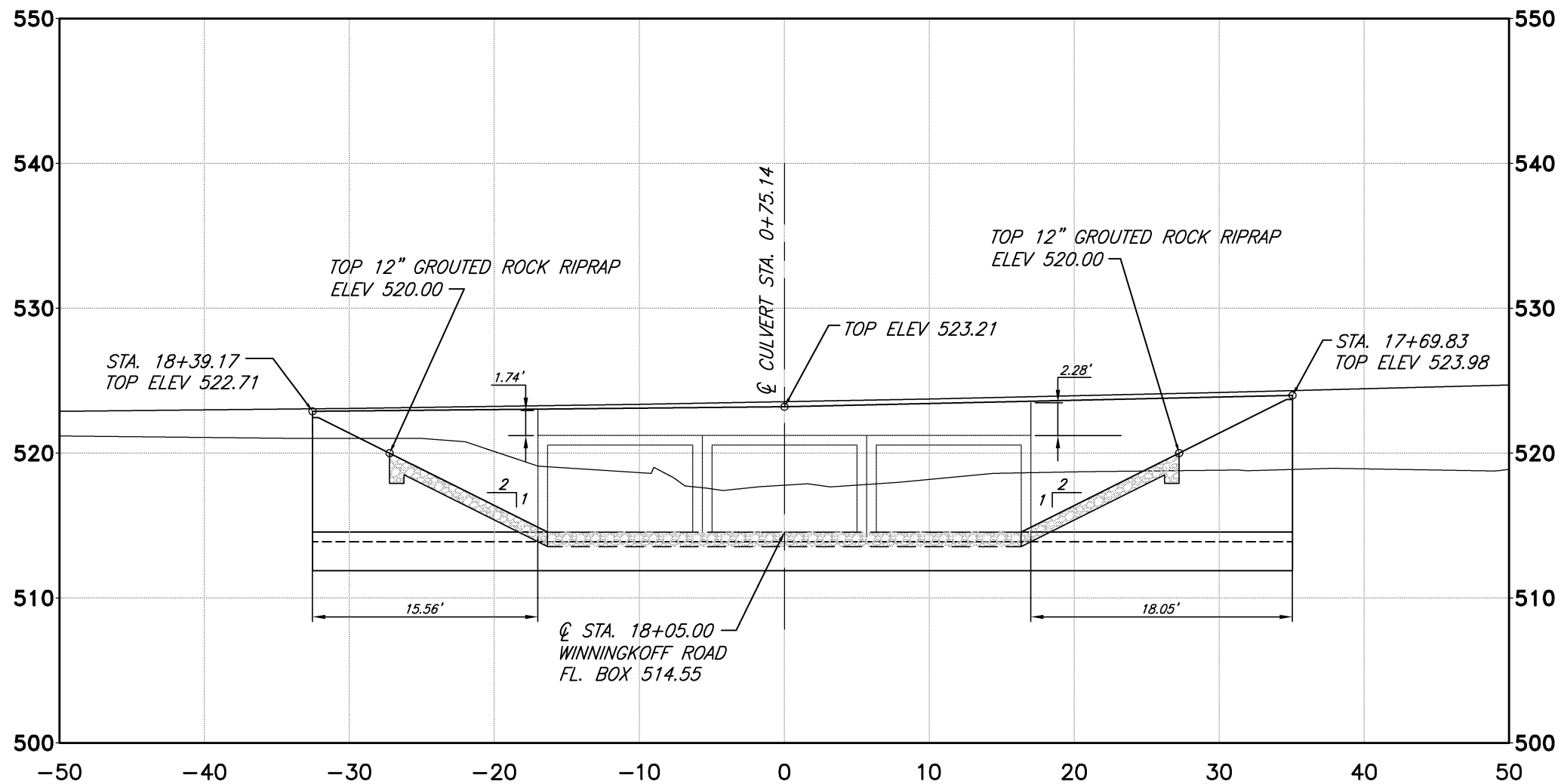
MARY E. JACKSON  
INST. # 20100603000559480



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|-------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------|----------------------------|
| REVISED: 1/8/19 - RLOWE | H:\Projects\Lucas\2017156 Winningkoff Phase 2\Sheets\2017156 Paving PP06.dwg | These plans and related specifications were prepared for construction of this specific project only. Reuse of these documents is not permitted without written authorization of Birkhoff, Hendricks & Carter, L.L.P. If this drawing is converted to an electronic file, if any discrepancy occurs between the electronic file and the Birkhoff, Hendricks & Carter, L.L.P. original document, the original document will govern in all cases. | <b>BIRKHOFF, HENDRICKS &amp; CARTER, L.L.P.</b><br>PROFESSIONAL ENGINEERS<br>TBPE Firm No. 526; TBPLS Firm No. 10031800<br>11910 Greenville Ave., Suite 600<br>Dallas, Texas 75243 (214) 361-7900 |  | <br>1/7/19 | <b>CITY OF LUCAS, TEXAS</b><br>WINNINGKOFF ROAD PHASE II                 | BHC<br>PROJECT NO.<br>2017-156<br><br>January, 2019 | SHEET NO.<br><br><b>11</b> |
|                         |                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |                                                                                       |                                                                                                 | <b>PROPOSED PAVING PLAN &amp; PROFILE</b><br>STA. 26+00 TO STA. 28+40.55 |                                                     |                            |
|                         |                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |                                                                                       |                                                                                                 |                                                                          |                                                     |                            |
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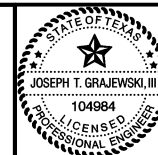




TxDOT PW DESIGN DATA  
 $H_w = 9.36'$   
 $W = 6'-0''$   
 $X = 2'-10''$   
 $Y = 2'-2''$   
 $Z = 0'-9''$

**UPSTREAM HEADWALL AT WINNINGKOFF ROAD  
 STA. 18+05 LOOKING EAST**

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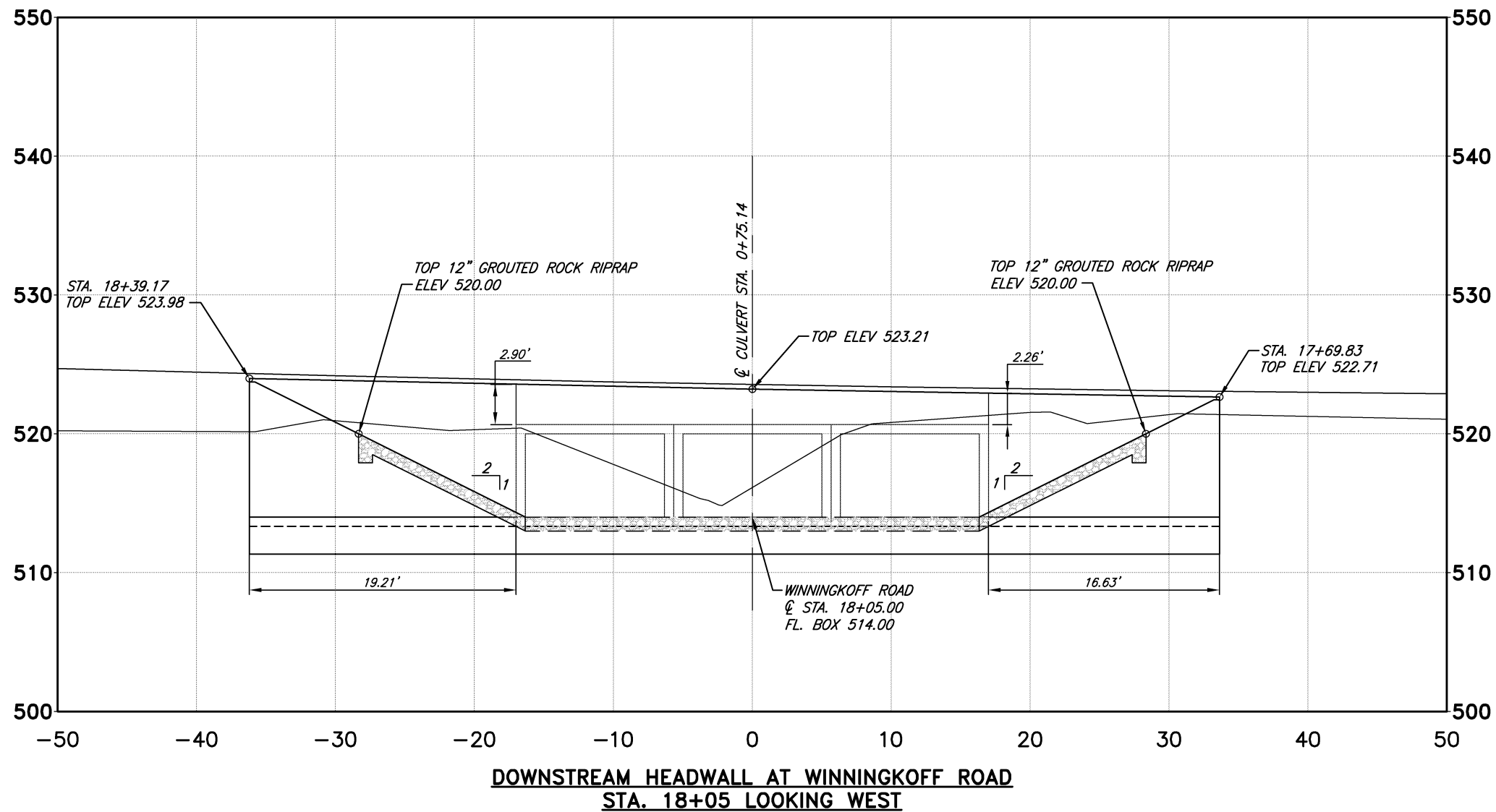


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**CITY OF LUCAS, TEXAS**  
 WINNINGKOFF ROAD PHASE II  
 UPSTREAM HEADWALL SECTION

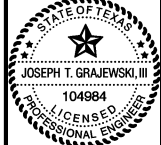
BHC  
 PROJECT NO.  
 2017-156  
 January, 2019

SHEET NO.  
**14**



*TxDOT PW DESIGN DATA*  
*Hw = 9.94'*  
*W = 6'-5"*  
*X = 3'-0"*  
*Y = 2'-5"*  
*Z = 0'-9"*

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*1/7/19*

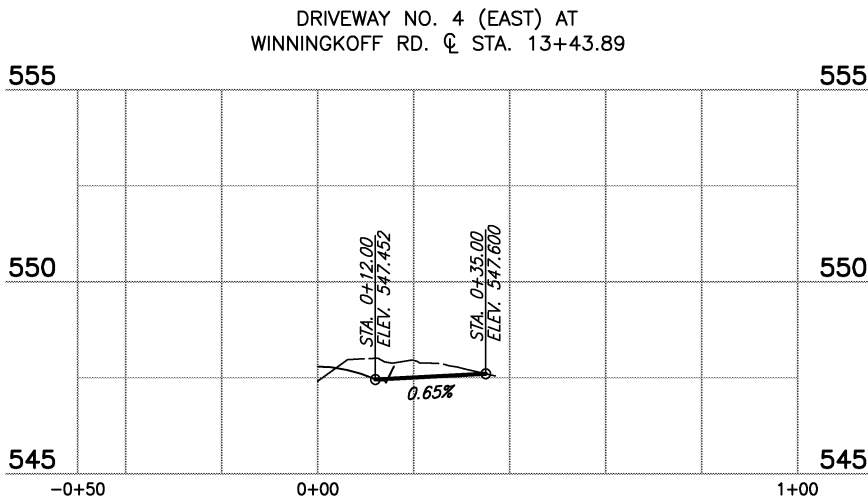
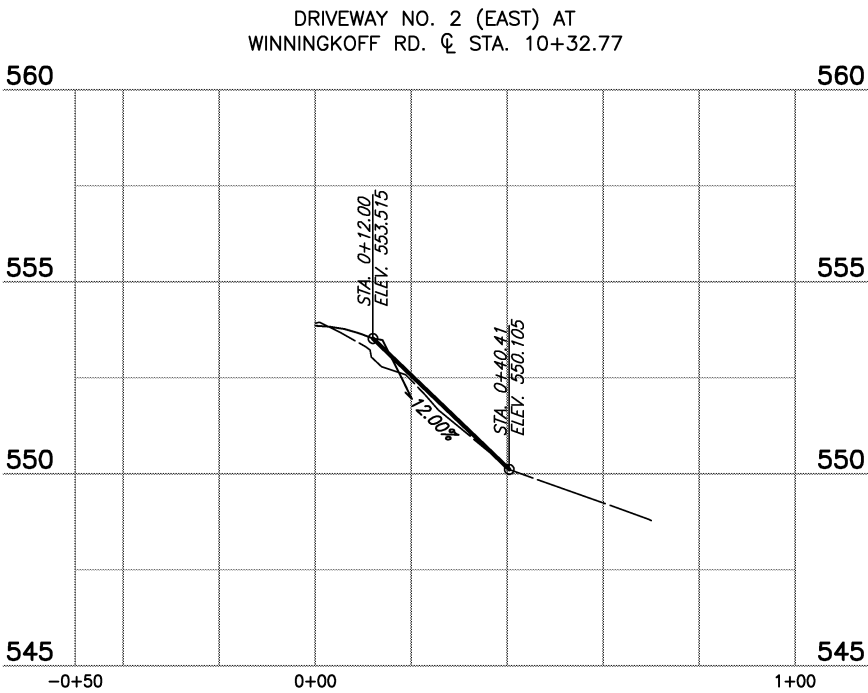
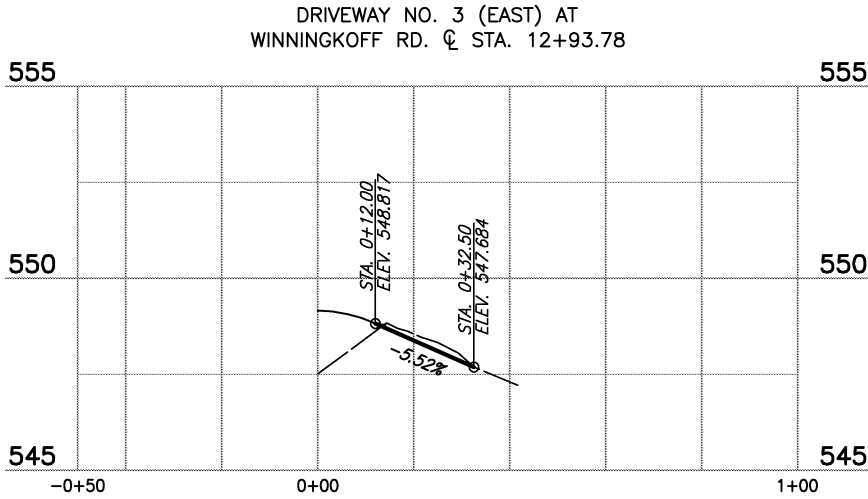
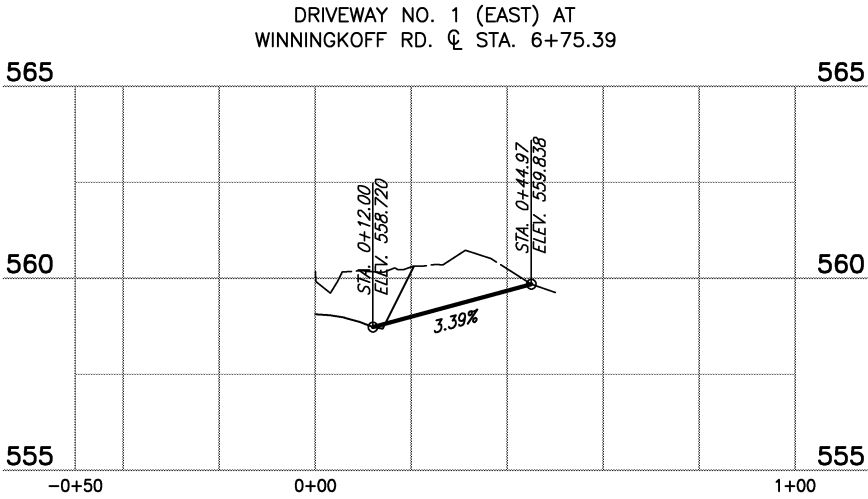
**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
DOWNSTREAM HEADWALL SECTION

BHC  
PROJECT NO.  
2017-156  
January, 2019

SHEET NO.  
**15**







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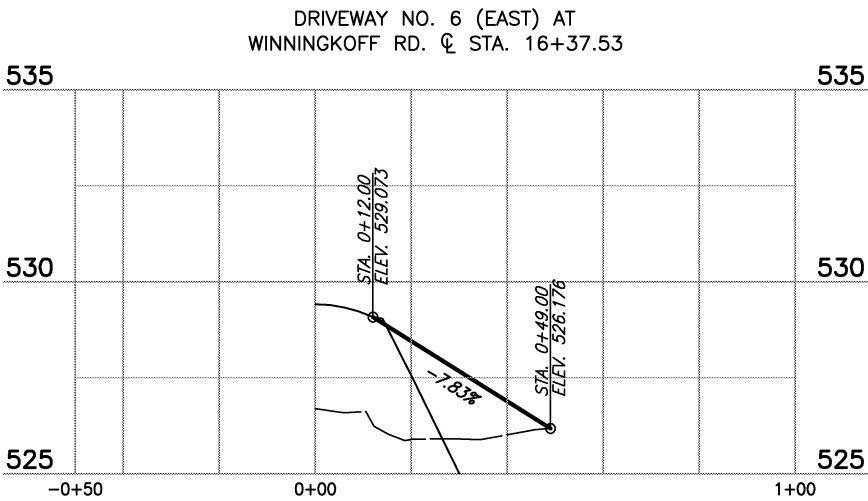
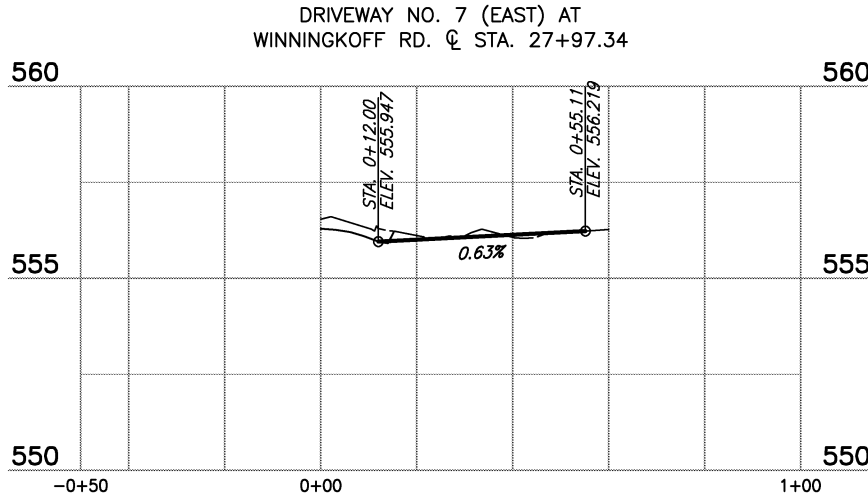
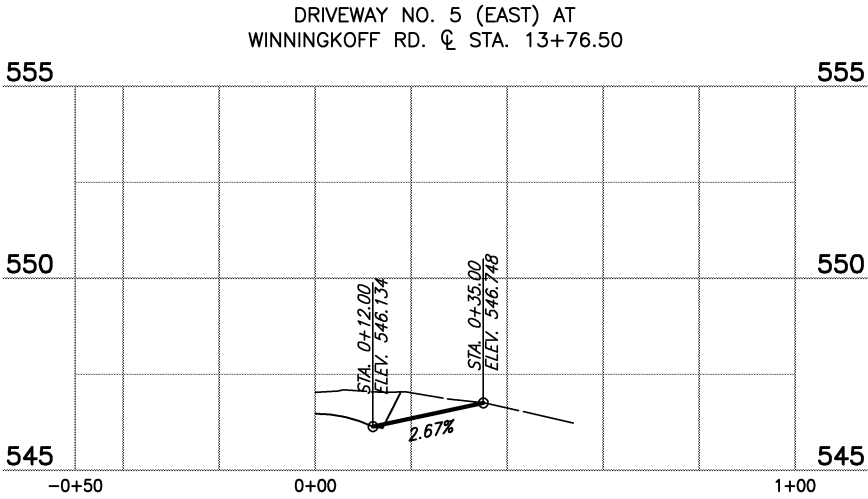
1/7/19

**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
**EAST DRIVEWAY PROFILES**

BHC  
PROJECT NO.  
2017-156  
January, 2019

SHEET NO.  
**17**

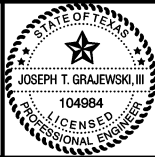




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11910 Greenville Ave., Suite 600  
Dallas, Texas 75243 (214) 361-7900

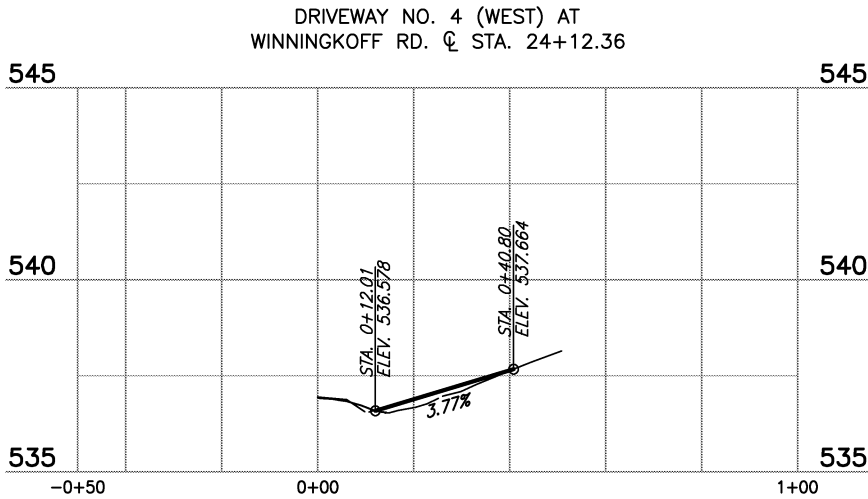
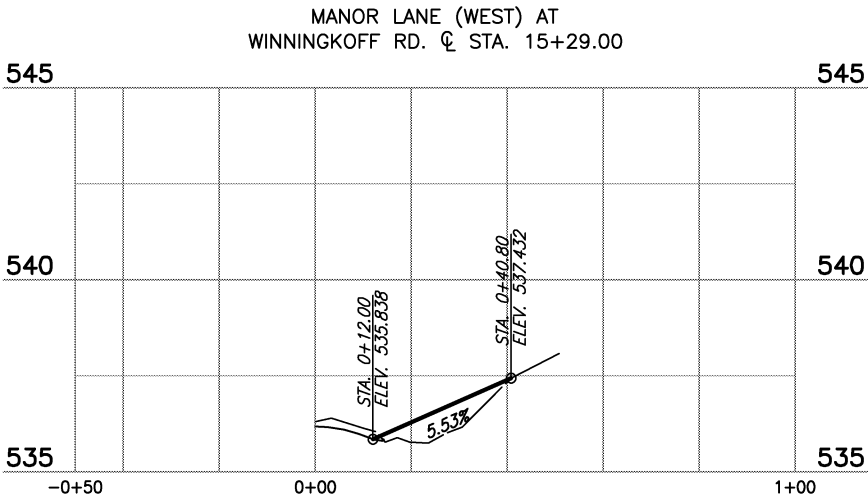
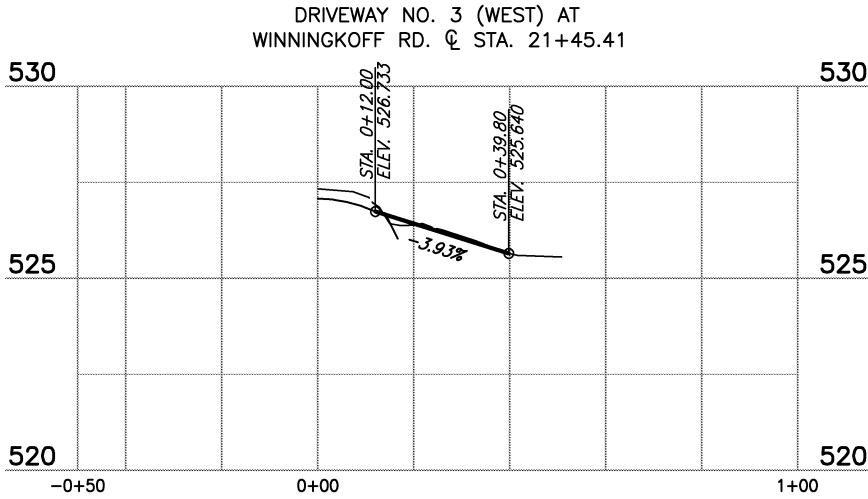
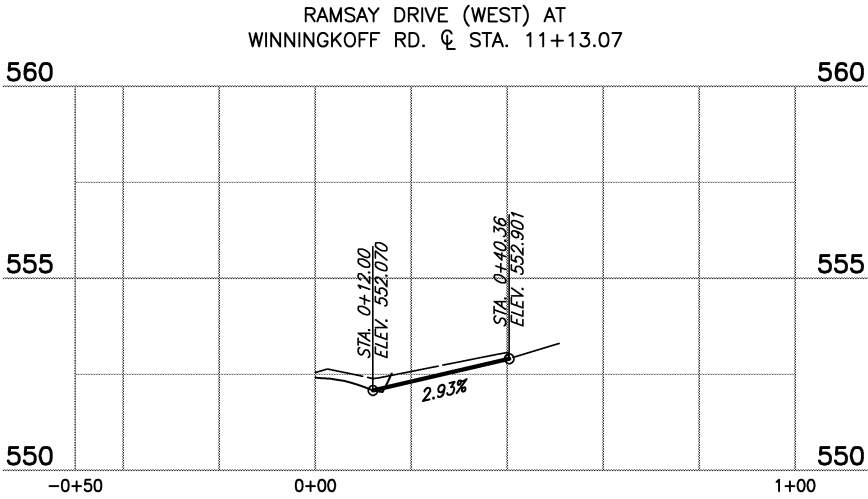


1/7/19

**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
**EAST DRIVEWAY PROFILES**

BHC  
PROJECT NO.  
2017-156  
January, 2019

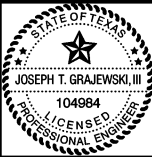
SHEET NO.  
**18**



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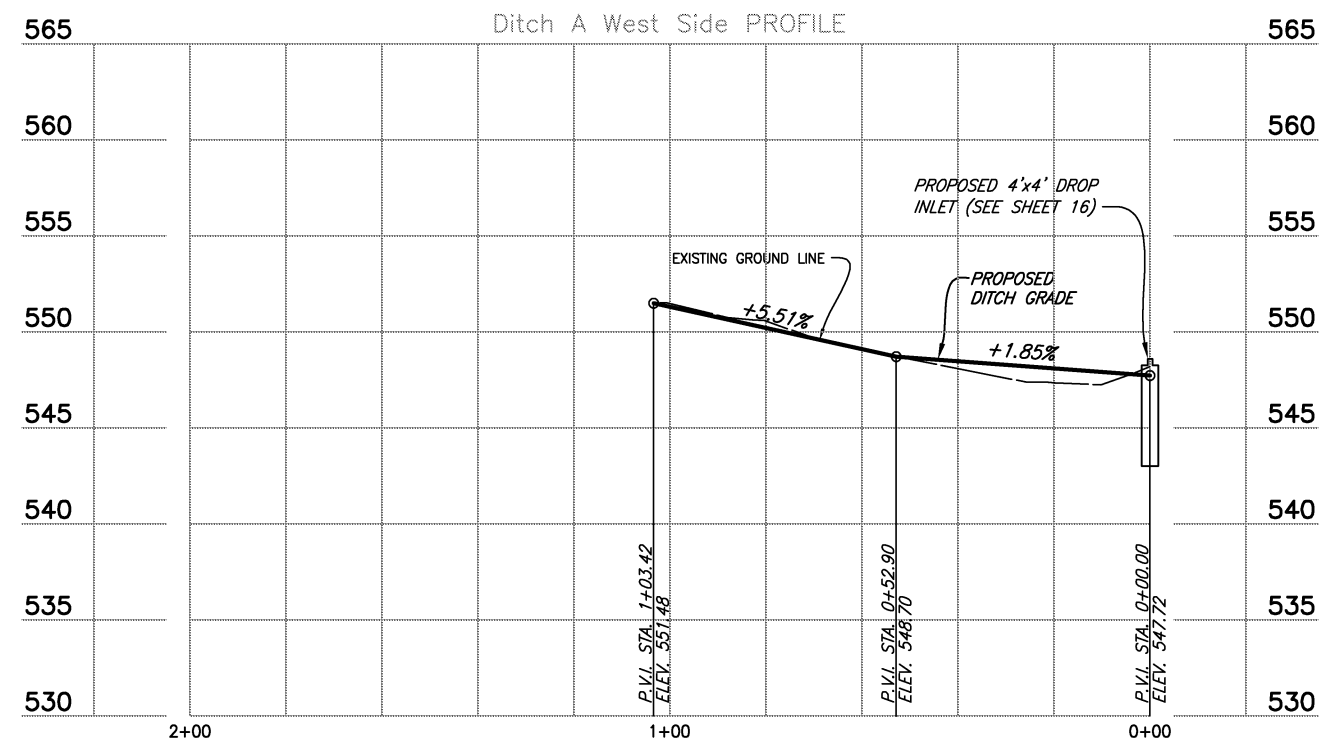
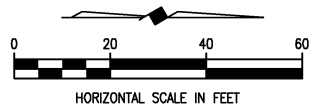
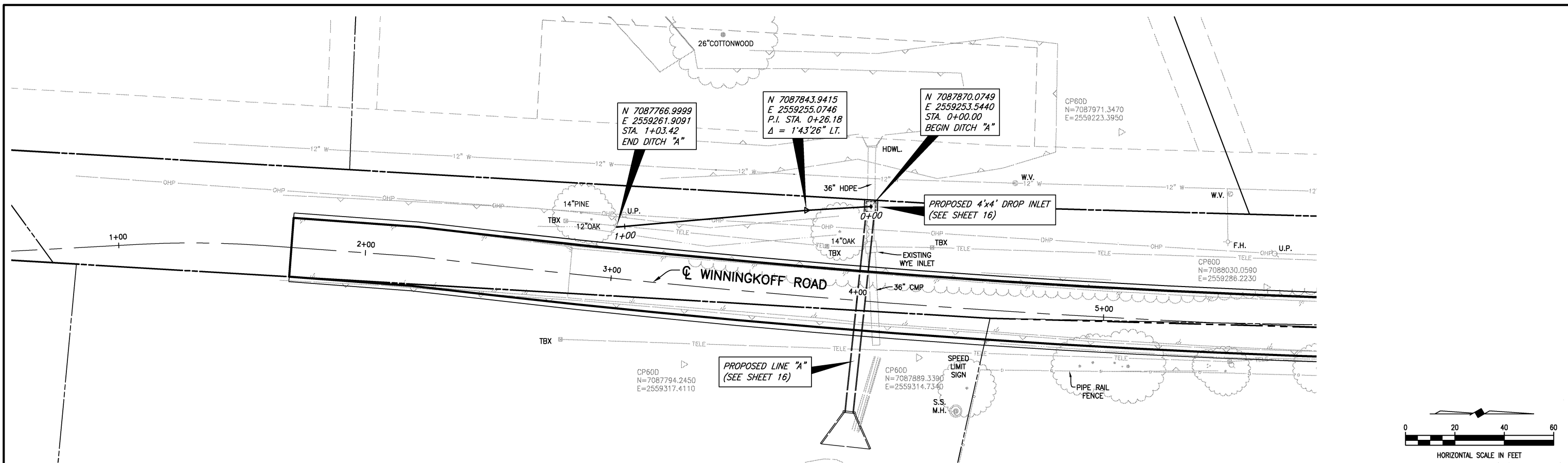


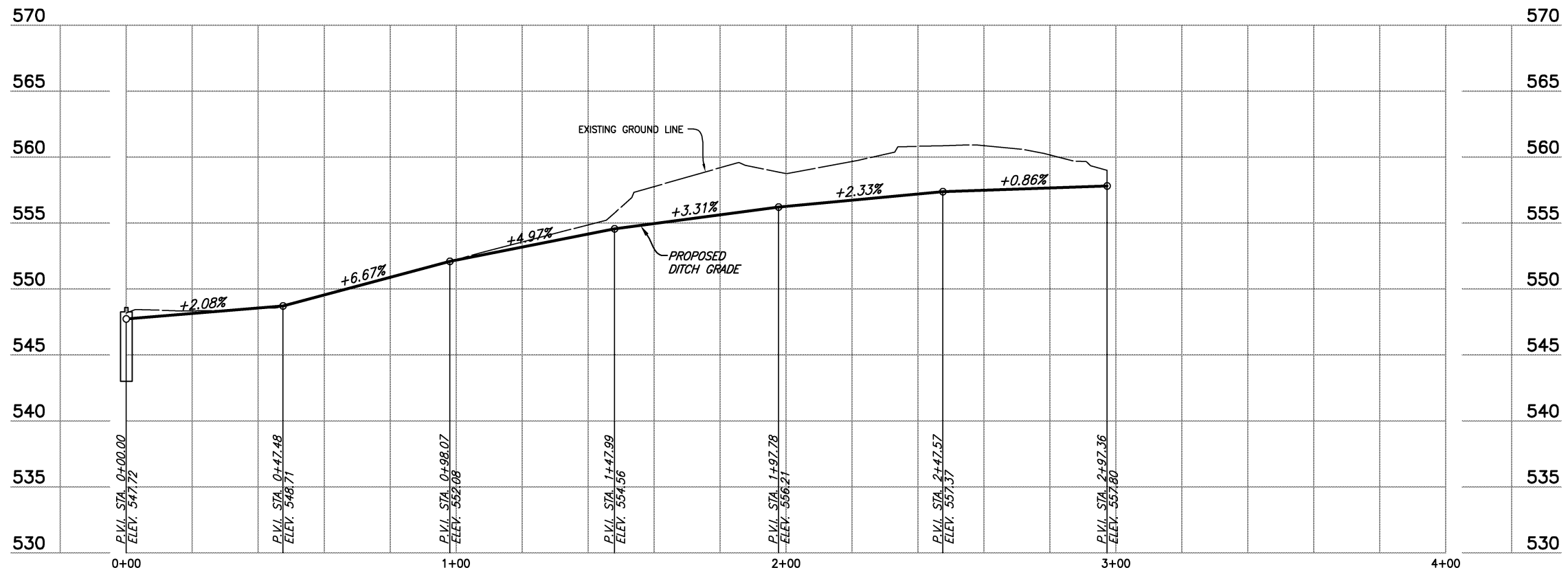
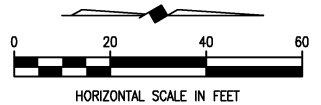
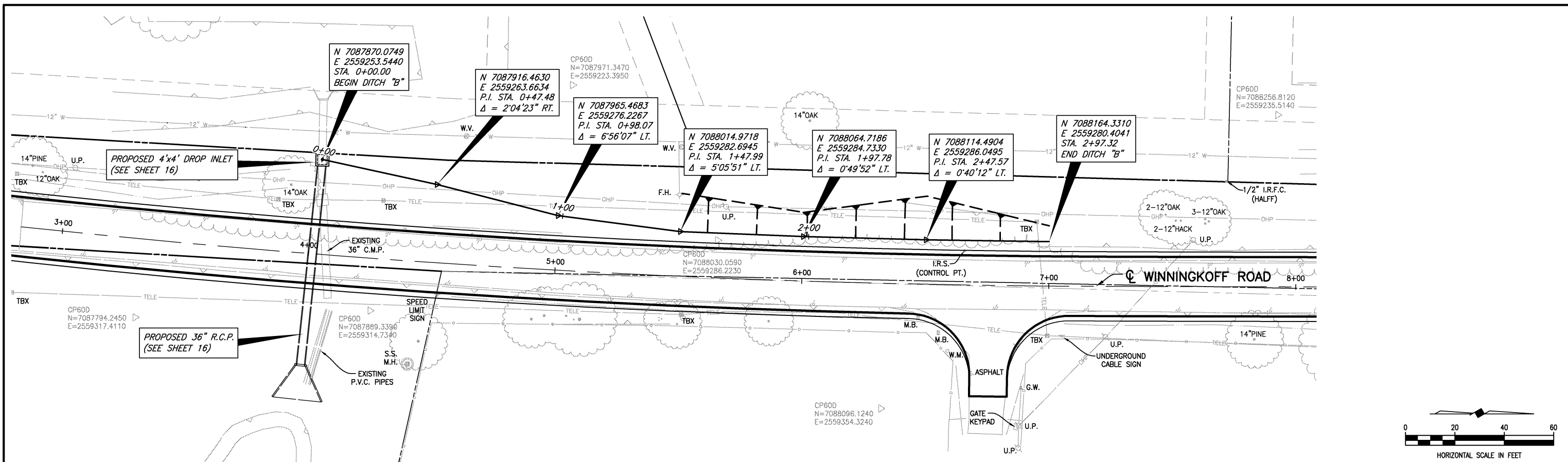
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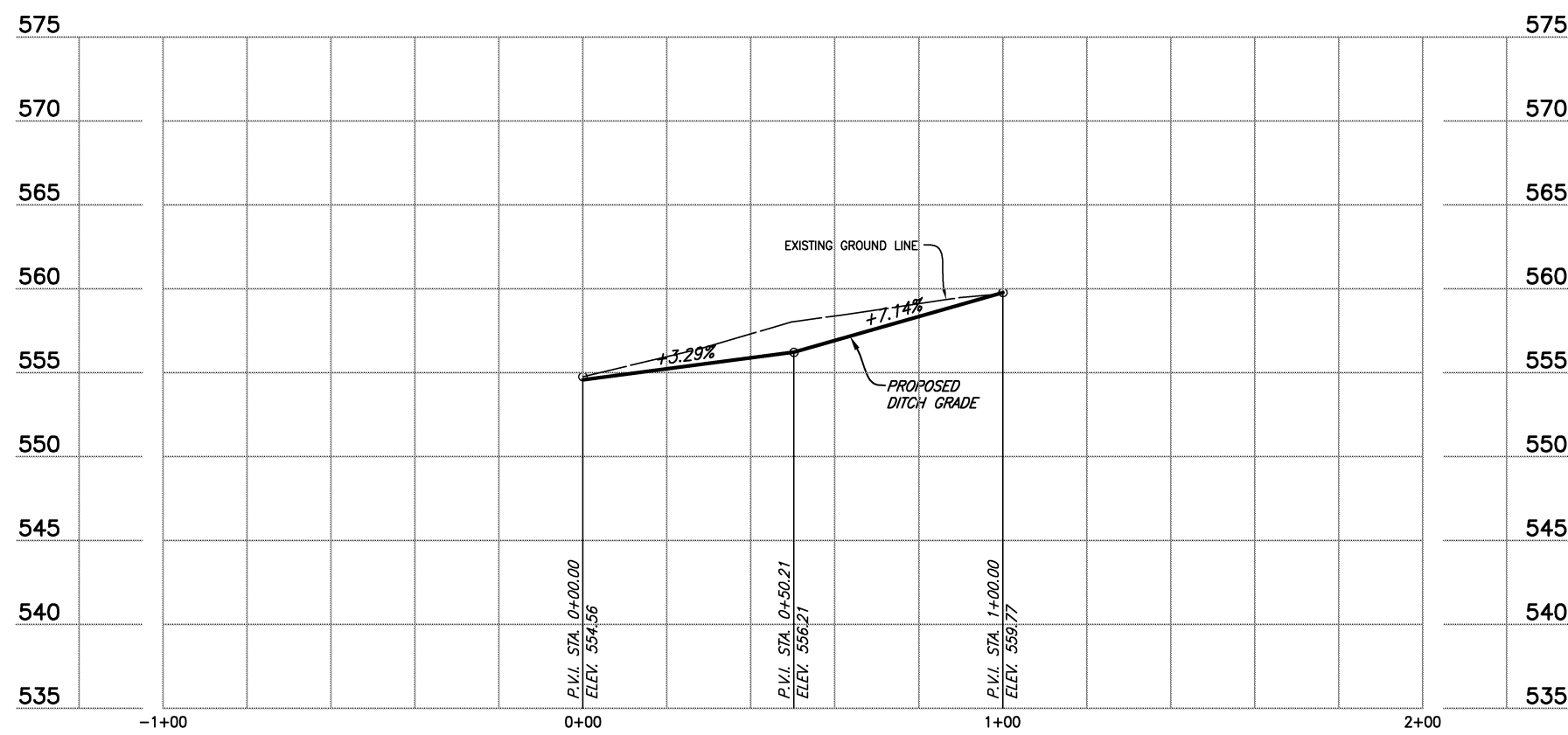
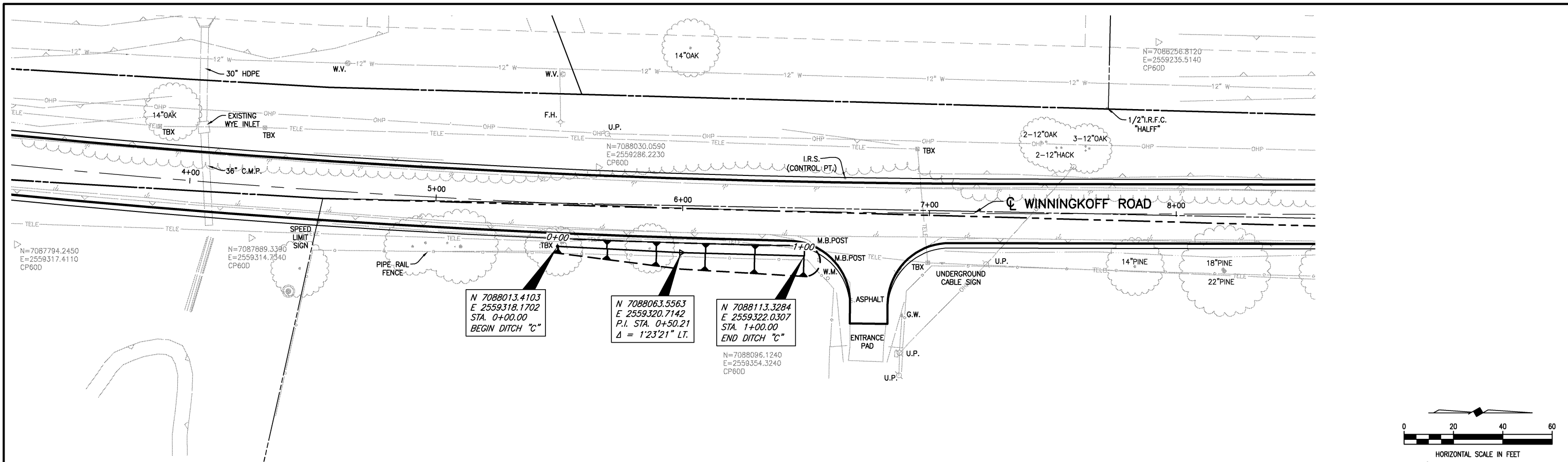
**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
**WEST DRIVEWAY PROFILES**

BHC  
PROJECT NO.  
2017-156  
January, 2019

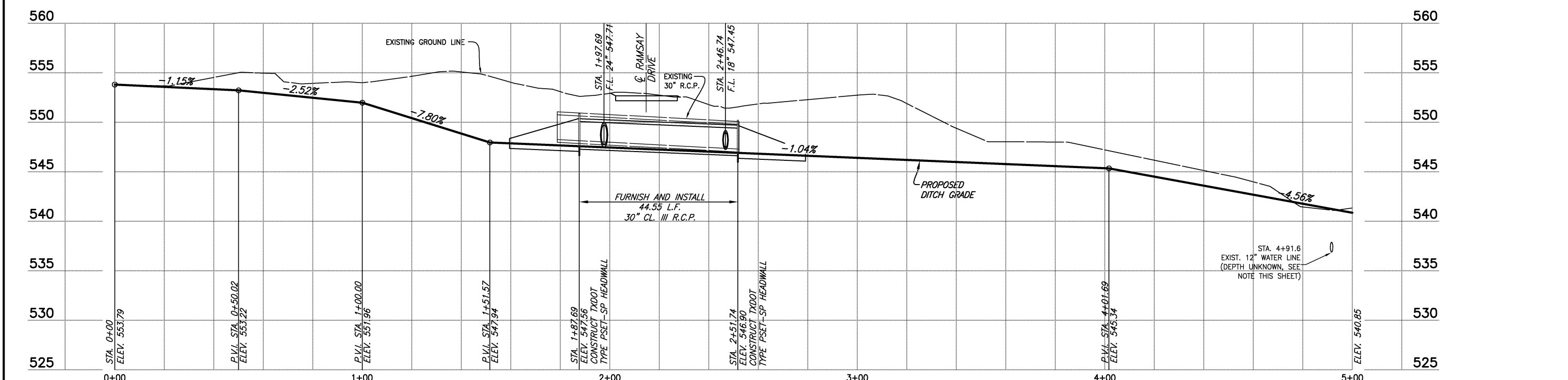
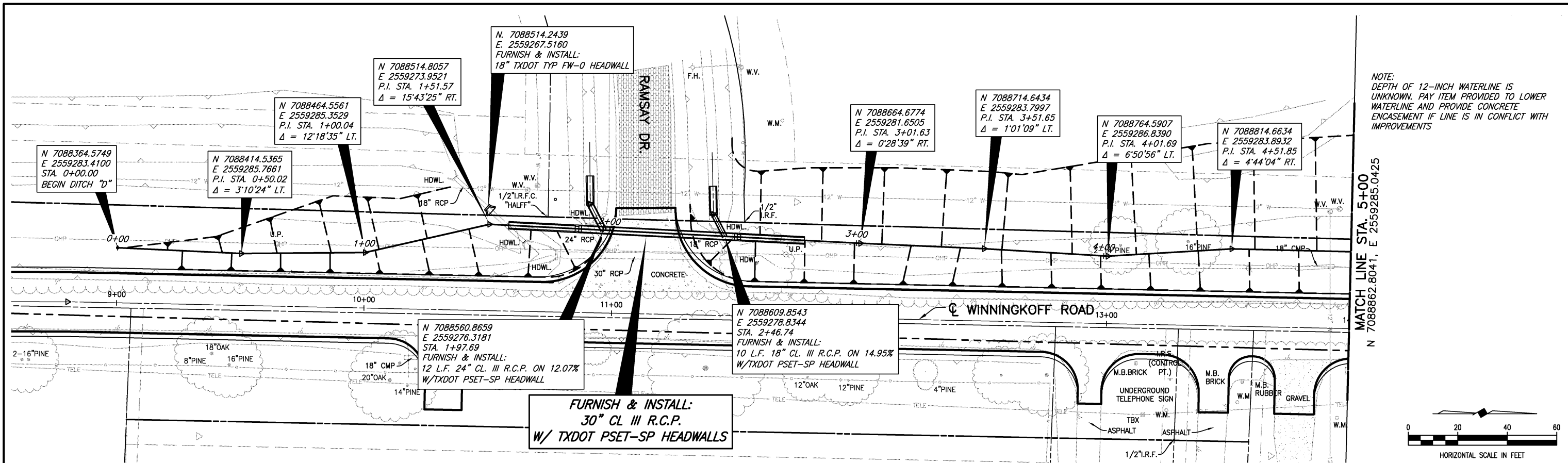
SHEET NO.  
**19**



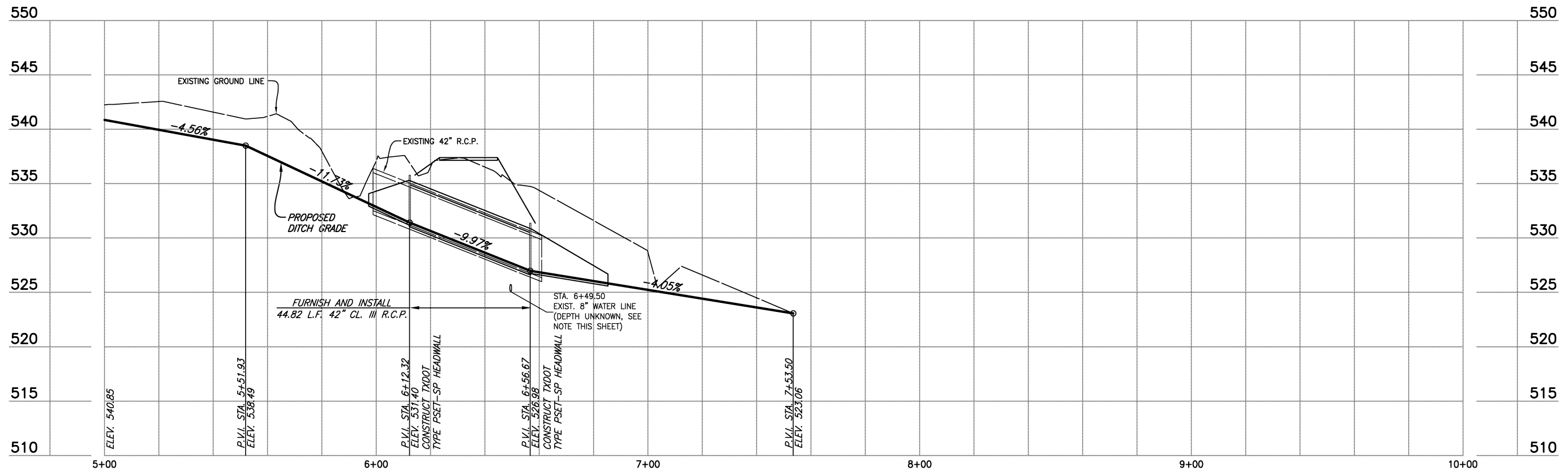
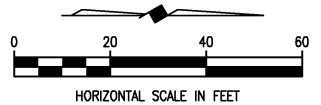
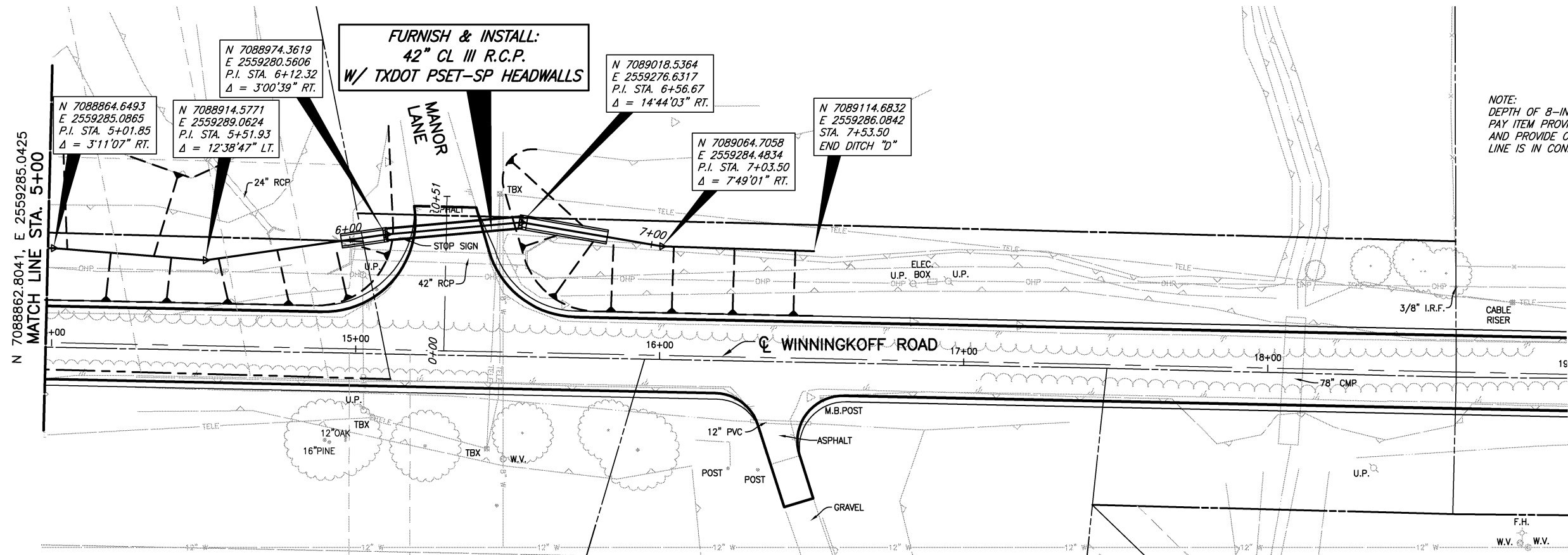




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|                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |  |  | <b>DITCH "C"</b><br>PLAN AND PROFILE<br>STA. 0+00 TO STA. 1+00 |                                                     |                            |







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Dallas, Texas 75243 (214) 361-7900



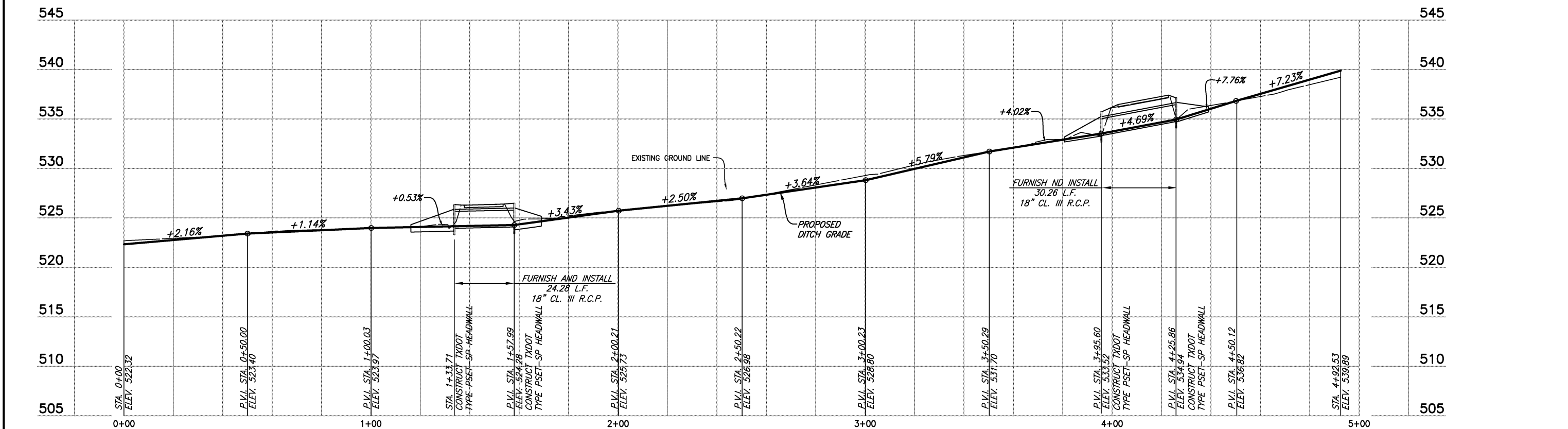
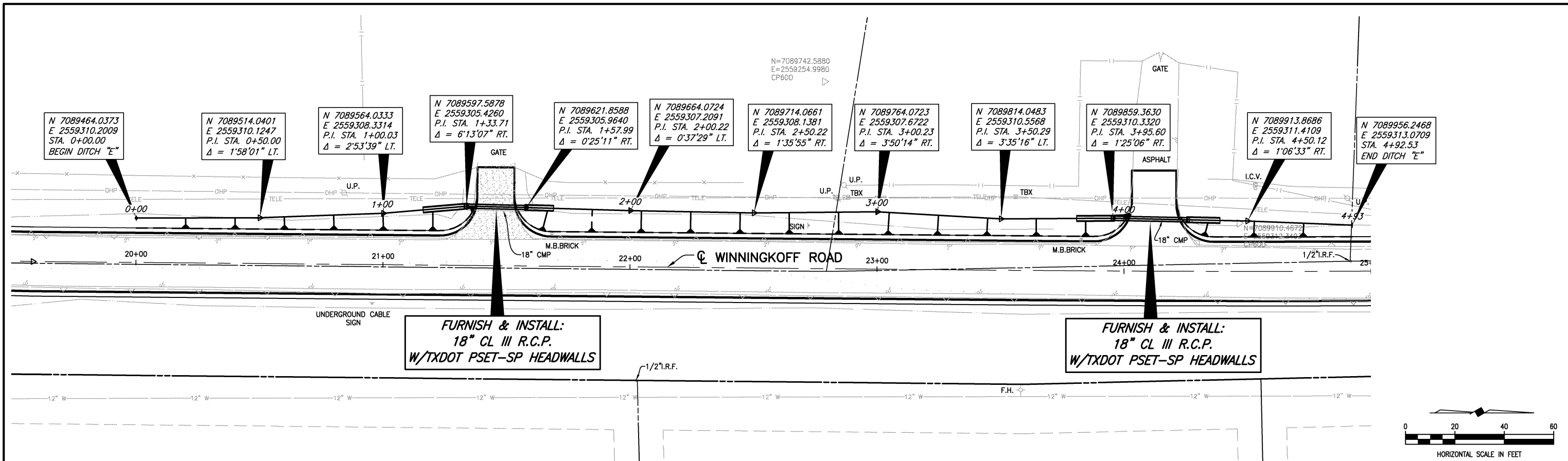
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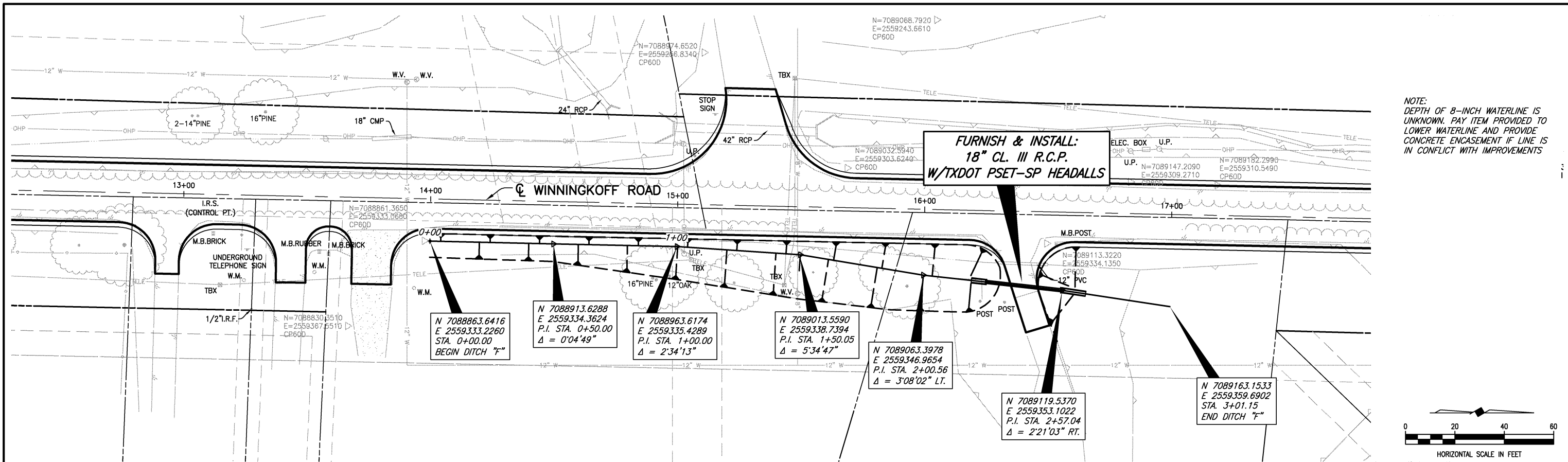
**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
**DITCH "D"**  
PLAN AND PROFILE  
STA. 5+00 TO STA. 7+53.50

BHC  
PROJECT NO.  
2017-156  
January, 2019

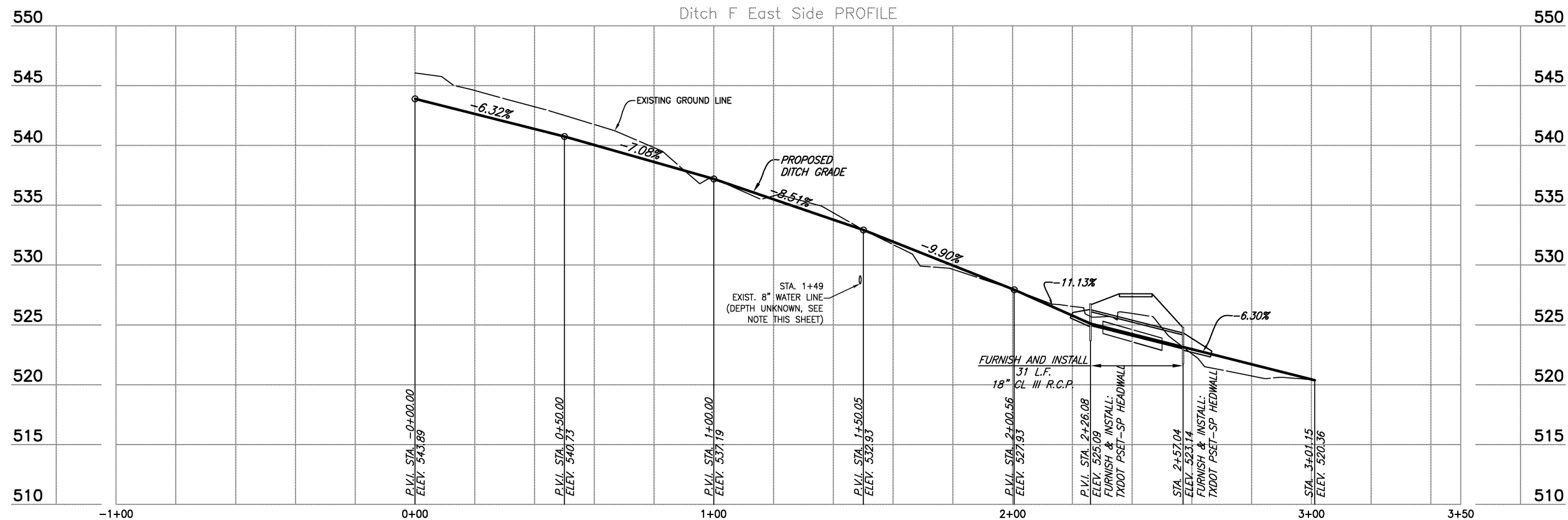
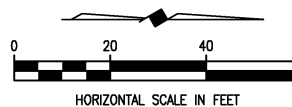
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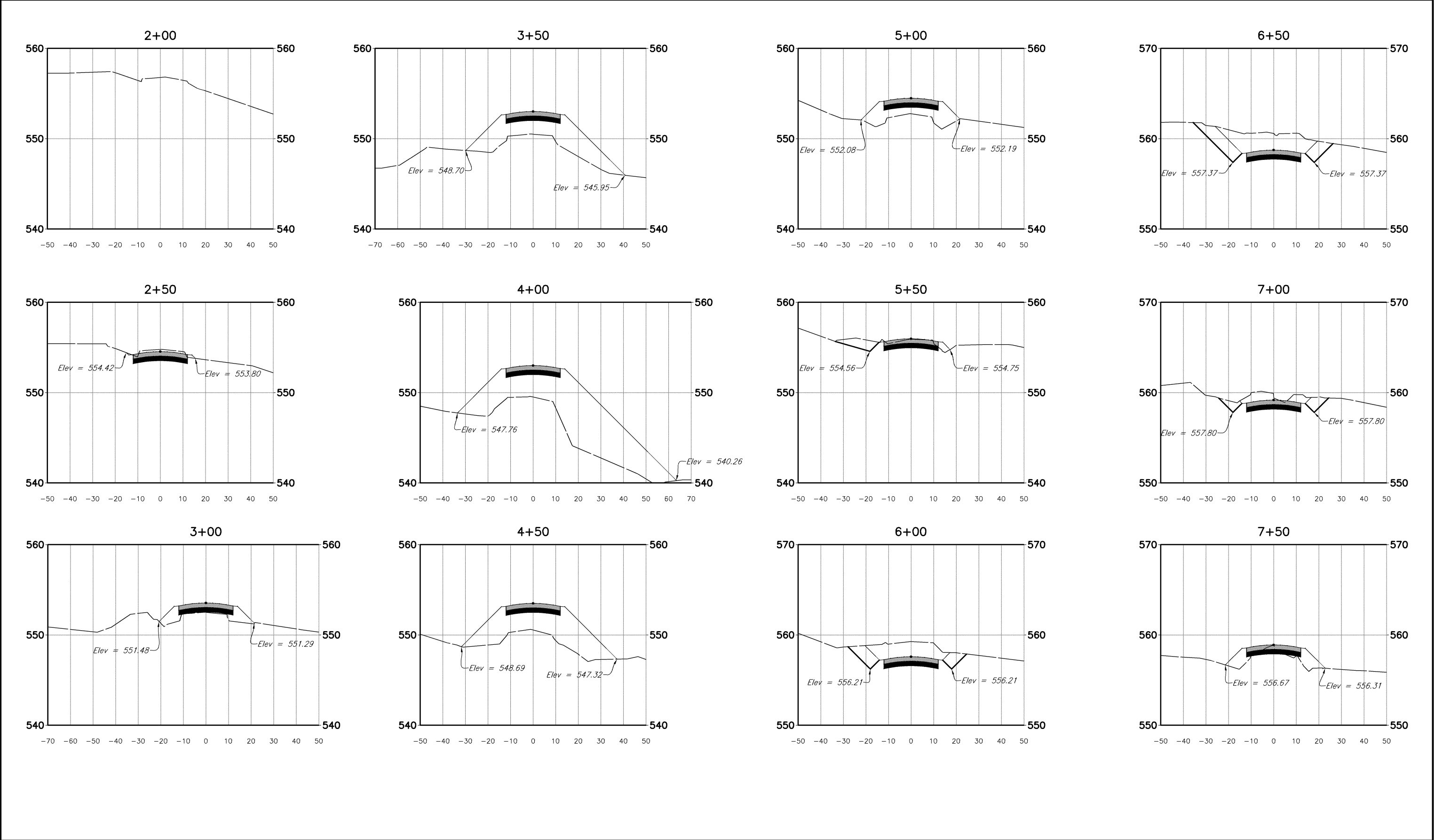




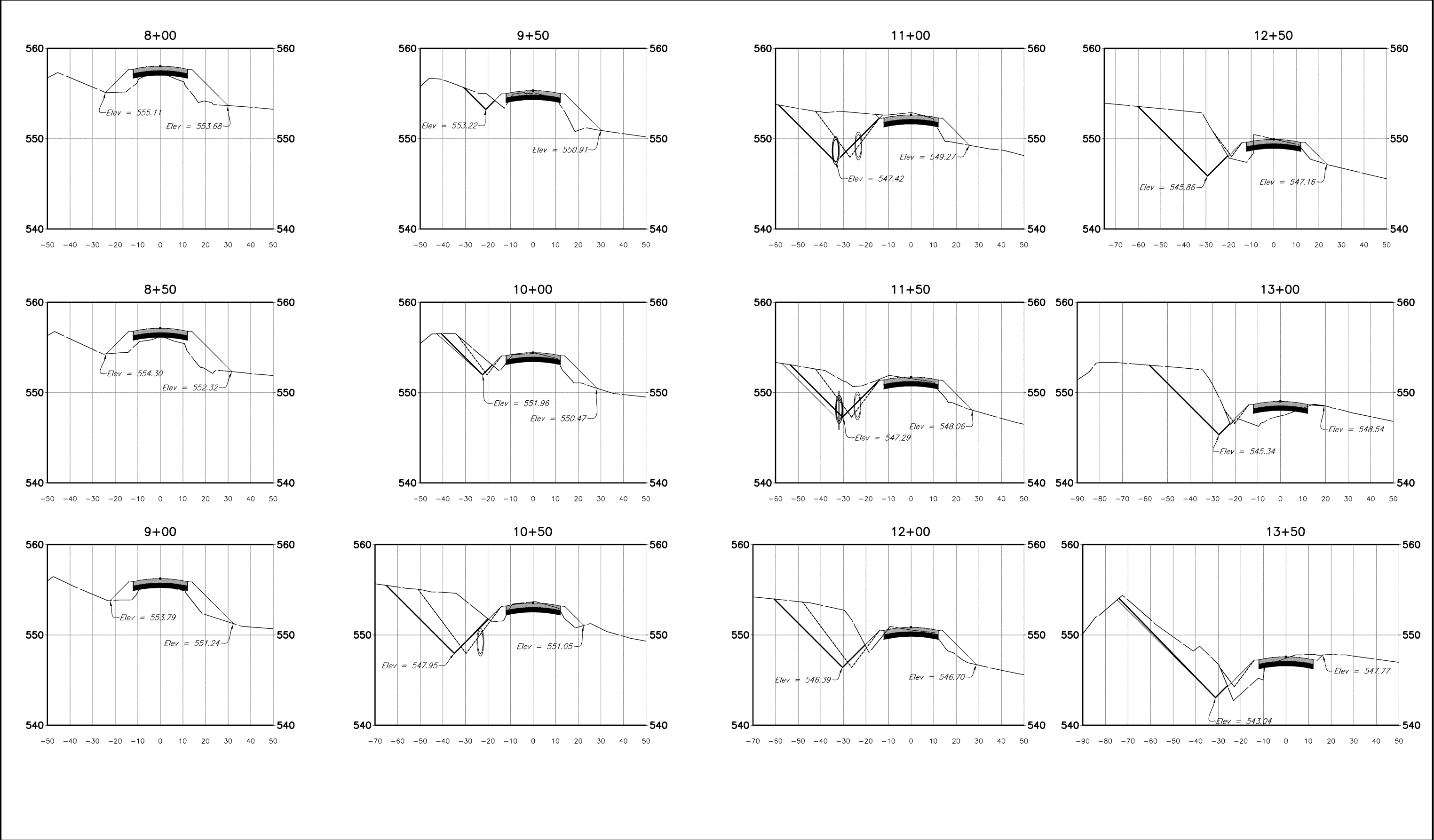


NOTE:  
DEPTH OF 8-INCH WATERLINE IS  
UNKNOWN. PAY ITEM PROVIDED TO  
LOWER WATERLINE AND PROVIDE  
CONCRETE ENCASEMENT IF LINE IS  
IN CONFLICT WITH IMPROVEMENTS

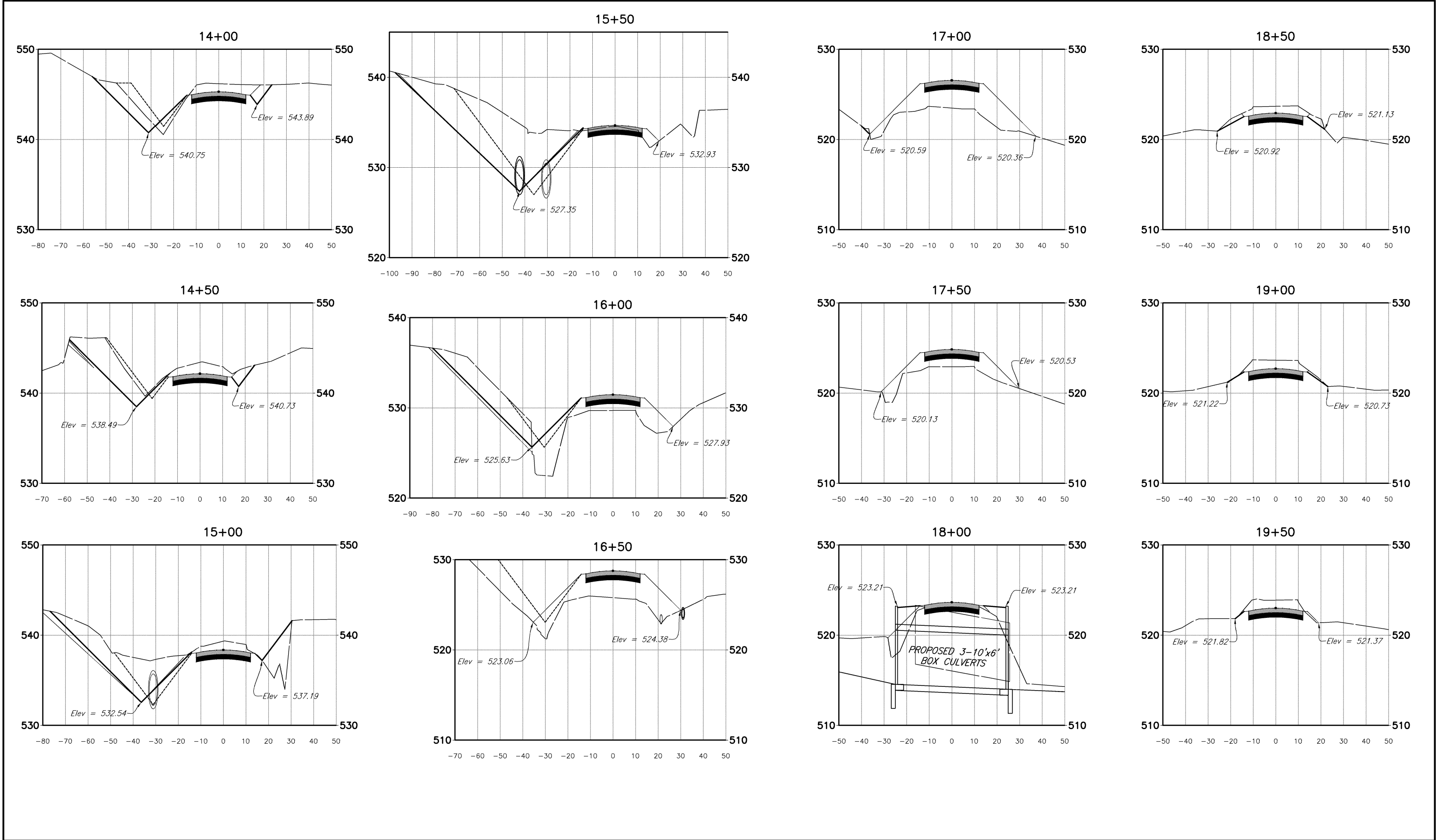




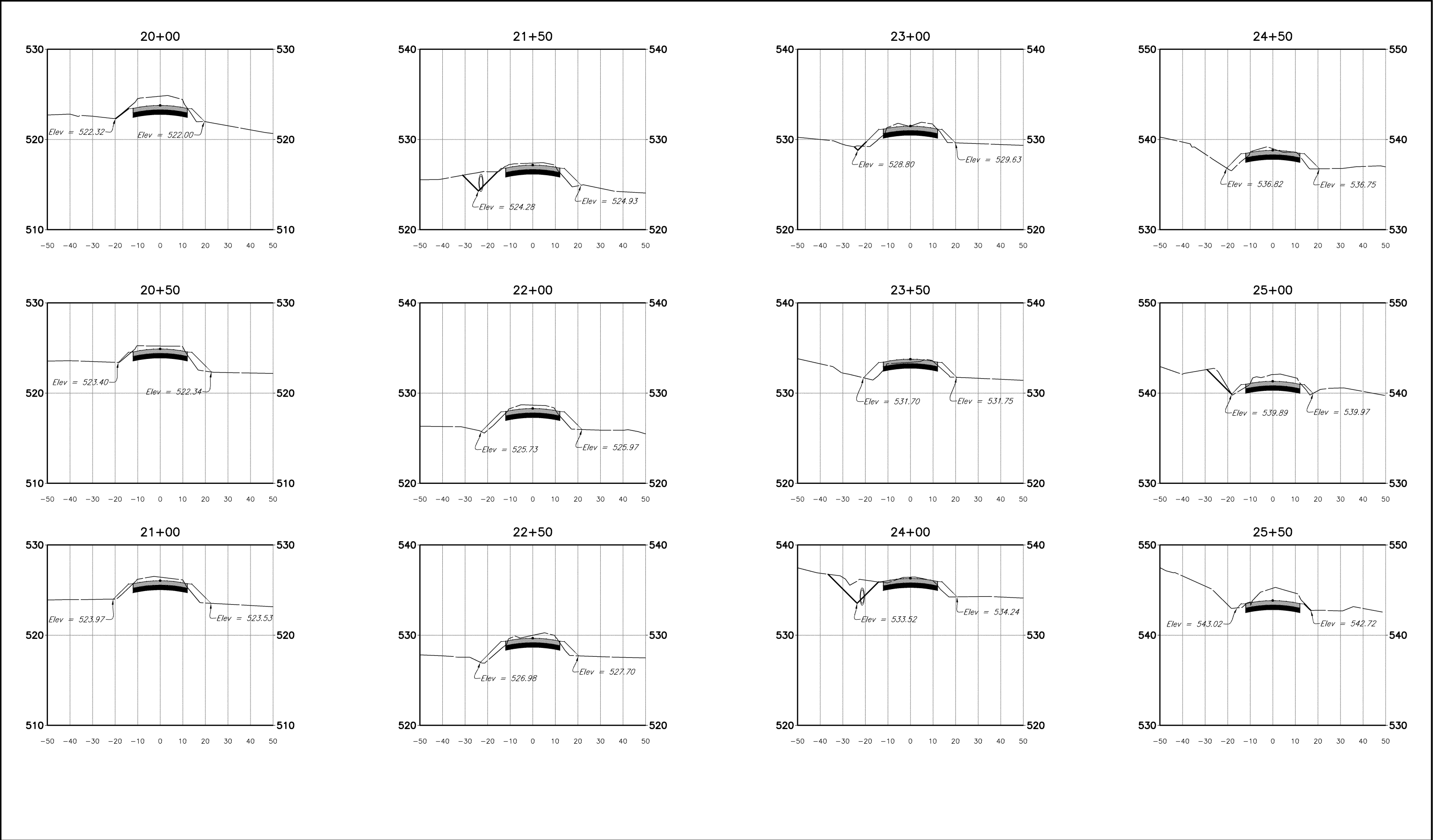
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |                                                                                       |                       |                                                                  |                                         |                                     |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------|------------------------------------------------------------------|-----------------------------------------|-------------------------------------|
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|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |                                                                                       |                       | <p>CROSS SECTIONS</p>                                            | <p>January, 2019</p>                    |                                     |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |                                                                                       |                       |                                                                  |                                         |                                     |

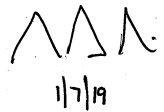


|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |  |  |                                                                  |                                         |                  |
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|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |  |  | <p><b>CROSS SECTIONS</b></p>                                     | <p>January, 2019</p>                    | <p><b>28</b></p> |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |  |  |                                                                  |                                         |                  |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |  |  |                                                                  |                                         |                  |

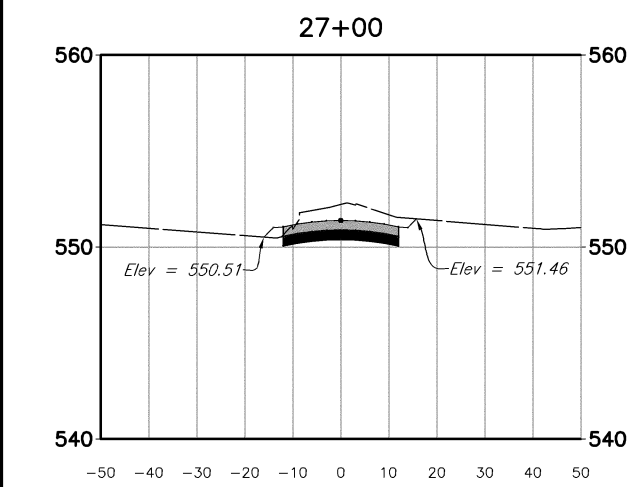
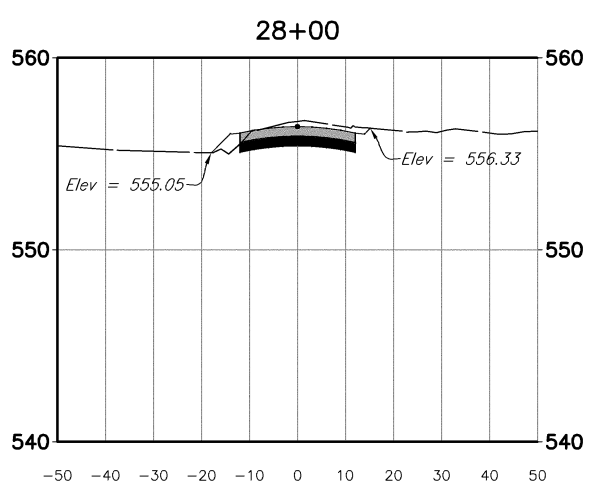
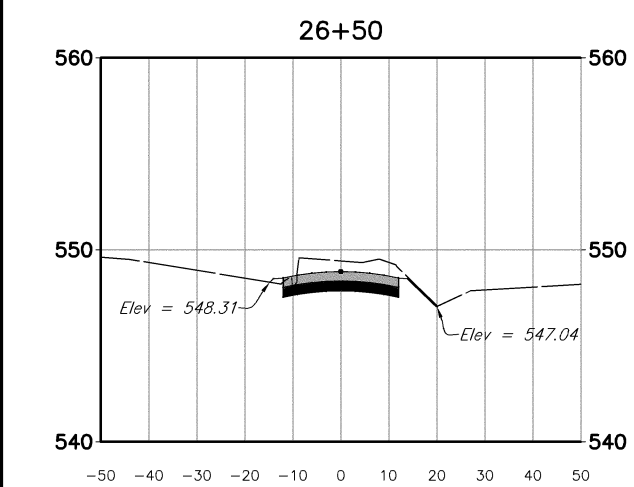
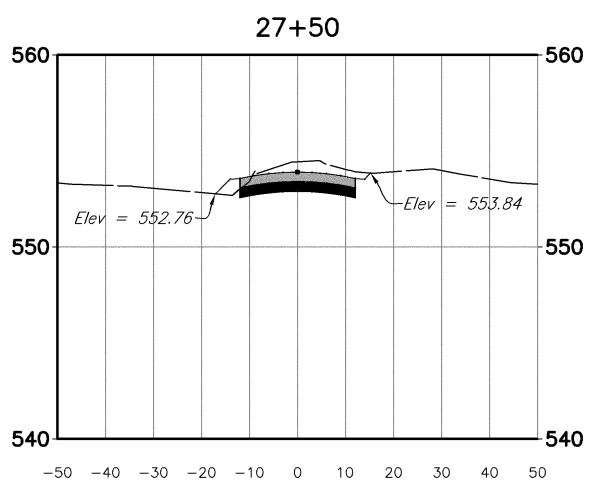
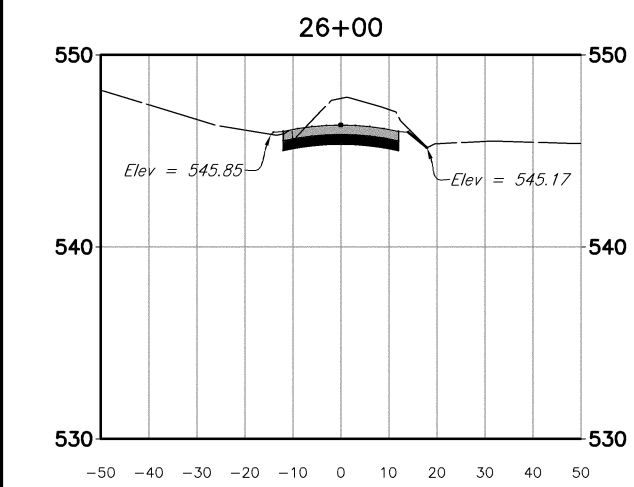


|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |                                                                                       |                                                                                       |                                                                                               |                                                              |                                   |
|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------|
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|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------|



|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |                                                                                       |                                                                                       |                                                          |                                |                            |
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|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |                                                                                       |                                                                                       | <b>CROSS SECTIONS</b>                                    | January, 2019                  |                            |





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Dallas, Texas 75243 (214) 361-7900



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**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II

CROSS SECTIONS

BHC  
PROJECT NO.  
2017-156

SHEET NO.

31

January, 2019

CONSTRUCTION PHASING NOTES

STAGE ONE

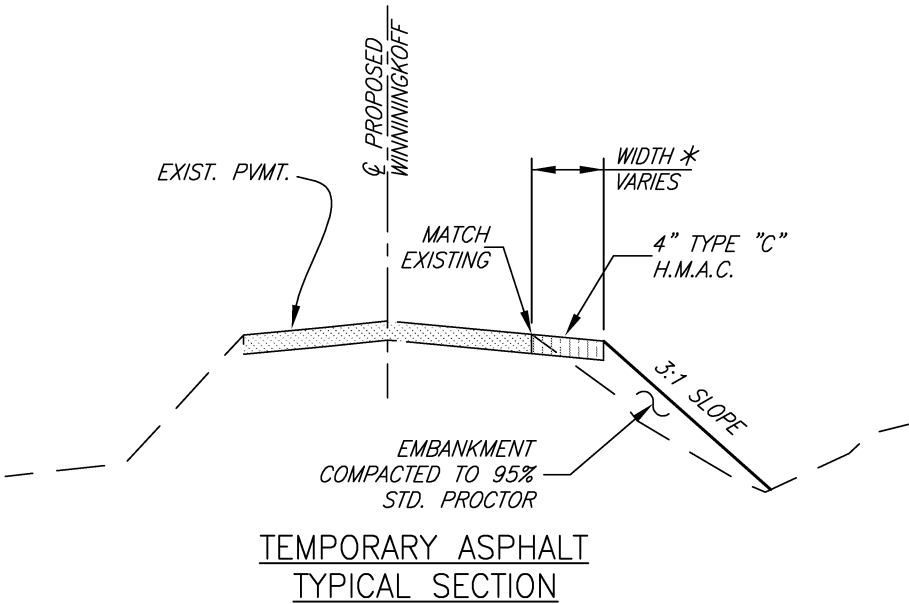
- 1. CLOSE WINNINGKOFF FROM STA 2+20 TO STA 6+40
- 2. CLOSE WINNINGKOFF FROM STA 16+60 TO STA 21+20
- 3. MAINTAIN TWO-WAY, DEAD END TRAFFIC FROM STA 6+60 TO STA 16+60 VIA A RAMSEY DETOUR
- 4. MAINTAIN TWO-WAY, DEAD END TRAFFIC FROM STA 21+20 TO STA 27+50 VIA NORTH END
- 5. CONSTRUCT CULVERT AT STA 4+00
- 6. CONSTRUCT BRIDGE AT STA 18+00
- 7. CONSTRUCT ALL PAVEMENT FROM STA 2+20 TO STA 6+40
- 8. CONSTRUCT ALL PAVEMENT FROM STA 16+60 TO STA 21+20
- 9. CONSTRUCT THE NORTHERN HALF OF MANOR (STAGE 1.1)
- 10. CONSTRUCT THE SOUTHERN HALF OF MANOR (STAGE 1.2)
- 11. MAINTAIN ACCESS TO DRIVEWAYS AT STA 6+75 AND STA 10+32 VIA RAMSEY
- 12. CONSTRUCT TEMPORARY ASPHALT PAVEMENT FROM STA 6+60 TO STA 16+60 AND STA 21+20 TO THE NORTH END OF THE PROJECT. TEMPORARY ASPHALT SHALL BE A MINIMUM OF 4-INCHES IN THICKNESS AND CONFORM TO THE TYPICAL SECTION PROVIDED.

STAGE TWO

- 1. CLOSE WESTERN HALF OF WINNINGKOFF TO ALL TRAFFIC
- 2. CLOSE WESTERN HALF OF WINNINGKOFF FROM STA 28+40 TO MCMILLEN ROAD
- 3. CLOSE RAMSEY DRIVE WEST OF WINNINGKOFF TO ALL TRAFFIC
- 4. CONSTRUCT WESTER HALF OF WINNINGKOFF FROM STA 6+40 TO STA 16+60 AND FROM STA 21+20 TO STA 28+40
- 5. MAINTAIN ACCESS TO ALL DRIVEWAYS AND MANOR
- 6. MANOR IS LEFT IN AND LEFT OUT ONLY FROM WINNINGKOFF
- 7. EASTBOUND MANOR TRAFFIC CAN ONLY TURN LEFT ONTO WINNINGKOFF
- 8. SNIDER IS RIGHT IN AND RIGHT OUT ONLY FROM WINNINGKOFF
- 9. WESTBOUND SNIDER TRAFFIC CAN ONLY TURN RIGHT ONTO WINNINGKOFF
- 10. MAINTAIN NORTHBOUND TRAFFIC ONLY FROM STA 2+20 TO MCMILLEN ROAD WITH NO ACCESS TO RAMSEY

STAGE THREE

- 1. CLOSE EASTERN HALF OF WINNINGKOFF TO ALL TRAFFIC FROM STA 2+20 TO MCMILLEN
- 2. CLOSE SNIDER
- 3. OPEN RAMSEY
- 4. CONSTRUCT EASTERN HALF OF WINNINGKOFF FROM STA 6+40 TO STA 16+60 AND FROM STA 21+20 TO STA 28+40
- 5. CONSTRUCT SNIDER
- 6. MAINTAIN ACCESS TO ALL DRIVEWAYS, RAMSEY, AND MANOR



| * ASPHALT WIDTH RANGE |               |      |      |
|-----------------------|---------------|------|------|
| STATION RANGE         |               | MIN. | MAX. |
| STA. 7+00             | TO STA. 14+00 | 5.2' | 5.4' |
| STA. 14+00            | TO STA. 16+50 | 5.4' | 7.0' |
| STA. 21+25            | TO STA. 28+00 | 5.2' | 7.2' |

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CITY OF LUCAS, TEXAS  
WINNINGKOFF ROAD PHASE II  
CONSTRUCTION PHASING NOTES

BHC  
PROJECT NO.  
2017-156  
January, 2019

SHEET NO.  
32

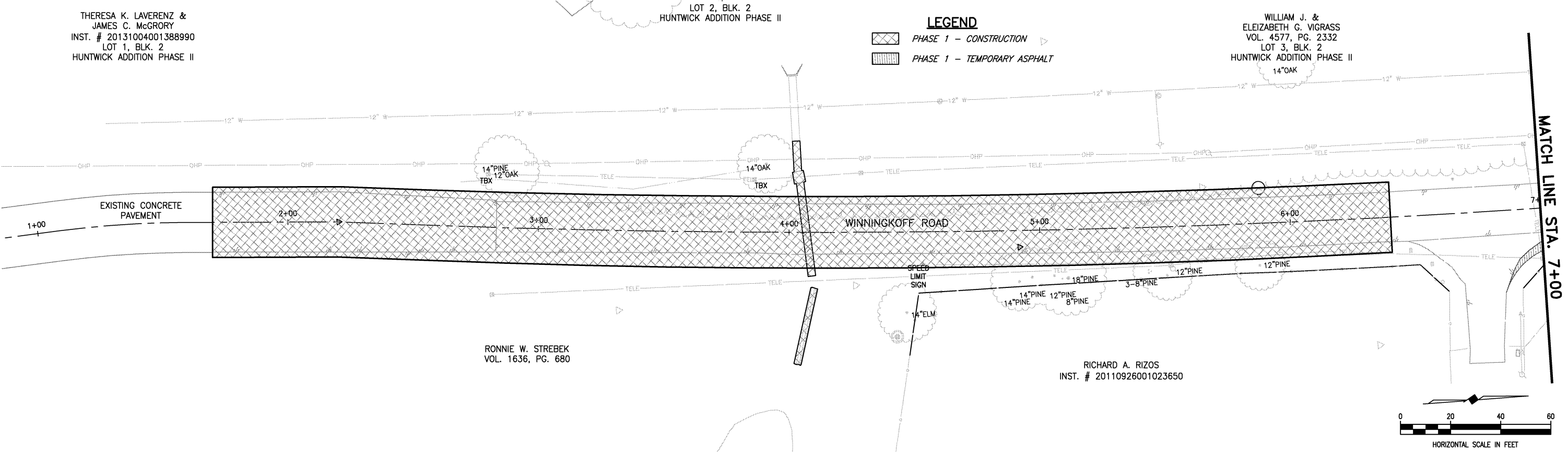


THERESA K. LAVERENZ &  
JAMES C. McGRORY  
INST. # 20131004001388990  
LOT 1, BLK. 2  
HUNTWICK ADDITION PHASE II

LOT 2, BLK. 2  
HUNTWICK ADDITION PHASE II

WILLIAM J. &  
ELEIZABETH G. VIGRASS  
VOL. 4577, PG. 2332  
LOT 3, BLK. 2  
HUNTWICK ADDITION PHASE II

**LEGEND**  
PHASE 1 - CONSTRUCTION  
PHASE 1 - TEMPORARY ASPHALT



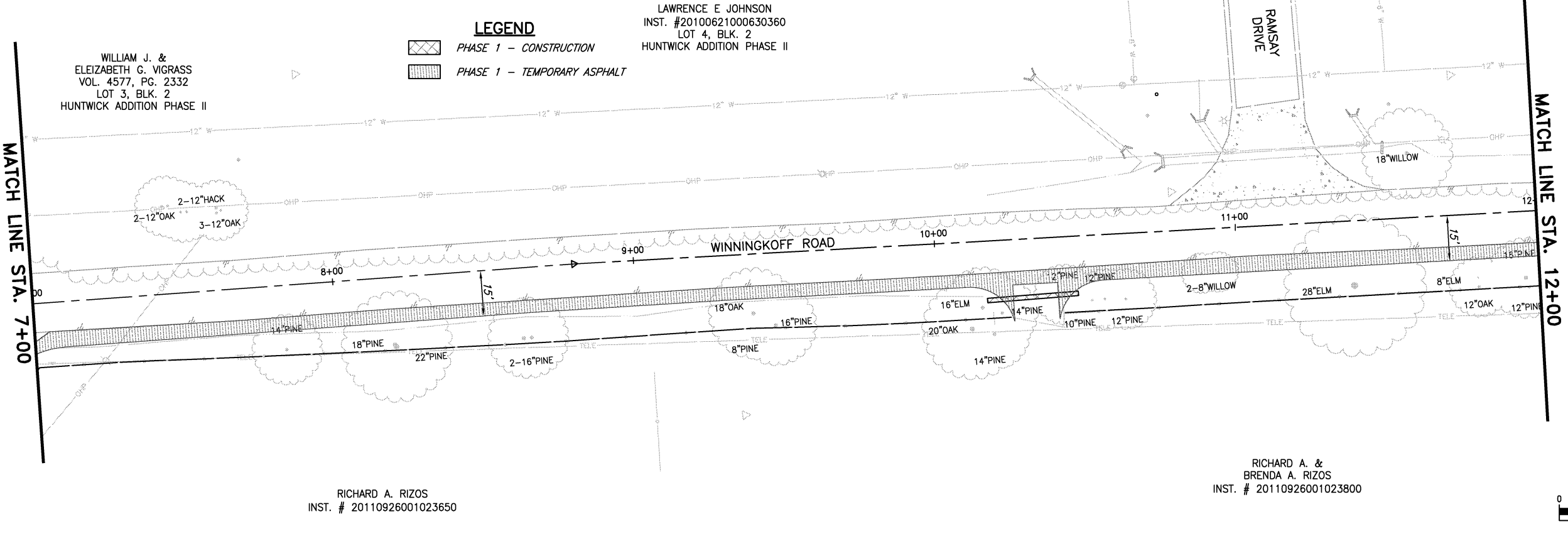
RONNIE W. STREBEK  
VOL. 1636, PG. 680

RICHARD A. RIZOS  
INST. # 20110926001023650

**LEGEND**  
PHASE 1 - CONSTRUCTION  
PHASE 1 - TEMPORARY ASPHALT

LAWRENCE E JOHNSON  
INST. #20100621000630360  
LOT 4, BLK. 2  
HUNTWICK ADDITION PHASE II

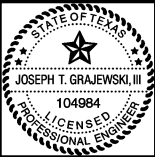
WILLIAM J. &  
ELEIZABETH G. VIGRASS  
VOL. 4577, PG. 2332  
LOT 3, BLK. 2  
HUNTWICK ADDITION PHASE II



RICHARD A. RIZOS  
INST. # 20110926001023650

RICHARD A. &  
BRENDA A. RIZOS  
INST. # 20110926001023800

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1/7/19

**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
CONSTRUCTION - PHASE 1  
STA. 2+20.24 TO STA. 12+00

BHC  
PROJECT NO.  
2017-156  
January, 2019

SHEET NO.  
**33**

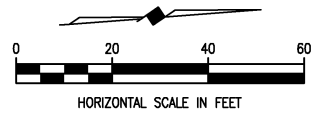
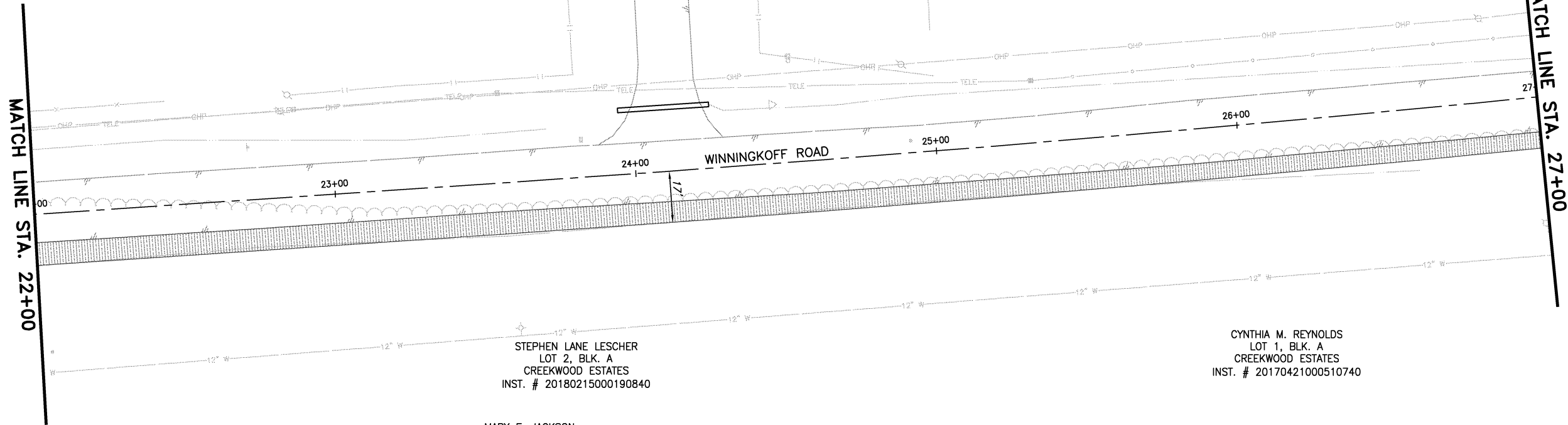


SANDY L. BEDELL  
INST. # 97-/0036552

JOSEPH & IMA JEAN LEACH  
INST. # 20020104000022430

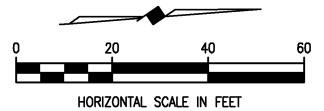
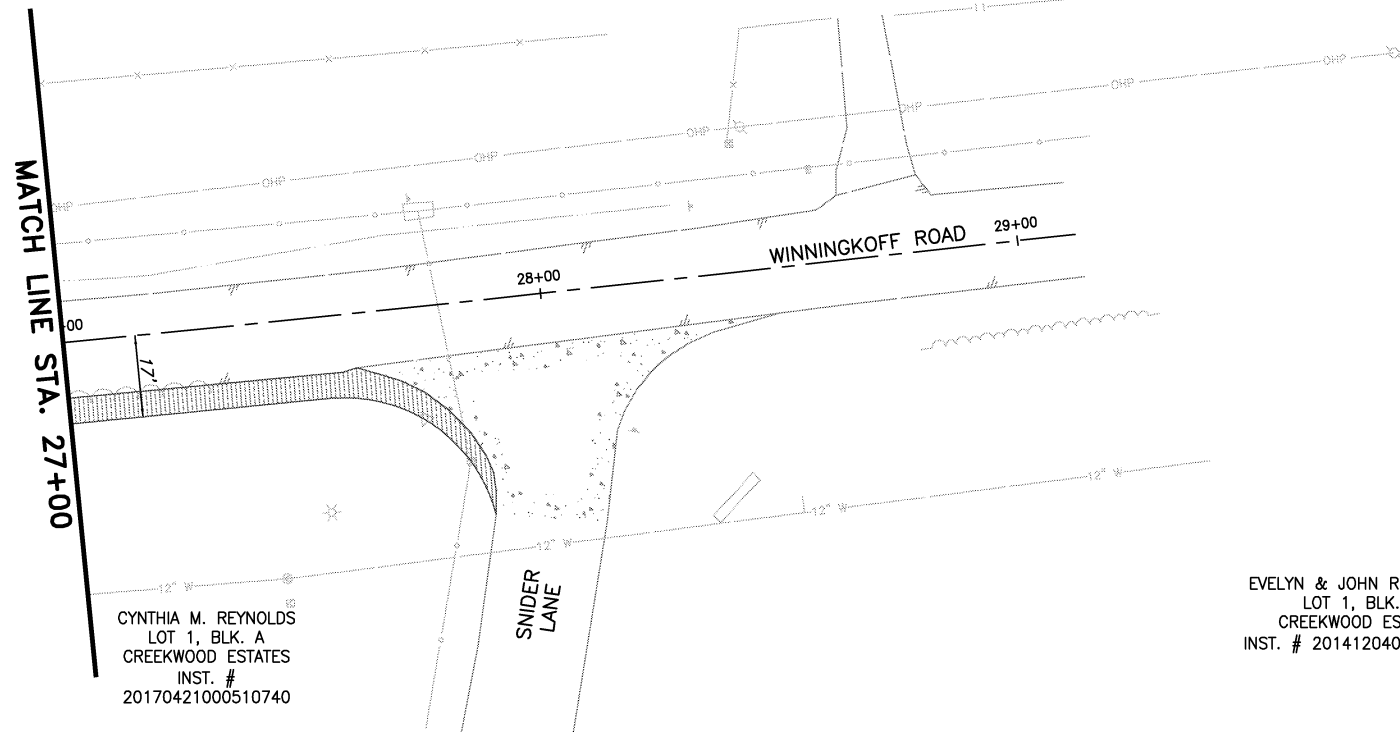
MARY E. JACKSON  
INST. # 20100603000559480

**LEGEND**  
PHASE 1 - CONSTRUCTION  
PHASE 1 - TEMPORARY ASPHALT

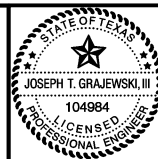


MARY E. JACKSON  
INST. # 20100603000559480

**LEGEND**  
PHASE 1 - CONSTRUCTION  
PHASE 1 - TEMPORARY ASPHALT



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1/7/19

**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
CONSTRUCTION - PHASE 1  
STA. 22+00 TO PROJECT END

BHC  
PROJECT NO.  
2017-156  
January, 2019

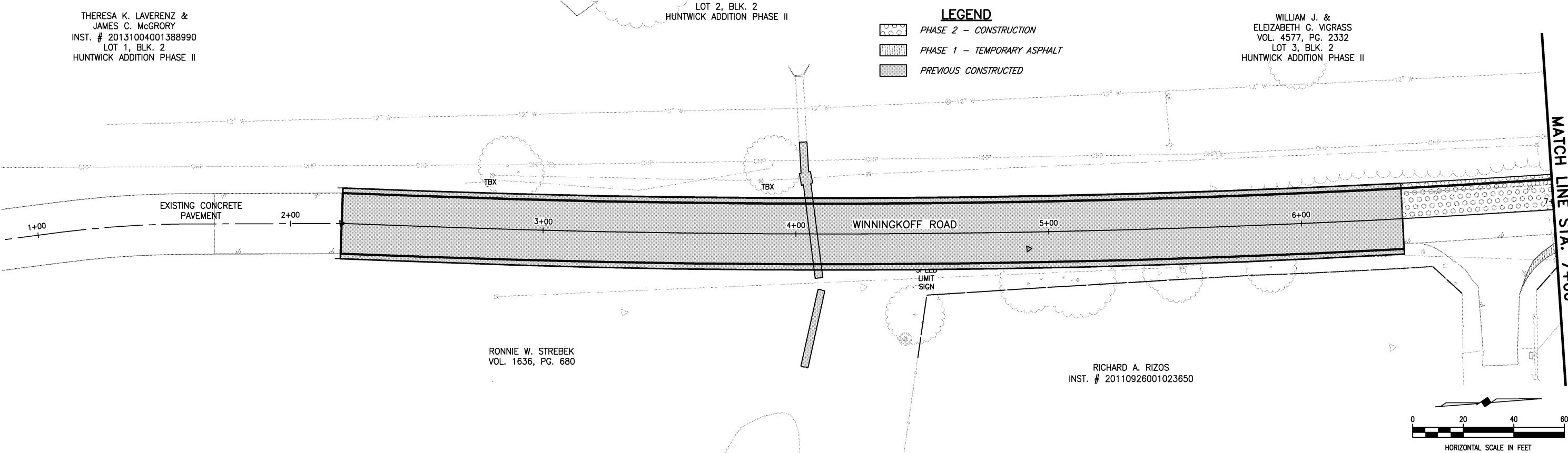
SHEET NO.  
**35**

THERESA K. LAVERENZ &  
JAMES C. McGRORY  
INST. # 20131004001388990  
LOT 1, BLK. 2  
HUNTWICK ADDITION PHASE II

LOT 2, BLK. 2  
HUNTWICK ADDITION PHASE II

- LEGEND**
- PHASE 2 - CONSTRUCTION
  - PHASE 1 - TEMPORARY ASPHALT
  - PREVIOUS CONSTRUCTED

WILLIAM J. &  
ELEIZABETH G. VIGRASS  
VOL. 4577, PG. 2332  
LOT 3, BLK. 2  
HUNTWICK ADDITION PHASE II

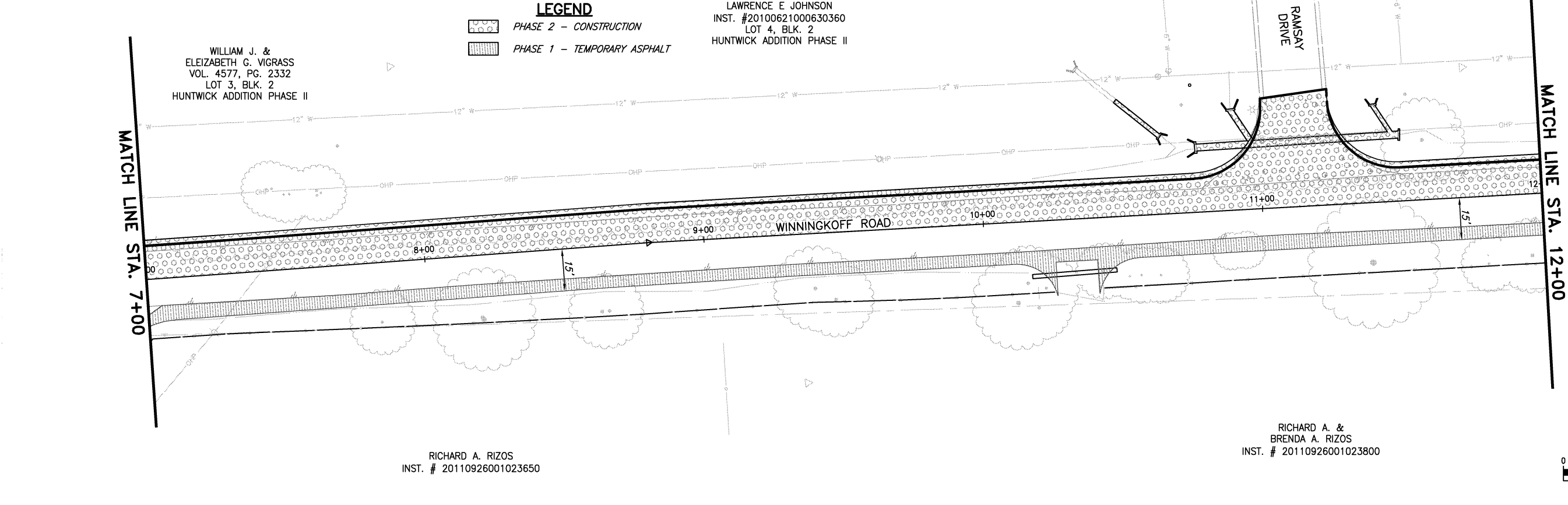


**LEGEND**

- PHASE 2 - CONSTRUCTION
- PHASE 1 - TEMPORARY ASPHALT

LAWRENCE E JOHNSON  
INST. #20100621000630360  
LOT 4, BLK. 2  
HUNTWICK ADDITION PHASE II

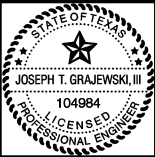
WILLIAM J. &  
ELEIZABETH G. VIGRASS  
VOL. 4577, PG. 2332  
LOT 3, BLK. 2  
HUNTWICK ADDITION PHASE II



RICHARD A. RIZOS  
INST. # 20110926001023650

RICHARD A. &  
BRENDA A. RIZOS  
INST. # 20110926001023800

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Dallas, Texas 75243 (214) 361-7900

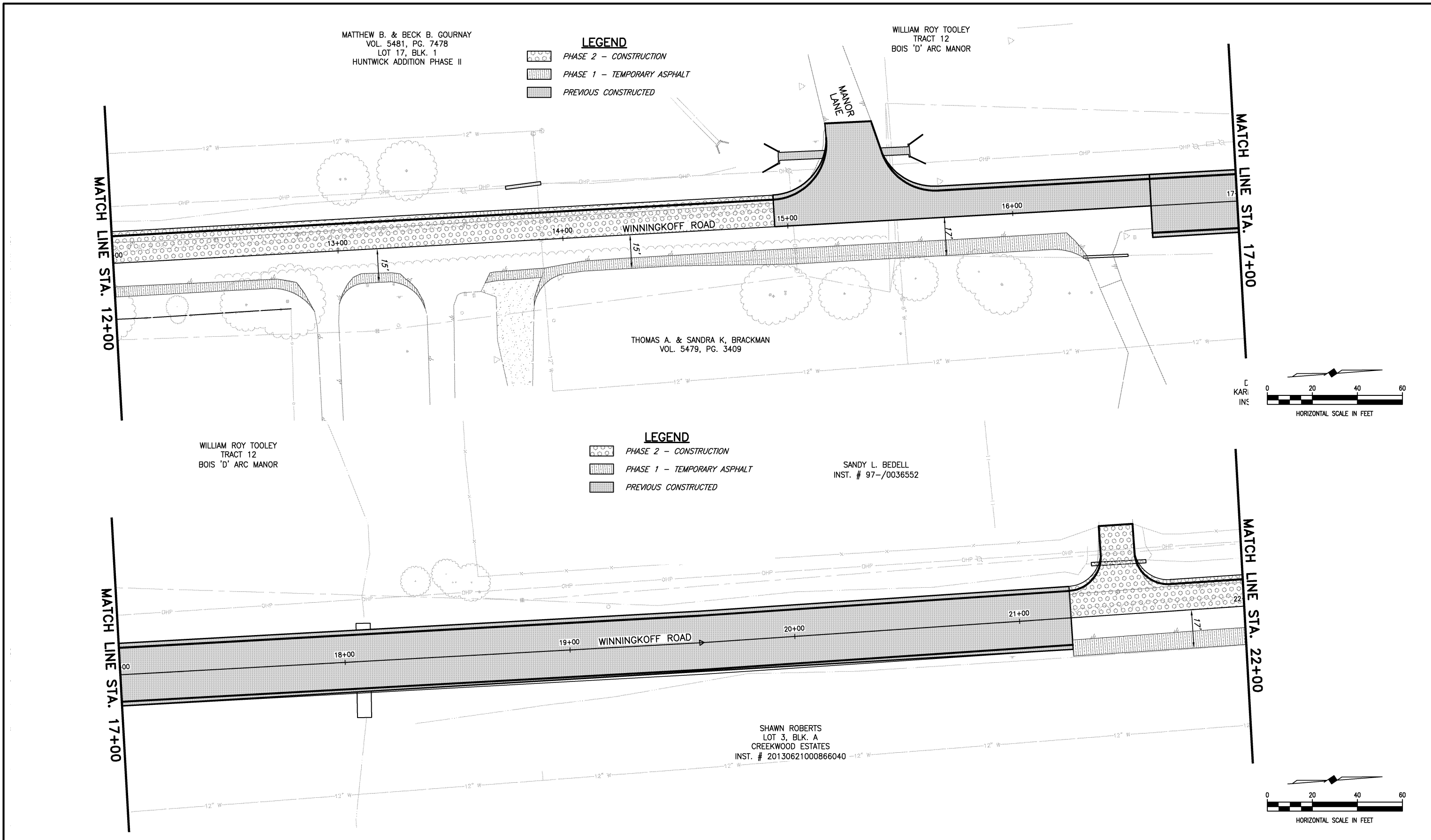


1/7/19

**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
CONSTRUCTION - PHASE 2  
STA. 2+20.24 TO STA. 12+00

BHC  
PROJECT NO.  
2017-156  
January, 2019

SHEET NO.  
**36**



|                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |  |                                                     |                                                                                                                               |                                                                |                                     |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------|
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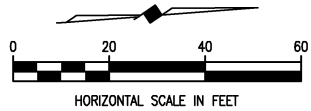
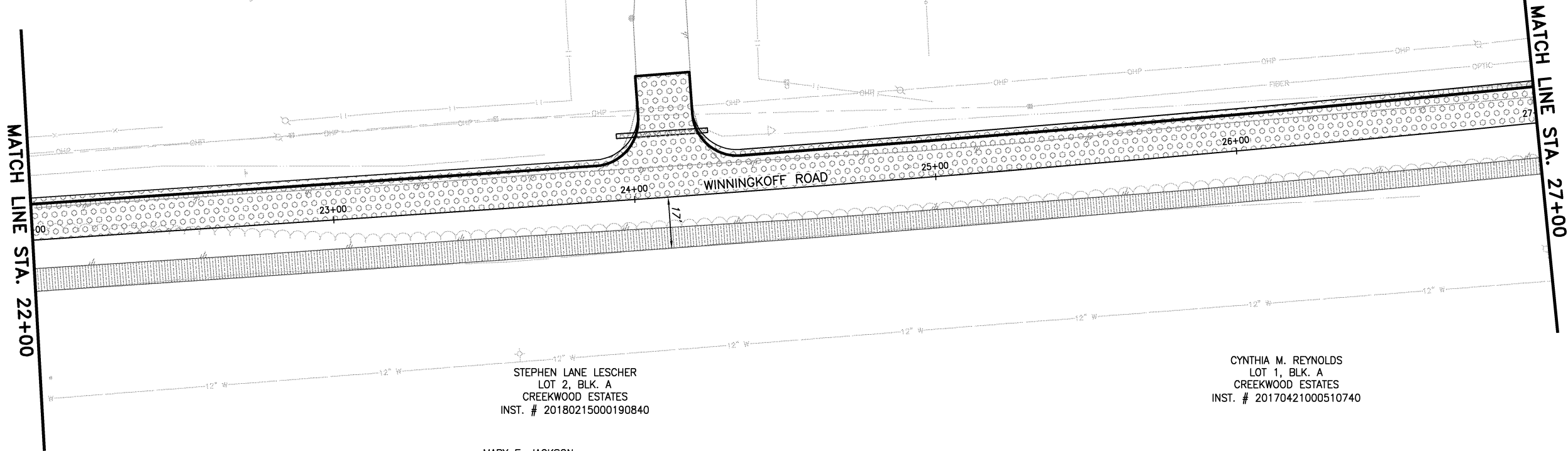
SANDY L. BEDELL  
INST. # 97-/0036552

JOSEPH & IMA JEAN LEACH  
INST. # 20020104000022430

MARY E. JACKSON  
INST. # 20100603000559480

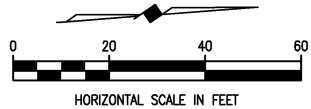
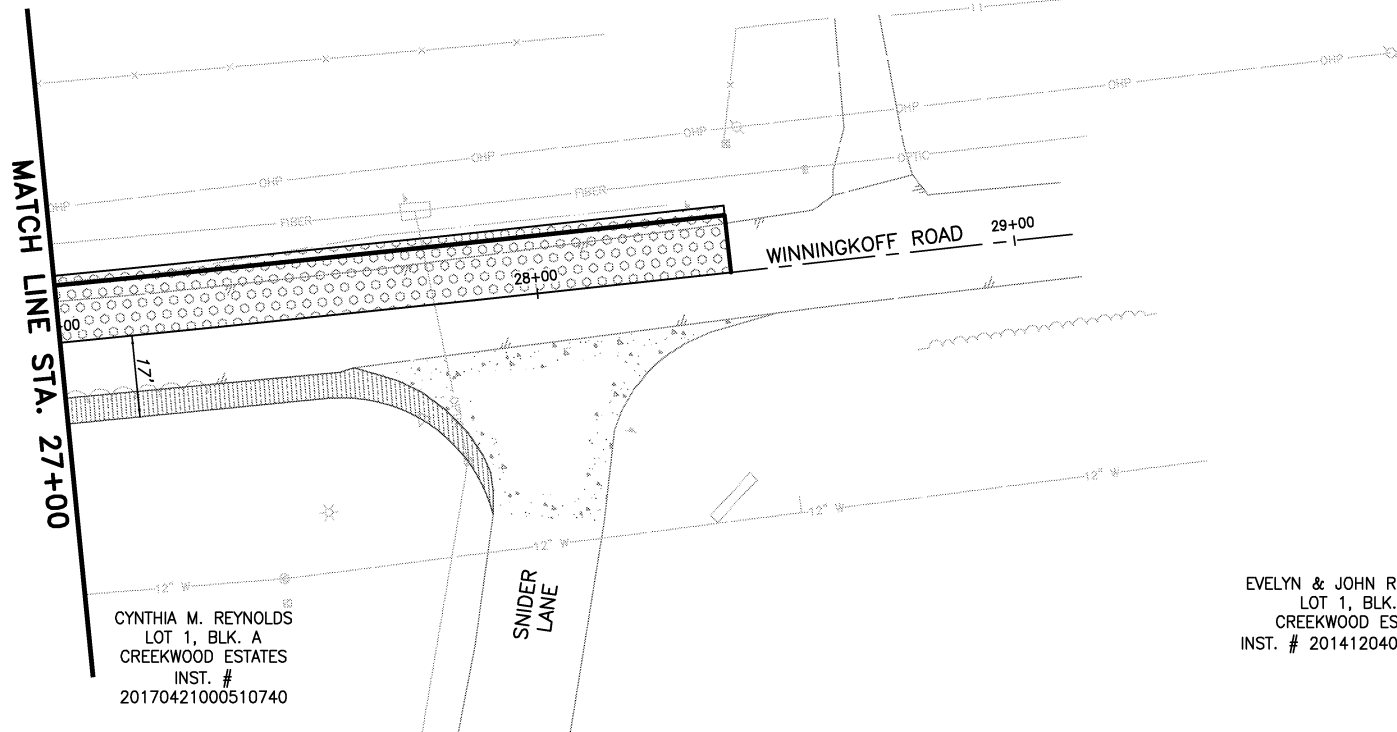
**LEGEND**

-  PHASE 2 - CONSTRUCTION  
 PHASE 1 - TEMPORARY ASPHALT

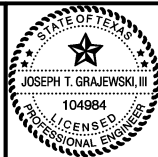


**LEGEND**

-  PHASE 2 - CONSTRUCTION  
 PHASE 1 - TEMPORARY ASPHALT



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*Handwritten signature and date 1/7/19*

**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
CONSTRUCTION - PHASE 2  
STA. 22+00 TO PROJECT END

BHC  
PROJECT NO.  
2017-156  
January, 2019

SHEET NO.  
**38**



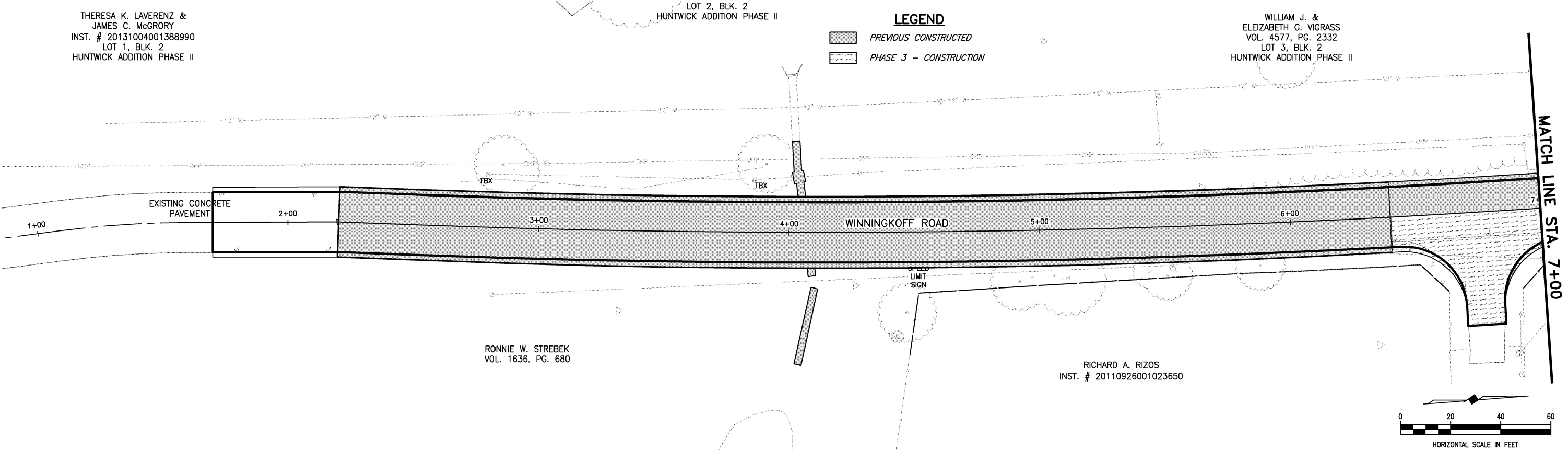
THERESA K. LAVERENZ &  
JAMES C. McGRORY  
INST. # 20131004001388990  
LOT 1, BLK. 2  
HUNTWICK ADDITION PHASE II

LOT 2, BLK. 2  
HUNTWICK ADDITION PHASE II

LEGEND

- PREVIOUS CONSTRUCTED  
PHASE 3 - CONSTRUCTION

WILLIAM J. &  
ELEIZABETH G. VIGRASS  
VOL. 4577, PG. 2332  
LOT 3, BLK. 2  
HUNTWICK ADDITION PHASE II



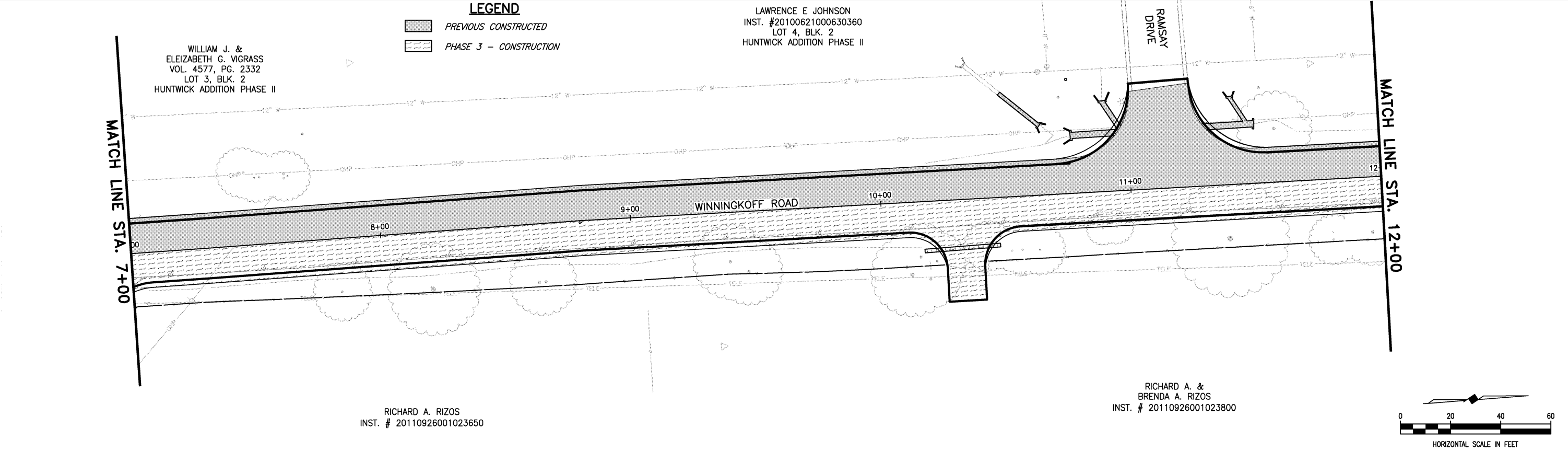
LEGEND

- PREVIOUS CONSTRUCTED  
PHASE 3 - CONSTRUCTION

WILLIAM J. &  
ELEIZABETH G. VIGRASS  
VOL. 4577, PG. 2332  
LOT 3, BLK. 2  
HUNTWICK ADDITION PHASE II

LAWRENCE E JOHNSON  
INST. #20100621000630360  
LOT 4, BLK. 2  
HUNTWICK ADDITION PHASE II

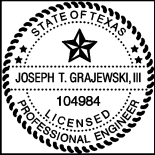
RAMSAY  
DRIVE



RICHARD A. RIZOS  
INST. # 20110926001023650

RICHARD A. &  
BRENDA A. RIZOS  
INST. # 20110926001023800

**BIRKHOFF, HENDRICKS & CARTER, L.L.P.**  
PROFESSIONAL ENGINEERS  
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11910 Greenville Ave., Suite 600  
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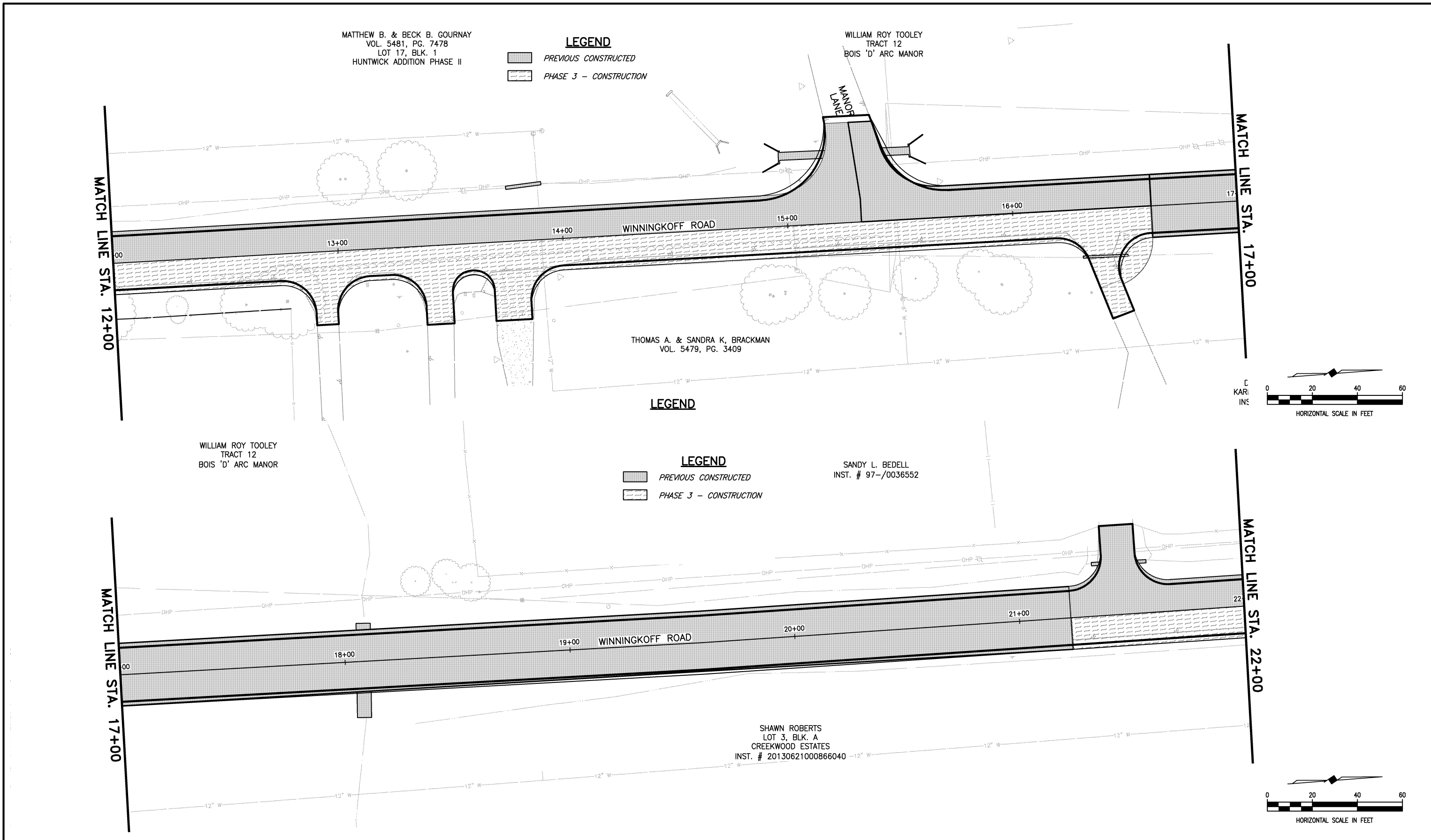


1/7/19

**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
CONSTRUCTION - PHASE 3  
STA. 2+20.24 TO STA. 12+00

BHC  
PROJECT NO.  
2017-156  
January, 2019

SHEET NO.  
**39**



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                  |                                                                                                                   |                                                                                                                              |                                                               |                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------|
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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------|



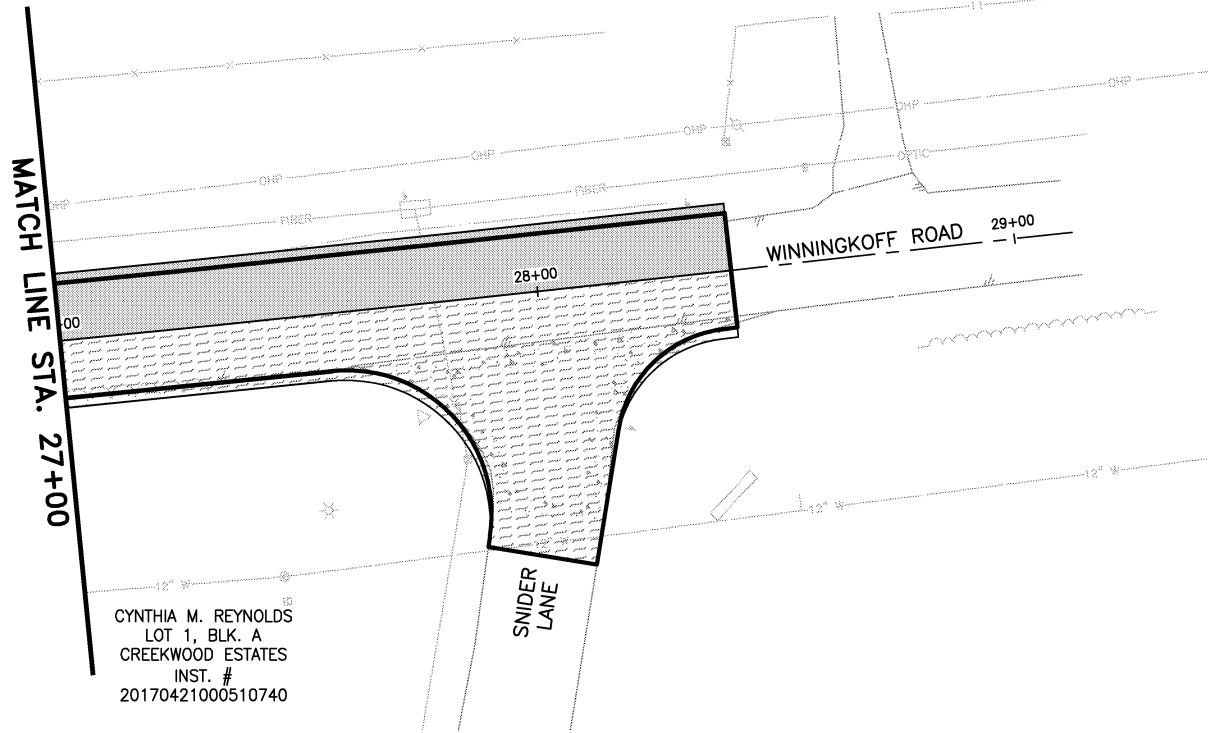
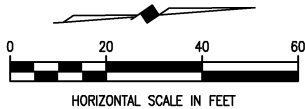
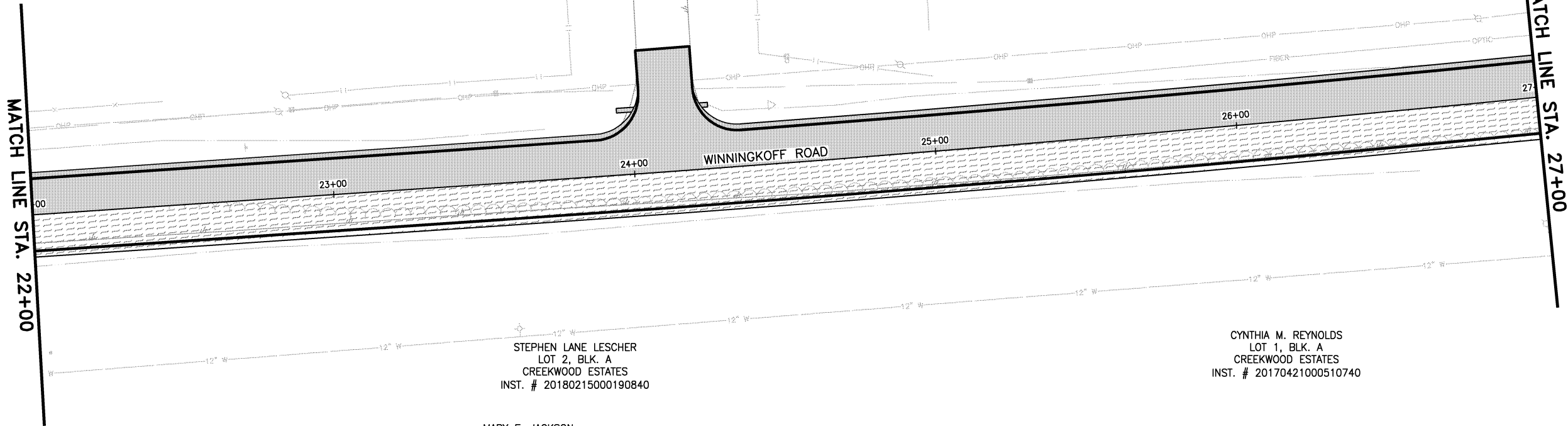
SANDY L. BEDELL  
INST. # 97-/0036552

JOSEPH & IMA JEAN LEACH  
INST. # 20020104000022430

MARY E. JACKSON  
INST. # 20100603000559480

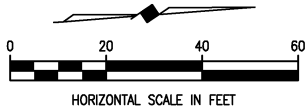
**LEGEND**

-  PREVIOUS CONSTRUCTED  
 PHASE 3 - CONSTRUCTION



**LEGEND**

-  PREVIOUS CONSTRUCTED  
 PHASE 3 - CONSTRUCTION



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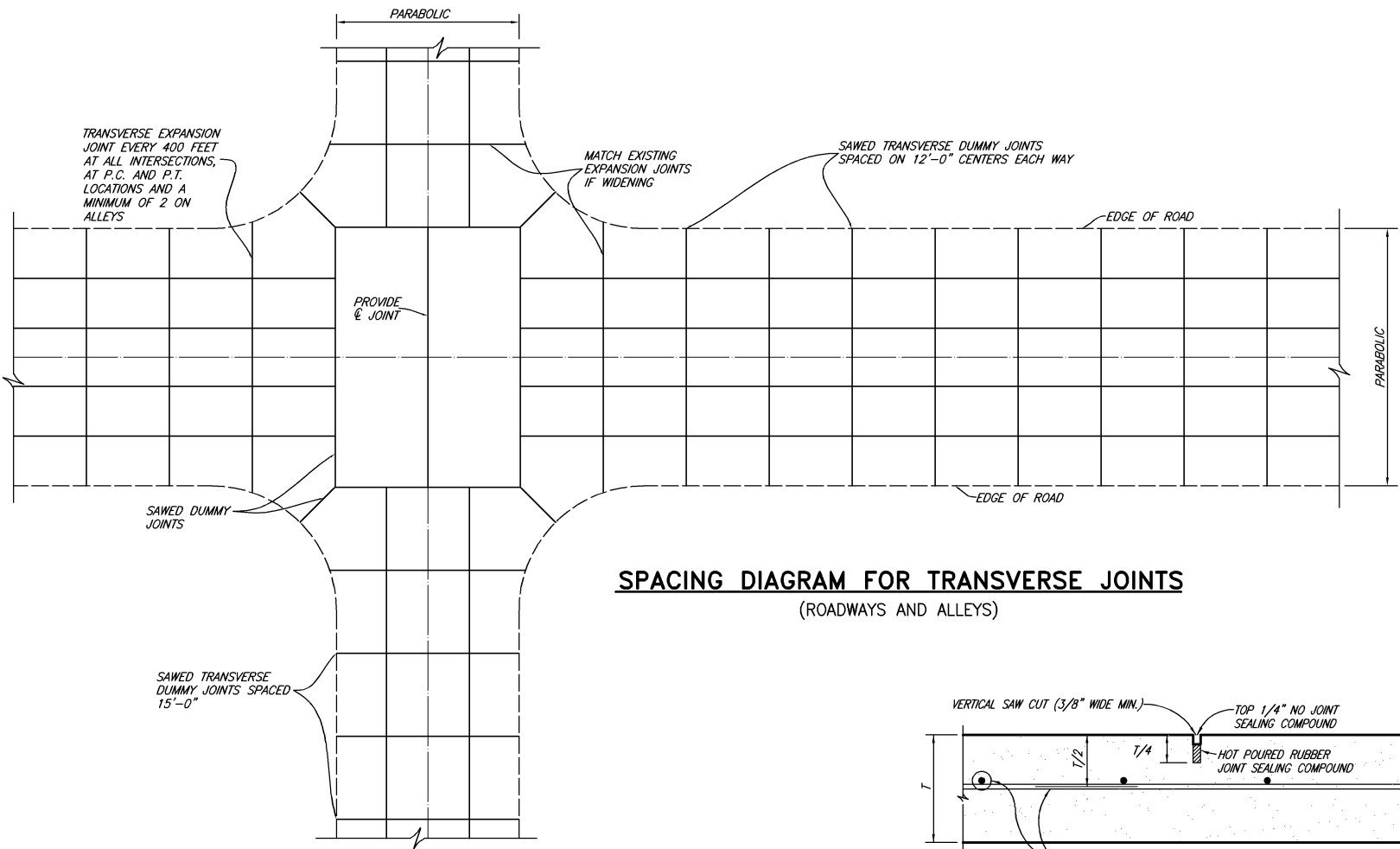


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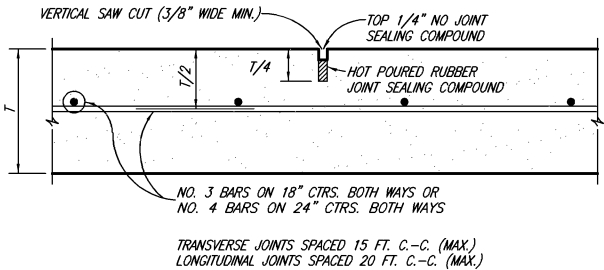
**CITY OF LUCAS, TEXAS**  
WINNINGKOFF ROAD PHASE II  
CONSTRUCTION - PHASE 3  
STA. 22+00 TO PROJECT END

BHC  
PROJECT NO.  
2017-156  
January, 2019

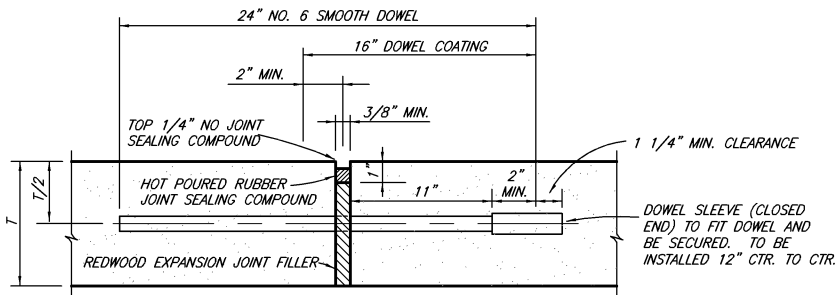
SHEET NO.  
**41**



**SPACING DIAGRAM FOR TRANSVERSE JOINTS**  
(ROADWAYS AND ALLEYS)

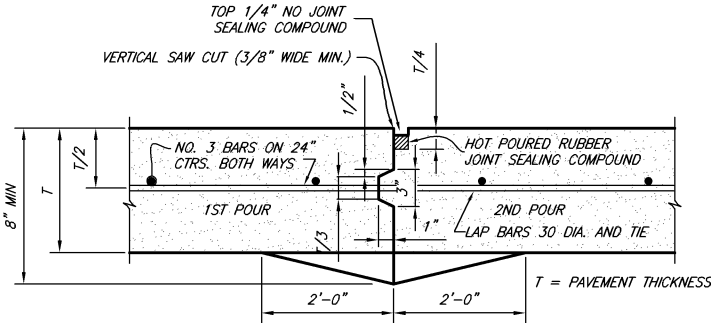


**SAWED DUMMY JOINT**



- TRANSVERSE EXPANSION JOINT NOTES:
1. DOWELS AND REINFORCING BARS SHALL BE SUPPORTED BY AN APPROVED DEVICE.
  2. TRANSVERSE EXPANSION JOINTS SHALL BE SPACED AT 400 FT. MAXIMUM AND AT ALL INTERSECTIONS.

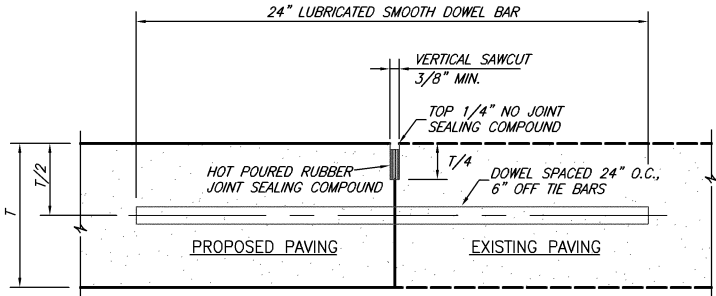
**TRANSVERSE EXPANSION JOINT**



- CONSTRUCTION JOINT NOTES:
1. CONTRACTOR SHALL PROTECT KEYWAY PRIOR TO SECOND POUR. IF LONGITUDINAL KEYWAY IS DAMAGED, CONTRACTOR SHALL REPAIR WITH THE USE OF LONGITUDINAL BUTT JOINT (DRILL DOWELS INTO FIRST POUR).
  2. THICKENED EDGES ARE REQUIRED FOR FUTURE WIDENING ONLY.

**CONSTRUCTION JOINT**

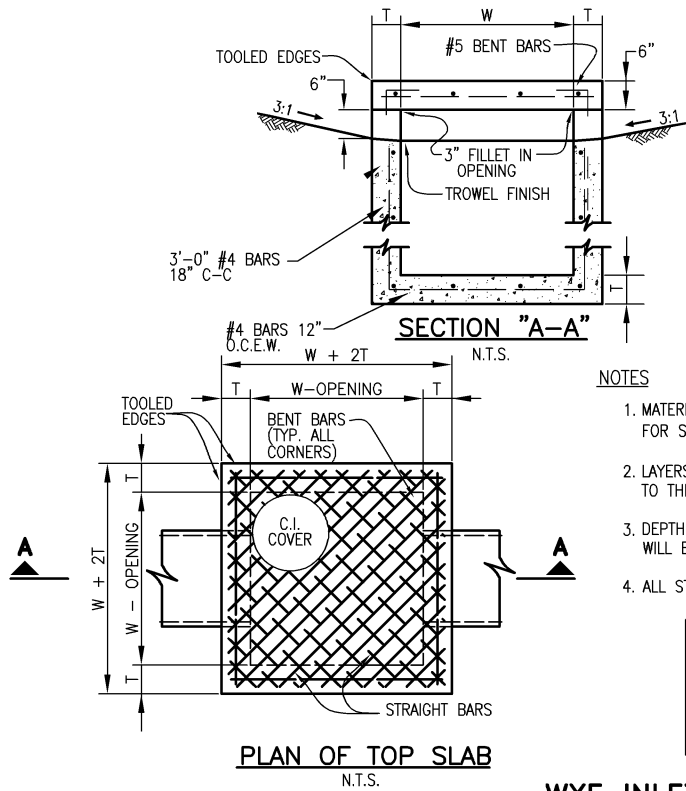
NO SCALE



- NOTE:
1. T-8" AND GREATER NO. 6 BAR, T-6" AND LESS NO. 5 BAR.
  2. LONGITUDINAL BUTT CONSTRUCTION MAY BE UTILIZED IN PLACE OF LONGITUDINAL HINGED (KEYWAY) JOINT AT CONTRACTORS OPTION.
  3. DOWEL BARS SHALL BE DRILLED INTO PAVEMENT HORIZONTALLY BY USE OF A MECHANICAL RIG. HAND DRILLING IS NOT ACCEPTABLE. PUSHING DOWEL BARS INTO GREEN CONCRETE IS NOT ACCEPTABLE. DAMAGE TO EXISTING PAVEMENT SHALL BE REMOVED BY CONTRACTOR AND JOINT CONSTRUCTED AT CONTRACTORS EXPENSE.
  4. DOWEL BAR SHOWN IS IN ADDITION TO TIE BARS (12" O.C.-6" OFF DOWELS).
  5. TIE BARS SHALL BE NO. 5 BAR DEFORMED. TIE BAR SHALL HAVE A LENGTH OF 24 INCHES.

**LONGITUDINAL BUTT JOINT**

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |  |  |                                                          |                                |                            |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|----------------------------------------------------------|--------------------------------|----------------------------|
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|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |  |  | CONSTRUCTION DETAILS                                     | January, 2019                  |                            |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                   |  |  |                                                          |                                |                            |

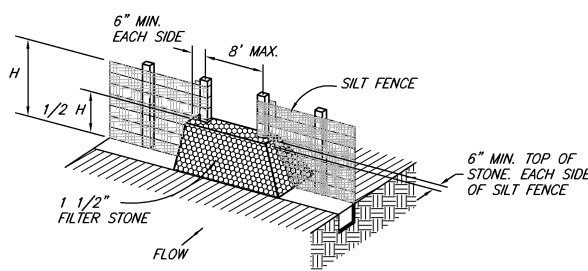
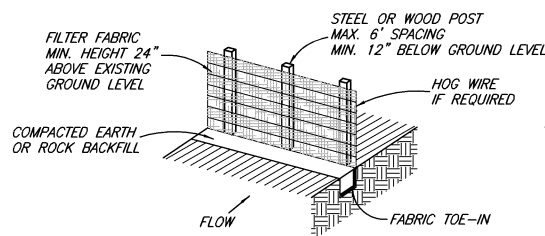
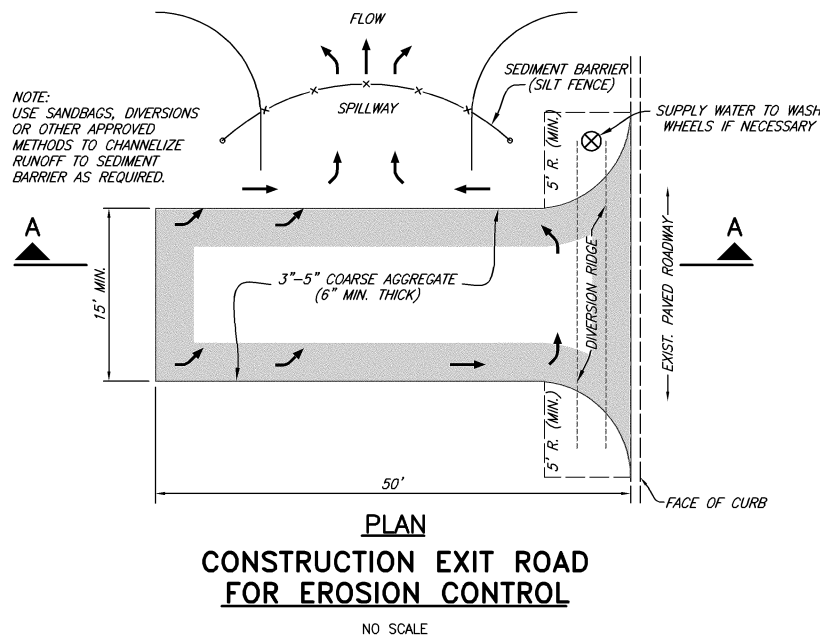
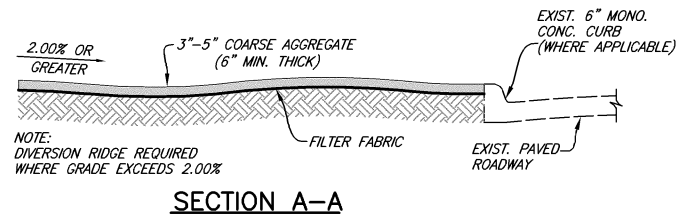


#### NOTES

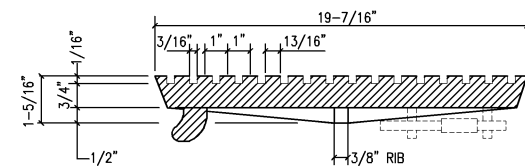
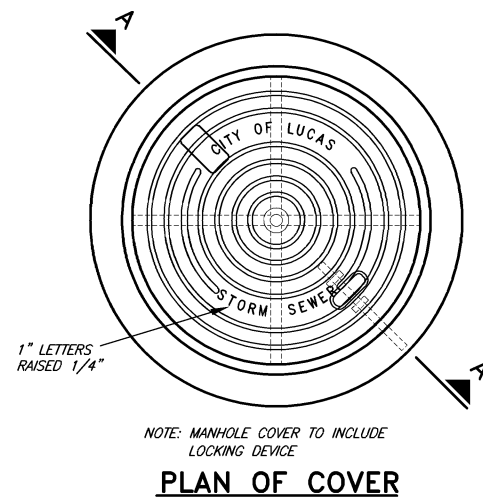
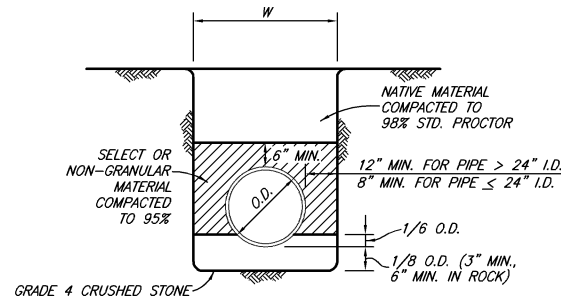
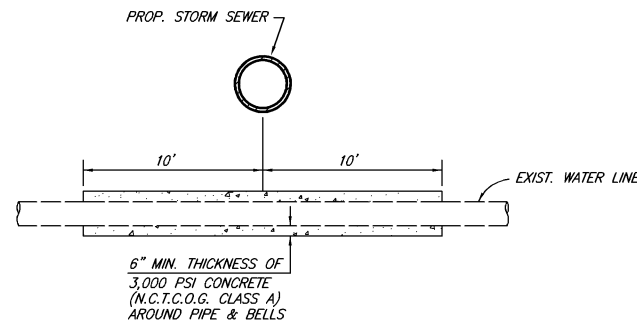
1. MATERIAL AND WORKMANSHIP SHALL CONFORM WITH THE REQUIREMENTS OF NCTCOG STANDARD SPECIFICATIONS FOR STANDARD CONCRETE MANHOLES, MINIMUM CLASS "A" CONCRETE.
2. LAYERS OF REINFORCING STEEL NEAREST THE INTERIOR AND EXTERIOR SURFACES SHALL HAVE A COVER OF 2" TO THE CENTER BARS, UNLESS OTHERWISE NOTED.
3. DEPTH OF DROP INLET FROM FINISHED GRADE TO FLOW LINE OF INLET IS VARIABLE. APPROXIMATE DEPTH WILL BE SHOWN ON PLANS AT LOCATION OF INLET.
4. ALL STANDARD DROP INLETS SHALL HAVE ONE OPENING ON EACH SIDE UNLESS OTHERWISE SHOWN ON PLANS.

| INLET SIZE | T  | W     |
|------------|----|-------|
| 2' SQUARE  | 7" | 2'-0" |
| 3' SQUARE  | 7" | 3'-0" |
| 4' SQUARE  | 7" | 4'-0" |
| 5' SQUARE  | 8" | 5'-0" |
| 6' SQUARE  | 9" | 6'-0" |

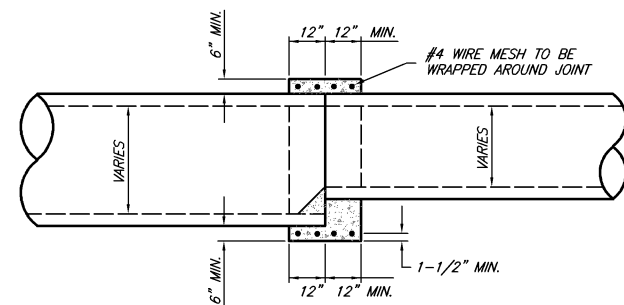
#### WYE INLET DETAILS



#### EROSION CONTROL



#### SECTION OF FRAME AND COVER SECTION A-A

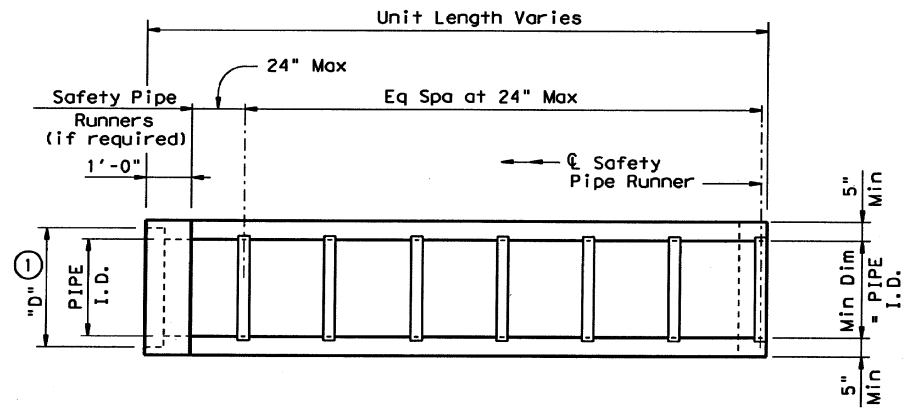


#### DETAIL OF CONCRETE COLLAR FOR R.C.P. OR CONNECTIONS

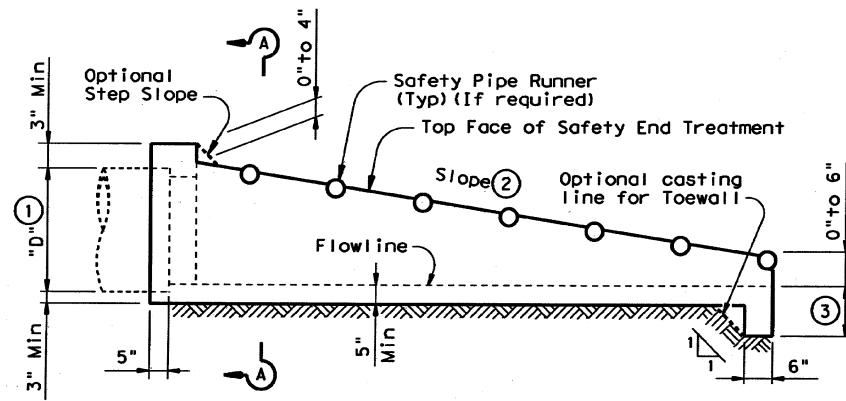
|                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                              |                                                                                           |                                                           |                                |
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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------|

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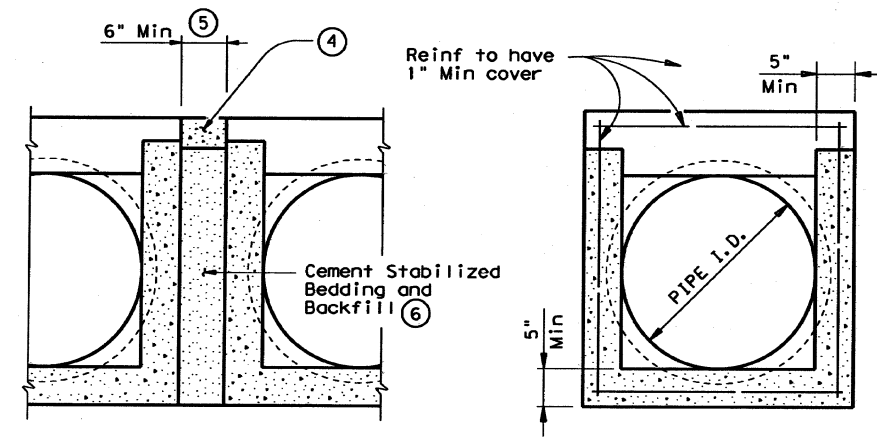
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PLAN



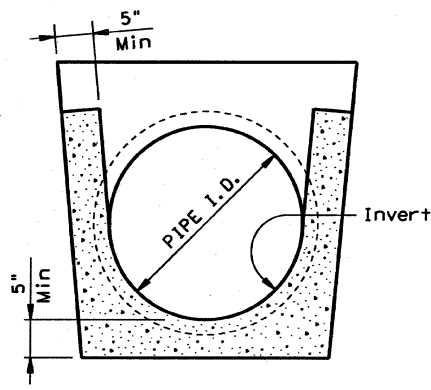
LONGITUDINAL ELEVATION



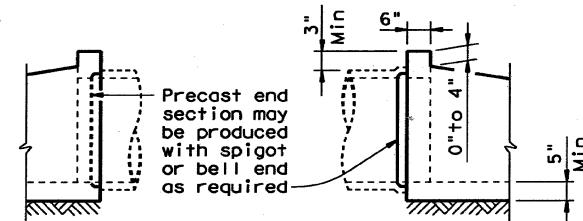
MULTIPLE PIPE INSTALLATION

OPTION WITH SQUARE BOTTOM

SECTION A-A

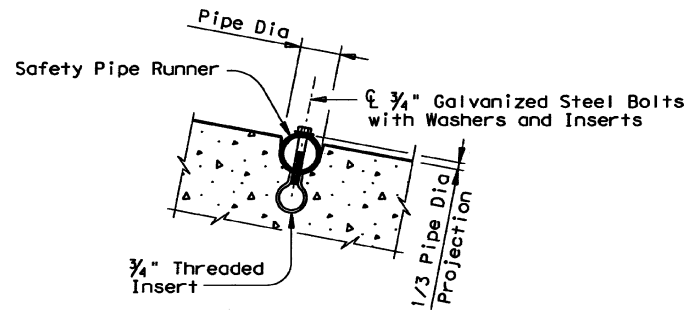


OPTION WITH INVERT BOTTOM



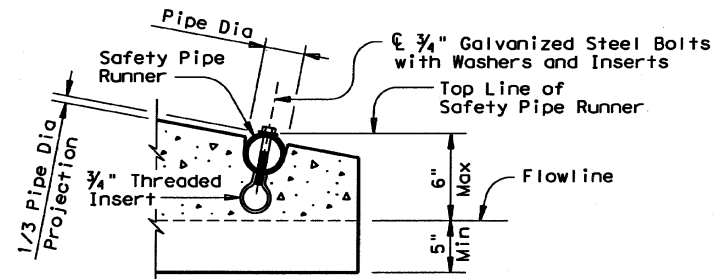
OPTIONAL JOINT

(Showing joint between RCP and Precast Safety End Treatment)

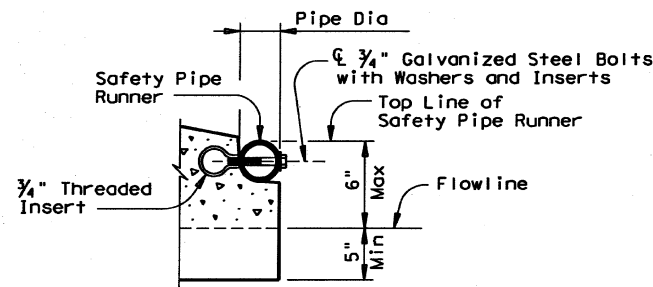


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

| PIPE I.D. | PIPE WALL "B" THICKNESS | "D" ①   | MAXIMUM SLOPE | MINIMUM LENGTH OF UNIT | PIPE RUNNERS REQUIRED |                   | REQUIRED PIPE RUNNER SIZES |        |        |
|-----------|-------------------------|---------|---------------|------------------------|-----------------------|-------------------|----------------------------|--------|--------|
|           |                         |         |               |                        | SINGLE PIPE           | MULTIPLE PIPE     | NOMINAL DIA.               | O.D.   | I.D.   |
| 12"       | 2"                      | 17"     | 6:1           | 4'-9"                  | No                    | Yes, for >2 pipes | 3" STD                     | 3.500" | 3.068" |
| 15"       | 2 1/4"                  | 20 1/2" | 6:1           | 6'-5"                  | No                    | Yes, for >2 pipes | 3" STD                     | 3.500" | 3.068" |
| 18"       | 2 1/2"                  | 24"     | 6:1           | 8'-0"                  | No                    | Yes, for >2 pipes | 3" STD                     | 3.500" | 3.068" |
| 24"       | 3"                      | 31"     | 6:1           | 11'-3"                 | No                    | Yes, for >2 pipes | 3" STD                     | 3.500" | 3.068" |
| 30"       | 3 1/2"                  | 38 1/2" | 6:1           | 14'-8"                 | No                    | Yes               | 4" STD                     | 4.500" | 4.026" |
| 36"       | 4"                      | 45 1/2" | 6:1           | 17'-11"                | Yes                   | Yes               | 4" STD                     | 4.500" | 4.026" |
| 42"       | 4 1/2"                  | 52 1/2" | 6:1           | 21'-2"                 | Yes                   | Yes               | 4" STD                     | 4.500" | 4.026" |

- ① Dimension "D" is based on ASTM C-76, Class III, Wall "B" thickness. If any other wall thickness is used, dimension "D" must be adjusted accordingly.
- ② Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.
- ③ Toewall to be used only when dimension is shown elsewhere in the plans.
- ④ The top 4" of void between Precast End Treatments shall be filled with concrete Riprap and shall be considered subsidiary to Safety End Treatment.
- ⑤ Clear distance between pipes shall be adjusted to provide for the minimum distance between safety end treatments.
- ⑥ Cement stabilized bedding and backfill shall be in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill shall be considered subsidiary to the Item "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill shall be as directed by Engineer.

#### GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item "Safety End Treatment". When Precast Safety End Treatment is used as a Contractor's alternate to mitered RCP, Riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture of this product shall conform to requirements of Item "Safety End Treatment" except as noted below:

A. Minimum reinforcing shall be #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6 x 6 - W12 x W12 or 5 x 5 - W10 x W10 welded wire reinforcement (WWR).

B. Concrete for precast (steel formed) sections shall be Class "C" with a minimum compressive strength of 3600 psi.

At the option and expense of the Contractor the next larger size of Safety End Treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe Runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Pipe Runners shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

All steel components except reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

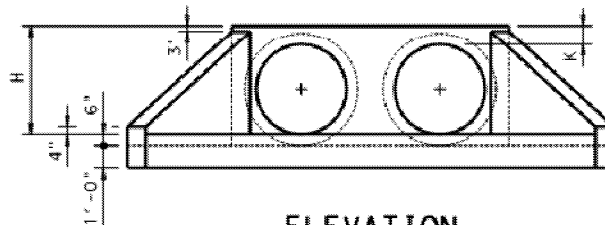
|                                       |         |                          |           |
|---------------------------------------|---------|--------------------------|-----------|
| Texas Department of Transportation    |         | Bridge Division Standard |           |
| PRECAST SAFETY END TREATMENT          |         |                          |           |
| TYPE II ~ PARALLEL DRAINAGE           |         |                          |           |
| PSET-SP                               |         |                          |           |
| FILE: psetspss.dgn                    | DN: RLW | CK: KLR                  | DW: JTR   |
| CONT: February 2010                   | SECT:   | JOB:                     | HIGHWAY:  |
| REVISIONS                             |         |                          |           |
| 11-10: Add note for synthetic fibers. | DIST:   | COUNTY:                  | SHEET NO. |

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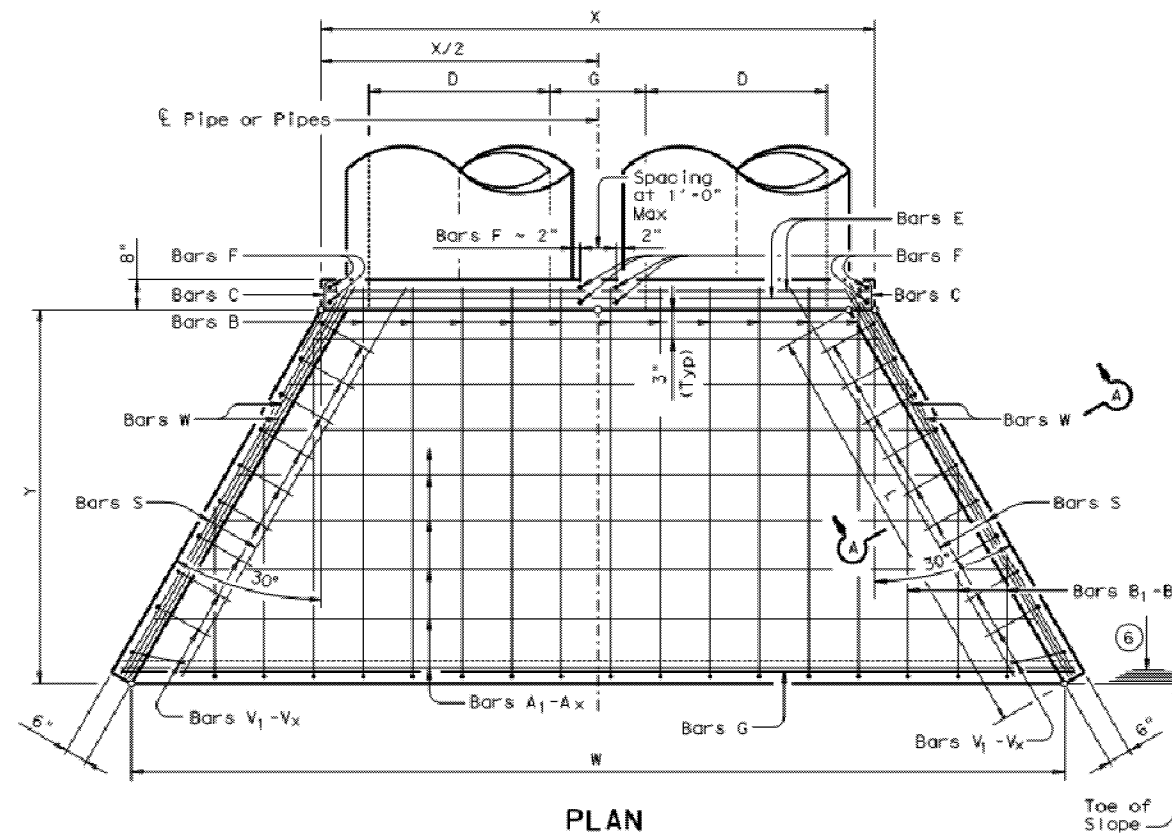
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TABLE OF VARIABLE DIMENSIONS  
AND QUANTITIES FOR ONE HEADWALL ④

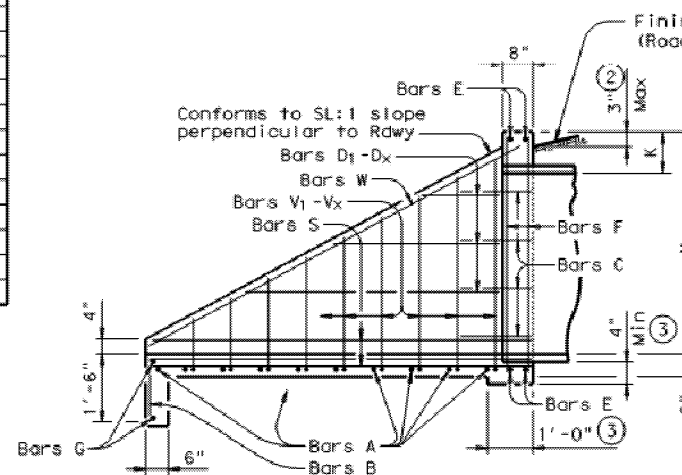
| SLOPE | DIA OF PIPE, D | Values for one Pipe |            |        |             |             | Values to be added for each add'l Pipe |         |             |           |
|-------|----------------|---------------------|------------|--------|-------------|-------------|----------------------------------------|---------|-------------|-----------|
|       |                | W                   | X          | Y      | L           | Reinf (Lbs) | Conc (CY)                              | X and W | Reinf (Lbs) | Conc (CY) |
| 2:1   | 12"            | 4'-7 1/2"           | 2'-6"      | 2'-10" | 3'-3 1/4"   | 84          | 0.6                                    | 1'-9"   | 20          | 0.2       |
|       | 15"            | 5'-5 3/4"           | 2'-9 1/2"  | 3'-4"  | 3'-10 1/4"  | 99          | 0.7                                    | 2'-2"   | 24          | 0.3       |
|       | 18"            | 6'-4 1/4"           | 3'-1"      | 3'-10" | 4'-5"       | 120         | 0.9                                    | 2'-8"   | 32          | 0.3       |
|       | 21"            | 7'-2 3/4"           | 3'-4 1/2"  | 4'-4"  | 5'-0"       | 137         | 1.1                                    | 3'-1"   | 43          | 0.4       |
|       | 24"            | 8'-2 1/2"           | 3'-9 1/2"  | 4'-10" | 5'-7"       | 158         | 1.3                                    | 3'-7"   | 50          | 0.5       |
|       | 27"            | 9'-1"               | 4'-1"      | 5'-4"  | 6'-2"       | 173         | 1.5                                    | 3'-11"  | 56          | 0.6       |
|       | 30"            | 9'-11 1/2"          | 4'-4 1/2"  | 5'-10" | 6'-8 3/4"   | 197         | 1.7                                    | 4'-4"   | 65          | 0.8       |
|       | 33"            | 10'-10"             | 4'-8"      | 6'-4"  | 7'-3 3/4"   | 216         | 2.0                                    | 4'-8"   | 71          | 0.9       |
|       | 36"            | 11'-8 1/4"          | 4'-11 1/2" | 6'-10" | 7'-10 3/4"  | 241         | 2.2                                    | 5'-1"   | 81          | 1.0       |
|       | 42"            | 13'-5 1/4"          | 5'-6 1/2"  | 7'-10" | 9'-0 1/2"   | 290         | 2.8                                    | 5'-10"  | 97          | 1.3       |
|       | 48"            | 15'-9"              | 6'-1 1/2"  | 9'-4"  | 10'-9 1/4"  | 350         | 3.8                                    | 6'-7"   | 117         | 1.7       |
|       | 54"            | 17'-5 3/4"          | 6'-8 1/2"  | 10'-4" | 11'-11 1/4" | 415         | 4.5                                    | 7'-6"   | 151         | 2.1       |
| 3:1   | 60"            | 19'-2 3/4"          | 7'-3 1/2"  | 11'-4" | 13'-1"      | 469         | 5.3                                    | 8'-3"   | 174         | 2.5       |
|       | 66"            | 20'-11 1/2"         | 7'-10 1/2" | 12'-4" | 14'-3"      | 530         | 6.2                                    | 8'-9"   | 194         | 2.9       |
|       | 72"            | 22'-8 1/2"          | 8'-5 1/2"  | 13'-4" | 15'-4 3/4"  | 587         | 7.1                                    | 9'-4"   | 213         | 3.3       |
|       | 12"            | 6'-3"               | 2'-6"      | 4'-3"  | 4'-11"      | 114         | 0.8                                    | 1'-9"   | 22          | 0.2       |
|       | 15"            | 7'-5"               | 2'-9 1/2"  | 5'-0"  | 5'-9 1/4"   | 133         | 1.1                                    | 2'-2"   | 28          | 0.3       |
|       | 18"            | 8'-6 3/4"           | 3'-1"      | 5'-9"  | 6'-7 3/4"   | 166         | 1.3                                    | 2'-8"   | 37          | 0.5       |
|       | 21"            | 9'-8 3/4"           | 3'-4 1/2"  | 6'-6"  | 7'-6"       | 189         | 1.6                                    | 3'-1"   | 48          | 0.6       |
|       | 24"            | 11'-0"              | 3'-9 1/2"  | 7'-3"  | 8'-4 1/2"   | 221         | 2.0                                    | 3'-7"   | 58          | 0.7       |
|       | 27"            | 12'-2"              | 4'-1"      | 8'-0"  | 9'-2 3/4"   | 245         | 2.3                                    | 3'-11"  | 67          | 0.8       |
|       | 30"            | 13'-4"              | 4'-4 1/2"  | 8'-9"  | 10'-1 1/4"  | 287         | 2.7                                    | 4'-4"   | 77          | 1.0       |
|       | 33"            | 14'-5 3/4"          | 4'-8"      | 9'-6"  | 10'-11 3/4" | 310         | 3.1                                    | 4'-8"   | 84          | 1.2       |
|       | 36"            | 15'-7 3/4"          | 4'-11 1/2" | 10'-3" | 11'-10"     | 343         | 3.5                                    | 5'-1"   | 96          | 1.4       |
| 4:1   | 42"            | 17'-11 1/2"         | 5'-6 1/2"  | 11'-9" | 13'-6 3/4"  | 424         | 4.5                                    | 5'-10"  | 119         | 1.7       |
|       | 48"            | 21'-1 3/4"          | 6'-1 1/2"  | 14'-0" | 16'-2"      | 527         | 6.1                                    | 6'-7"   | 146         | 2.3       |
|       | 54"            | 23'-5 1/2"          | 6'-8 1/2"  | 15'-6" | 17'-10 3/4" | 618         | 7.3                                    | 7'-6"   | 186         | 2.9       |
|       | 60"            | 25'-9 1/4"          | 7'-3 1/2"  | 17'-0" | 19'-7 1/2"  | 707         | 8.7                                    | 8'-3"   | 219         | 3.4       |
|       | 66"            | 28'-1"              | 7'-10 1/2" | 18'-6" | 21'-4 1/4"  | 797         | 10.1                                   | 8'-9"   | 242         | 3.9       |
|       | 72"            | 30'-4 3/4"          | 8'-5 1/2"  | 20'-0" | 23'-1 1/4"  | 910         | 11.7                                   | 9'-4"   | 272         | 4.4       |
|       | 12"            | 7'-10 3/4"          | 2'-6"      | 5'-8"  | 6'-6 1/2"   | 144         | 1.1                                    | 1'-9"   | 24          | 0.3       |
|       | 15"            | 9'-4"               | 2'-9 1/2"  | 6'-8"  | 7'-8 1/2"   | 177         | 1.5                                    | 2'-2"   | 32          | 0.4       |
|       | 18"            | 10'-9 1/2"          | 3'-1"      | 7'-8"  | 8'-10 1/4"  | 217         | 1.9                                    | 2'-8"   | 42          | 0.5       |
|       | 21"            | 12'-2 3/4"          | 3'-4 1/2"  | 8'-8"  | 10'-0"      | 254         | 2.3                                    | 3'-1"   | 57          | 0.7       |
|       | 24"            | 13'-9 1/2"          | 3'-9 1/2"  | 9'-8"  | 11'-2"      | 295         | 2.8                                    | 3'-7"   | 67          | 0.9       |
|       | 27"            | 15'-3"              | 4'-1"      | 10'-8" | 12'-3 3/4"  | 328         | 3.3                                    | 3'-11"  | 77          | 1.0       |
| 6:1   | 30"            | 16'-8 1/4"          | 4'-4 1/2"  | 11'-8" | 13'-5 3/4"  | 379         | 3.8                                    | 4'-4"   | 89          | 1.3       |
|       | 33"            | 18'-1 3/4"          | 4'-8"      | 12'-8" | 14'-7 1/2"  | 417         | 4.5                                    | 4'-8"   | 101         | 1.4       |
|       | 36"            | 19'-7"              | 4'-11 1/2" | 13'-8" | 15'-9 1/4"  | 464         | 5.1                                    | 5'-1"   | 115         | 1.7       |
|       | 42"            | 22'-5 3/4"          | 5'-6 1/2"  | 15'-8" | 18'-1"      | 575         | 6.5                                    | 5'-10"  | 141         | 2.1       |
|       | 48"            | 26'-6 1/4"          | 6'-1 1/2"  | 18'-8" | 21'-6 3/4"  | 720         | 8.9                                    | 6'-7"   | 175         | 2.8       |
|       | 54"            | 29'-5"              | 6'-8 1/2"  | 20'-8" | 23'-10 1/4" | 863         | 10.7                                   | 7'-6"   | 226         | 3.6       |
|       | 60"            | 32'-3 3/4"          | 7'-3 1/2"  | 22'-8" | 26'-2"      | 984         | 12.7                                   | 8'-3"   | 264         | 4.3       |
|       | 66"            | 35'-2 1/2"          | 7'-10 1/2" | 24'-8" | 28'-5 3/4"  | 1126        | 14.9                                   | 8'-9"   | 300         | 4.9       |
|       | 72"            | 38'-1 1/4"          | 8'-5 1/2"  | 26'-8" | 30'-9 1/2"  | 1283        | 17.3                                   | 9'-4"   | 334         | 5.6       |
|       | 12"            | 11'-2"              | 2'-6"      | 8'-6"  | 9'-9 3/4"   | 220         | 1.9                                    | 1'-9"   | 28          | 0.4       |
|       | 15"            | 13'-2 1/4"          | 2'-9 1/2"  | 10'-0" | 11'-6 1/2"  | 264         | 2.5                                    | 2'-2"   | 37          | 0.5       |
|       | 18"            | 15'-2 1/2"          | 3'-1"      | 11'-6" | 13'-3 1/4"  | 326         | 3.2                                    | 2'-8"   | 50          | 0.7       |
|       | 21"            | 17'-2 3/4"          | 3'-4 1/2"  | 13'-0" | 15'-0 1/4"  | 381         | 3.9                                    | 3'-1"   | 69          | 0.9       |



ELEVATION  
Showing dimensions

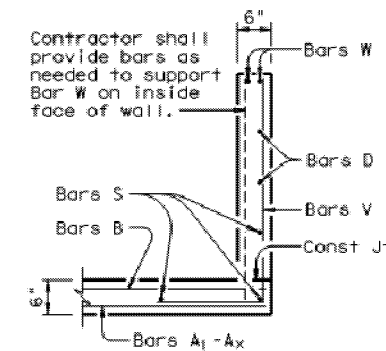


PLAN



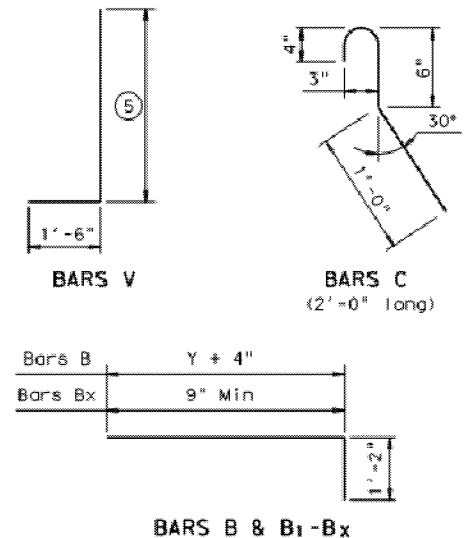
TYPICAL WING ELEVATION

- Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
- For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- Provide a 1'-0" footing as shown where required to maintain 4" Min cover for pipes.
- Quantities shown are for one structure end only (one headwall).
- Min Length =  $6" + 3" \times \left( \frac{12 \times H - 7}{12 \times L} \right)$   
Max Length =  $12 \times H - 3" \times \left( \frac{12 \times H - 7}{12 \times L} \right) = 1"$
- Lengths of wings based on SL:1 Slope along this line.



SECTION A-A

| TABLE OF REINFORCING STEEL ④ |      |       |     | TABLE OF CONSTANT DIMENSIONS |        |       |       |
|------------------------------|------|-------|-----|------------------------------|--------|-------|-------|
| Bar                          | Size | Spa   | No. | DIA OF PIPE, D               | G      | K     | H     |
| A                            | # 4  | 1'-0" | ~   | 12"                          | 9"     | 1'-0" | 2'-0" |
| B                            | # 3  | 1'-6" | ~   | 15"                          | 11"    | 1'-0" | 2'-3" |
| C                            | # 4  | 1'-0" | ~   | 18"                          | 1'-2"  | 1'-0" | 2'-6" |
| D                            | # 3  | 1'-0" | ~   | 21"                          | 1'-4"  | 1'-0" | 2'-9" |
| E                            | # 5  | ~     | 4   | 24"                          | 1'-7"  | 1'-0" | 3'-0" |
| F                            | # 5  | ~     | ~   | 27"                          | 1'-8"  | 1'-0" | 3'-3" |
| G                            | # 3  | ~     | 2   | 30"                          | 1'-10" | 1'-0" | 3'-6" |
| S                            | # 4  | ~     | 6   | 33"                          | 1'-11" | 1'-0" | 3'-9" |
| V                            | # 4  | 1'-0" | ~   | 36"                          | 2'-1"  | 1'-0" | 4'-0" |
| W                            | # 5  | ~     | 4   | 42"                          | 2'-4"  | 1'-0" | 4'-6" |
|                              |      |       |     | 48"                          | 2'-7"  | 1'-3" | 5'-3" |
|                              |      |       |     | 54"                          | 3'-0"  | 1'-3" | 5'-9" |
|                              |      |       |     | 60"                          | 3'-3"  | 1'-3" | 6'-3" |
|                              |      |       |     | 66"                          | 3'-3"  | 1'-3" | 6'-9" |
|                              |      |       |     | 72"                          | 3'-4"  | 1'-3" | 7'-3" |



GENERAL NOTES:  
Designed according to AASHTO LRFD Specifications.  
Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.  
All reinforcing steel shall be Grade 60.  
All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.  
No bridge rails of any type may be mounted directly to these culvert headwalls.

|                                                                      |           |                          |           |
|----------------------------------------------------------------------|-----------|--------------------------|-----------|
| Texas Department of Transportation                                   |           | Bridge Division Standard |           |
| CONCRETE HEADWALLS<br>WITH FLARED WINGS FOR<br>0° SKEW PIPE CULVERTS |           |                          |           |
| CH-FW-0                                                              |           |                          |           |
| FILE: chfw00.sedgn                                                   | DR: TxDOT | CR: TxDOT                | CK: GAF   |
| ©TxDOT February 2010                                                 | CONF      | SHEET                    | JOB       |
| REVISIONS                                                            | COUNT     |                          | SHEET NO. |

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ACC: LEVELS DISPLAYED

TABLE OF DIMENSIONS & REINFORCING STEEL  
(Wings for One Structure End)

| Dimensions                 |        |        |        |       | Variable Reinforcing |       |         |       | Estimated Quantities per ft of wing (2-Wings) |              | Estimated Quantities per ft of Toewall (1-Toewall) |              |
|----------------------------|--------|--------|--------|-------|----------------------|-------|---------|-------|-----------------------------------------------|--------------|----------------------------------------------------|--------------|
| Maximum Wingwall Height Hw | W      | X      | Y      | Z     | Bars J1              |       | Bars J2 |       | Reinf (Lb/Ft)                                 | Conc (CY/Ft) | Reinf (Lb/Ft)                                      | Conc (CY/Ft) |
|                            |        |        |        |       | Size                 | Spa   | Size    | Spa   |                                               |              |                                                    |              |
| 2'-6"                      | 2'-10" | 10"    | 1'-0"  | 7"    | #4                   | 1'-0" | #4      | 1'-0" | 43.13                                         | 0.406        | 6.85                                               | 0.071        |
| 2'-9"                      | 2'-10" | 10"    | 1'-0"  | 7"    | #4                   | 1'-0" | #4      | 1'-0" | 43.80                                         | 0.424        | 6.85                                               | 0.071        |
| 3'-0"                      | 2'-10" | 10"    | 1'-0"  | 7"    | #4                   | 1'-0" | #4      | 1'-0" | 44.47                                         | 0.444        | 6.85                                               | 0.071        |
| 3'-3"                      | 2'-10" | 10"    | 1'-0"  | 7"    | #4                   | 1'-0" | #4      | 1'-0" | 47.81                                         | 0.462        | 6.85                                               | 0.071        |
| 3'-6"                      | 2'-10" | 10"    | 1'-0"  | 7"    | #4                   | 1'-0" | #4      | 1'-0" | 48.48                                         | 0.480        | 6.85                                               | 0.071        |
| 4'-0"                      | 3'-2"  | 1'-2"  | 1'-0"  | 7"    | #4                   | 1'-0" | #4      | 1'-0" | 50.26                                         | 0.532        | 6.85                                               | 0.071        |
| 4'-6"                      | 3'-2"  | 1'-2"  | 1'-0"  | 7"    | #4                   | 1'-0" | #4      | 1'-0" | 54.27                                         | 0.568        | 6.85                                               | 0.071        |
| 5'-0"                      | 3'-9"  | 1'-7"  | 1'-2"  | 7"    | #4                   | 1'-0" | #4      | 1'-0" | 57.94                                         | 0.632        | 6.96                                               | 0.075        |
| 5'-6"                      | 3'-9"  | 1'-7"  | 1'-2"  | 7"    | #4                   | 1'-0" | #4      | 1'-0" | 61.95                                         | 0.668        | 6.96                                               | 0.075        |
| 6'-0"                      | 4'-4"  | 2'-0"  | 1'-4"  | 7"    | #5                   | 1'-0" | #5      | 1'-0" | 75.16                                         | 0.730        | 7.07                                               | 0.078        |
| 6'-6"                      | 4'-4"  | 2'-0"  | 1'-4"  | 7"    | #5                   | 1'-0" | #5      | 1'-0" | 79.54                                         | 0.768        | 7.07                                               | 0.078        |
| 7'-0"                      | 5'-0"  | 2'-3"  | 1'-9"  | 8"    | #5                   | 1'-0" | #5      | 1'-0" | 86.65                                         | 0.864        | 8.07                                               | 0.093        |
| 7'-6"                      | 5'-0"  | 2'-3"  | 1'-9"  | 8"    | #5                   | 1'-0" | #5      | 1'-0" | 91.03                                         | 0.902        | 8.07                                               | 0.093        |
| 8'-0"                      | 5'-6"  | 2'-8"  | 1'-10" | 8"    | #5                   | 6"    | #5      | 6"    | 133.54                                        | 0.962        | 8.13                                               | 0.095        |
| 8'-6"                      | 5'-6"  | 2'-8"  | 1'-10" | 8"    | #5                   | 6"    | #5      | 6"    | 138.96                                        | 1.000        | 8.13                                               | 0.095        |
| 9'-6"                      | 6'-0"  | 2'-10" | 2'-2"  | 9"    | #5                   | 6"    | #5      | 6"    | 151.43                                        | 1.136        | 8.41                                               | 0.110        |
| 10'-6"                     | 6'-5"  | 3'-0"  | 2'-5"  | 9"    | #6                   | 6"    | #5      | 6"    | 190.76                                        | 1.234        | 8.57                                               | 0.117        |
| 11'-6"                     | 7'-2"  | 3'-6"  | 2'-8"  | 11"   | #6                   | 6"    | #6      | 6"    | 224.62                                        | 1.438        | 9.52                                               | 0.140        |
| 12'-6"                     | 7'-8"  | 3'-9"  | 2'-11" | 1'-0" | #7                   | 6"    | #6      | 6"    | 277.90                                        | 1.592        | 9.74                                               | 0.157        |
| 13'-6"                     | 8'-2"  | 4'-0"  | 3'-2"  | 1'-2" | #8                   | 6"    | #6      | 6"    | 343.21                                        | 1.804        | 10.02                                              | 0.186        |
| 14'-6"                     | 8'-10" | 4'-5"  | 3'-5"  | 1'-4" | #9                   | 6"    | #6      | 6"    | 427.43                                        | 2.046        | 10.30                                              | 0.218        |
| 15'-6"                     | 9'-6"  | 4'-10" | 3'-8"  | 1'-6" | #9                   | 6"    | #7      | 6"    | 484.01                                        | 2.302        | 11.24                                              | 0.253        |
| 16'-0"                     | 9'-11" | 5'-0"  | 3'-11" | 1'-7" | #9                   | 6"    | #7      | 6"    | 500.21                                        | 2.448        | 11.47                                              | 0.279        |

TABLE OF WINGWALL REINFORCING (2-Wings)

| Bar | Size | No. | Spa   |
|-----|------|-----|-------|
| D1  | #5   | ~   | 1'-0" |
| D2  | #5   | ~   | 1'-0" |
| E1  | #4   | ~   | 1'-0" |
| F   | #4   | ~   | 1'-0" |
| G   | #5   | ~   | 1'-0" |
| M1  | #4   | 4   | ~     |
| P   | #4   | ~   | 1'-0" |
| V   | #4   | ~   | 1'-0" |

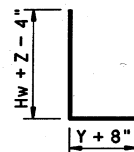
TABLE OF TOEWALL REINFORCING

| Bar | Size | No. | Spa   |
|-----|------|-----|-------|
| J3  | #4   | ~   | 1'-0" |
| M2  | #4   | 2   | ~     |
| E2  | #4   | ~   | 1'-0" |

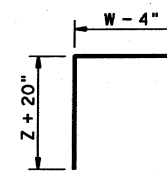
WING DIMENSION CALCULATIONS:

Formulas: (All values are in Feet)  
 $Hw = H + T + C$   
 $Lw = (Hw) (SL) \div \text{Cosine } (\phi)$   
For Cast-in-place culverts:  
 $Ltw = [(N) (S) + (N + 1) (U)] \div (\text{Cosine } \phi)$   
For Precast culverts:  
 $Ltw = [(N) (2 U + S) + (N - 1) (0.5')] \div (\text{Cosine } \phi)$   
Total Wingwall Area (Two Wings ~ S.F.)  
 $= (2) (Hw) (Lw)$   
  
 $Hw$  = Height of Wingwall  
 $Lw$  = Length of Wingwall  
 $Ltw$  = Culvert Toewall Length  
 $N$  = Number of Culvert Spans  
 $SL:1$  = Channel Slope ratio. (Horizontal: 1 Vertical, Usual value is 2:1)  
 $\phi$  = Culvert Skew

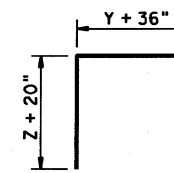
See applicable box culvert standard for S, H, T and U values.



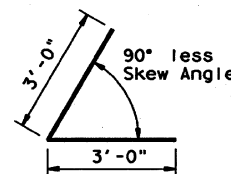
BARS J1



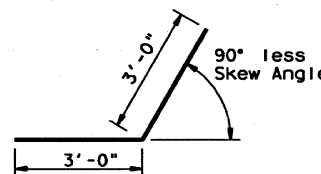
BARS J2



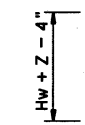
BARS J3



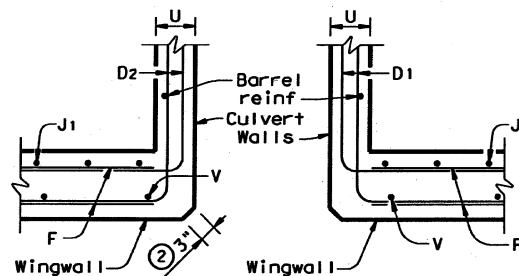
BARS D1



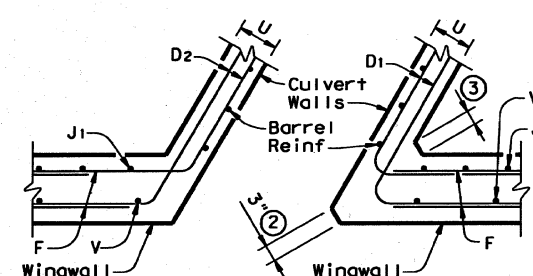
BARS D2



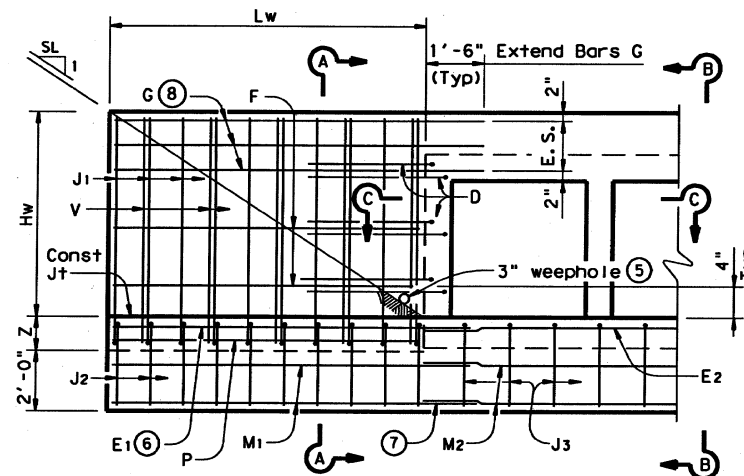
BARS V



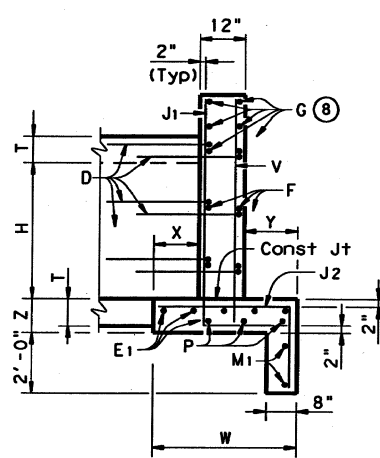
SECTION C-C



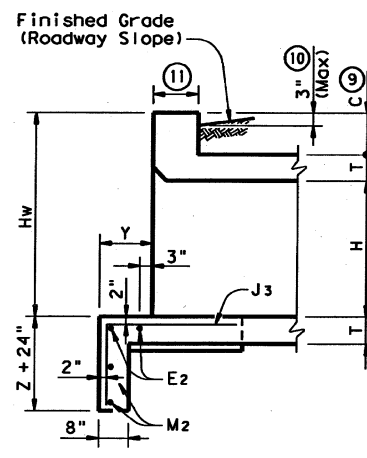
SECTION C-C



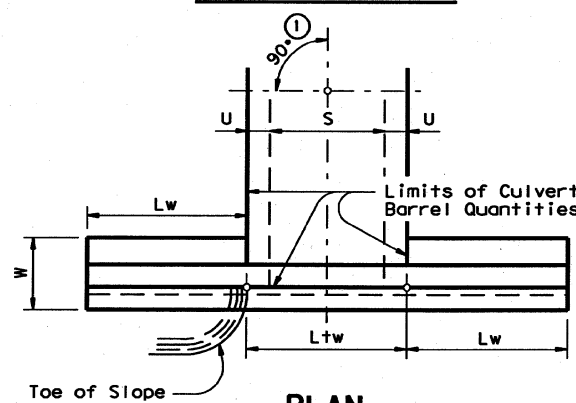
PARTIAL ELEVATION



SECTION A-A  
(Showing Wing Reinf)

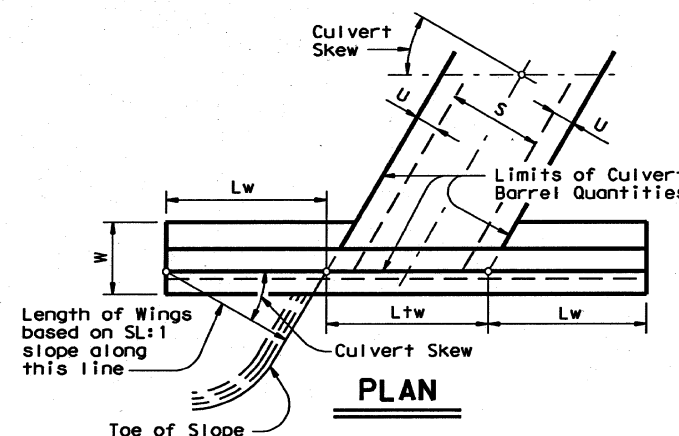


SECTION B-B  
(Showing Toewall Reinf)



PLAN

DETAILS FOR  
NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR  
SKEWED BOX CULVERTS  
(Showing 30° Skew)

- Skew Angle = 0°
- At discharge end, chamfer may be 3/4".
- For 15° Skew ~ 1"  
For 30° Skew ~ 2"  
For 45° Skew ~ 3"
- Quantities shown are for two wings. To determine total quantities for two wings, multiply the tabulated values by Lw.
- Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
- Extend Bars E1 1'-6" minimum into the bottom slab of the culvert.
- Lap Bars M1 1'-6" minimum with Bars M2.
- Bars G shall be equally spaced at 1'-0" maximum, placed as shown. There shall be at least 4 Bars G per wing.
- 0" min to 5'-0" max. For T6 or C6 Rail, see T6-CM standard for additional details. For all other rail types, refer to the RAC standard. For curbs without rail and greater than 1'-0" high, see ECD standard for additional details. Estimated curb heights are shown elsewhere in the plans.
- For vehicle safety, the following requirements must be met:
  - For structures without bridge rail, curbs shall project no more than 3" above finished grade.
  - For structures with bridge rail, curbs shall be flush with finished grade.Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- 1'-0" typical. 2'-0" typical when RAC standard is referenced elsewhere in the plans.

GENERAL NOTES:

Designed according to current AASHTO Standard and Interim Specifications.  
All reinforcing steel shall be Grade 60.  
All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.  
All reinforcing bars shall be adjusted to provide a minimum of 1 1/4" clear cover.  
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.  
See BCS sheet for additional dimensions and information.  
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

Texas Department of Transportation  
Bridge Division

CONCRETE WINGWALLS  
WITH PARALLEL WINGS FOR  
SKEWED AND NON-SKEWED  
BOX CULVERTS

PW

|                    |          |                     |           |         |
|--------------------|----------|---------------------|-----------|---------|
| FILE: pwstde01.dgn | DN: GAF  | CK: CAT             | DN: TxDOT | CK: GAF |
| © TxDOT May 2005   | DISTRICT | FEDERAL AID PROJECT | SHEET     |         |
| REVISIONS          | COUNTY   | CONTROL             | SECT      | JOB     |
|                    |          |                     |           | HIGHWAY |