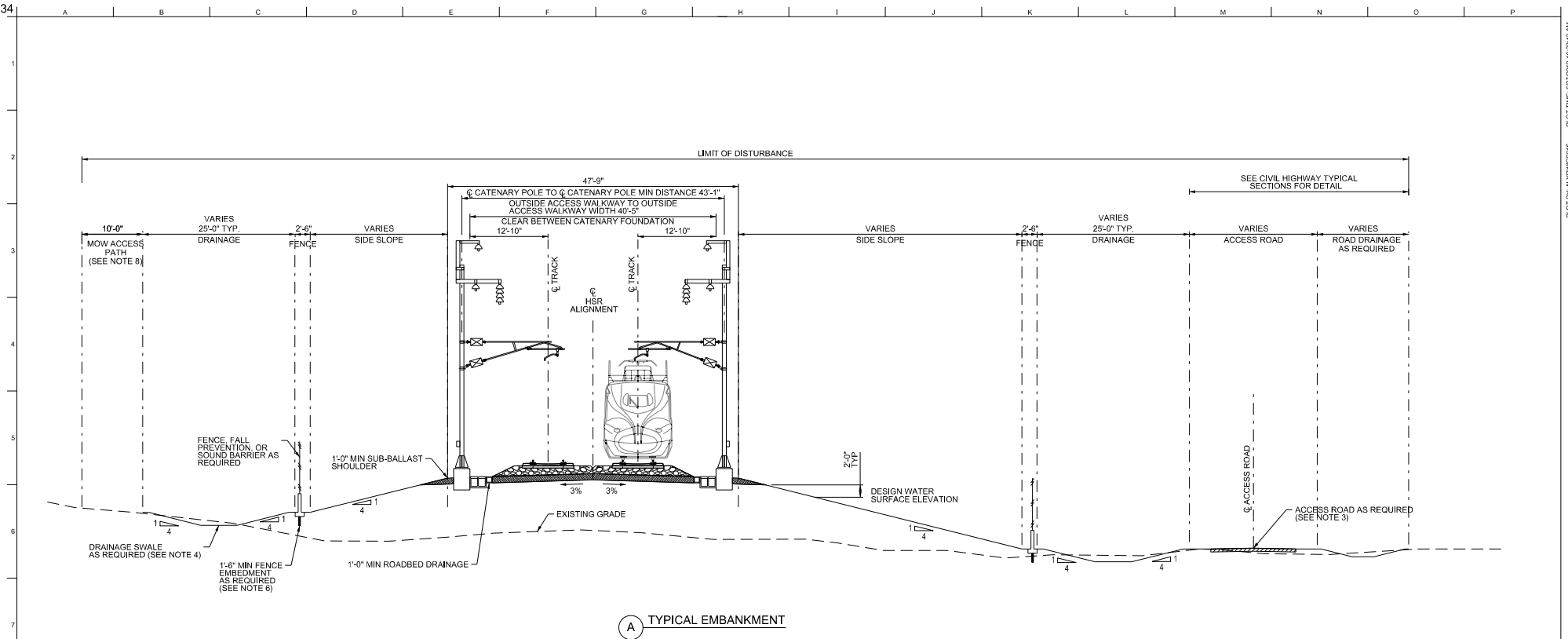


22x34



A TYPICAL EMBANKMENT

NOTES:

- FOR DIMENSIONS OF TYPICAL TWO TRACK HSR SYSTEM, SEE DRAWING CVL-00-03013. FOR GENERAL NOTES ON TYPICAL SECTIONS, SEE DRAWINGS GEN-00-00008.
- CENTERLINE HSR ALIGNMENT IS CENTERLINE OF TWO TRACK HSR ALIGNMENT AS SHOWN IN VOLUME 2 PLAN AND PROFILE DRAWINGS. EMBANKMENT HEIGHT VARIES WITH SURROUNDING GRADE AND RAIL PROFILE.
- TWO TYPES OF ACCESS ROADS ARE INCLUDED IN DESIGN: FACILITIES ACCESS ROADS AND SHARED ACCESS ROADS. ALIGNMENT OF ACCESS ROAD INDEPENDENT OF HSR ALIGNMENT AND IS SHOWN ON DRAWINGS INCLUDED IN VOLUMES 2 AND 4. REQUIREMENTS AND DESIGN CRITERIA FOR EACH TYPE OF ACCESS ROAD IS PROVIDED IN THE FINAL CONCEPTUAL ENGINEERING REPORT.
- DRAINAGE SWALE SIZE AND LOCATION WILL BE BASED ON SITE SPECIFIC CONSTRAINTS, TOPOGRAPHY, AND DRAINAGE REQUIREMENTS. A TYPICAL MINIMUM SWALE WIDTH OF 25 FT HAS BEEN PROVIDED AS SHOWN.
- THE TRACKWAY WILL BE ENTIRELY SECURED BETWEEN DALLAS AND HOUSTON TO PREVENT UNAUTHORIZED ACCESS OR INTRUSION ON TO THE OPERATING RAILWAY. SOUND BARRIERS WILL BE PROVIDED WHERE REQUIRED TO MITIGATE NOISE IMPACTS AS IDENTIFIED THROUGH DETAILED ENVIRONMENTAL ANALYSIS. WHERE ON ELEVATED STRUCTURE, TRACKWAY FENCING MAY BE REPLACED WITH FALL PREVENTION RAILINGS BASED ON SITE SPECIFIC CONDITIONS.
- FENCE LIMITS, LOCATION, HEIGHT, EMBEDMENT, AND OTHER DETAILS WILL BE DEVELOPED DURING MORE DETAILED DESIGN. DETAILS FOR FENCING AND OTHER INTRUSION PROTECTION MEASURES WILL BE INFORMED BY HAZARDS AND RISKS ANALYSIS AND WOULD BE DEVELOPED IN CLOSE COORDINATION WITH APPLICABLE REGULATORY AUTHORITIES AND COMPLY WITH APPLICABLE REQUIREMENTS.
- CONCEPTUAL SECTION SHOWN WITH SIDE SLOPES ON BOTH SIDES. SIDE SLOPES SUBJECT TO OPTIMIZATION AS SITE SPECIFIC GEOTECHNICAL DATA BECOMES AVAILABLE. RETAINING WALLS MAY BE UTILIZED ON ONE OR BOTH SIDES OF THE EMBANKMENT AS NECESSARY TO MINIMIZE IMPACTS TO ADJACENT PROPERTIES, UTILITIES, INFRASTRUCTURE OR ENVIRONMENTALLY SENSITIVE AREAS. SEE RETAINED FILL TYPICAL SECTION FOR DETAILS. LOCATION SPECIFIC CONFIGURATION WOULD BE ADVANCED DURING MORE DETAILED DESIGN.
- LIMIT OF DISTURBANCE PROVIDED FOR ENVIRONMENTAL ANALYSIS AS SHOWN INCLUDES 10FT BEYOND THE FOOTPRINT REQUIRED FOR CIVIL INFRASTRUCTURE, INCLUDING RAIL FORMATION, FENCING, ACCESS ROADS, AND DRAINAGE ELEMENTS. THIS 10FT SPACE ALLOWANCE WOULD BE CLEARED AND GRADED TO ALLOW FOR CONSTRUCTION ACCESS, FOLLOWING CONSTRUCTION, THIS 10FT SPACE ALLOWANCE WOULD BE GRADED, REVEGETATED, AND MAINTAINED AS AN MOW PATH TO PROVIDE FOR INSPECTION, MAINTENANCE, AND EMERGENCY RESPONSE ACCESS. IN WATERS OF THE U.S., PRECONSTRUCTION CONTIGURS WOULD BE RESTORED WITHIN THE 10FT SPACE ALLOWANCE AND ALL TEMPORARY FILLS WOULD BE REMOVED IN THEIR ENTIRETY AFTER CONSTRUCTION IS COMPLETE. WHERE PERMANENT ACCESS ROAD IS PROVIDED AS SHOWN ON PLANS, CONSTRUCTION ACCESS WOULD BE PROVIDED WITHIN LIMITS OF THE PROPOSED ACCESS ROAD AND NO ADDITIONAL MOW PATH WOULD BE PROVIDED.
- LIMIT OF DISTURBANCE PROVIDED FOR ENVIRONMENTAL ANALYSIS AS SHOWN INCLUDES SPACE PROVISIONS FOR DRAINAGE SWALES AND CONSTRUCTION ACCESS ON EACH SIDE OF RAIL FORMATION. DURING MORE DETAILED ENGINEERING DESIGN DEVELOPMENT, SITE SPECIFIC DRAINAGE DESIGN WOULD BE DEVELOPED TO OPTIMIZE SWALE CONFIGURATIONS AND ANALYSIS WAS DONE DURING CONCEPTUAL ENGINEERING TO CONFIRM THAT A MORE COMPACT FOOTPRINT ELIMINATING ONE SWALE AND ONE CONSTRUCTION ACCESS ALLOWANCE WAS FEASIBLE. LOCATIONS WHERE MORE COMPACT ARRANGEMENTS WERE USED IN THE FINAL CONCEPTUAL ENGINEERING DESIGN ARE SHOWN ON THE PLANS IN VOLUME 2.

DESIGNED BY	D. PETRIN
DRAWN BY	S. PAUDEL
CHECKED BY	K. SEYMOUR
IN CHARGE	C. TAYLOR
DATE	02/25/2019

REV	DATE	BY	CHK	APP	DESCRIPTION

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

ARUP

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DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

GENERAL
CIVIL RAIL
TYPICAL SECTIONS
SHEET 1 OF 13

Scale

1 1/4" = 10'

Drawing Status

FINAL

Job No

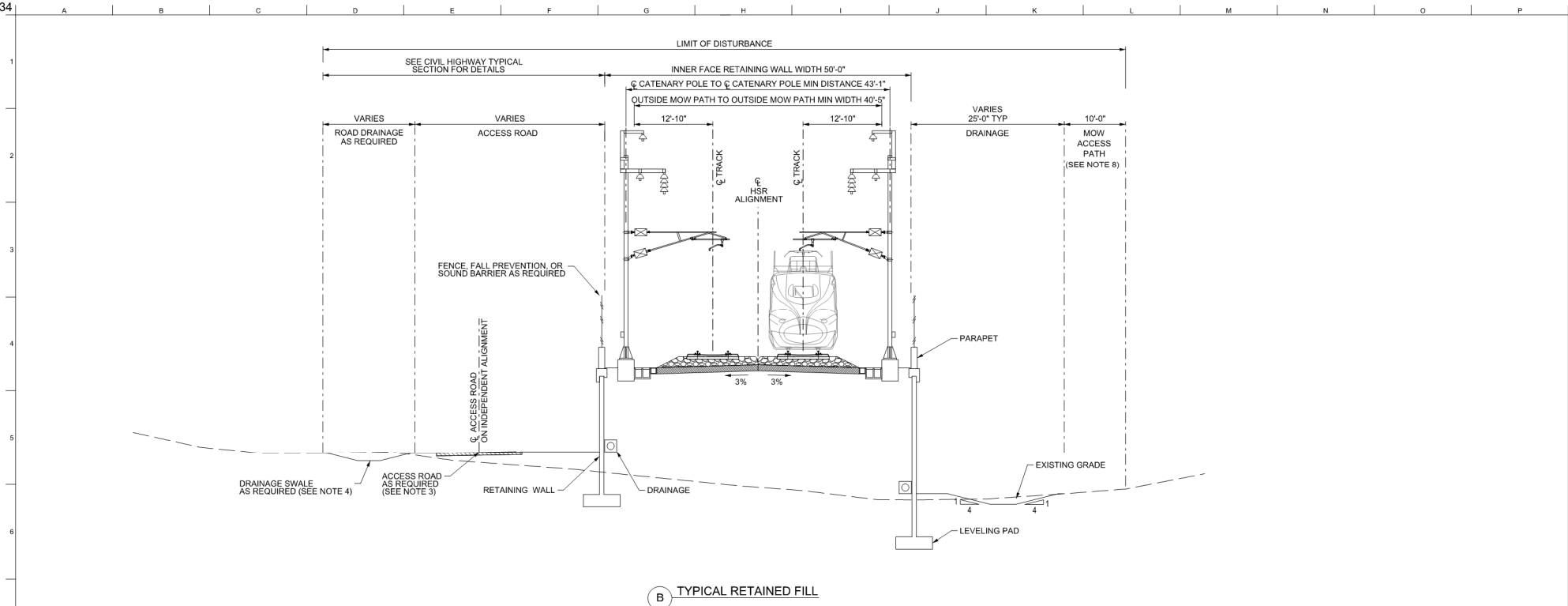
234180

Drawing No

CVL-00-03001

Rev

01



NOTES:

- FOR DIMENSIONS OF TYPICAL TWO TRACK HSR SYSTEM. SEE DRAWING CVL-00-03013. FOR GENERAL NOTES ON TYPICAL SECTIONS, SEE DRAWINGS GEN-00-00008.
- CENTERLINE HSR ALIGNMENT IS CENTERLINE OF TWO TRACK HSR ALIGNMENT AS SHOWN IN VOLUME 2 PLAN AND PROFILE DRAWINGS. RETAINING WALL DETAILS TO BE DEVELOPED DURING MORE ADVANCED DESIGN BASED UPON SITE SPECIFIC CONDITIONS AND GEOTECHNICAL INVESTIGATIONS. MECHANICALLY STABILIZED EARTH (MSE) WALLS ASSUMED FOR CONCEPTUAL ENGINEERING. WALL TYPE CONSTRUCTED IN RETAINED FILL AREAS WOULD BE DETERMINED DURING MORE DETAILED DESIGN AND SUBJECT TO SITE SPECIFIC CONSTRAINTS AND GEOTECHNICAL RECOMMENDATION.
- TWO TYPES OF ACCESS ROADS ARE INCLUDED IN DESIGN: FACILITIES ACCESS ROADS AND SHARED ACCESS ROADS. ALIGNMENT OF ACCESS ROAD INDEPENDENT OF HSR ALIGNMENT AND IS SHOWN ON DRAWINGS INCLUDED IN VOLUMES 2 AND 4. REQUIREMENTS AND DESIGN CRITERIA FOR EACH TYPE OF ACCESS ROAD IS PROVIDED IN THE FINAL CONCEPTUAL ENGINEERING REPORT.
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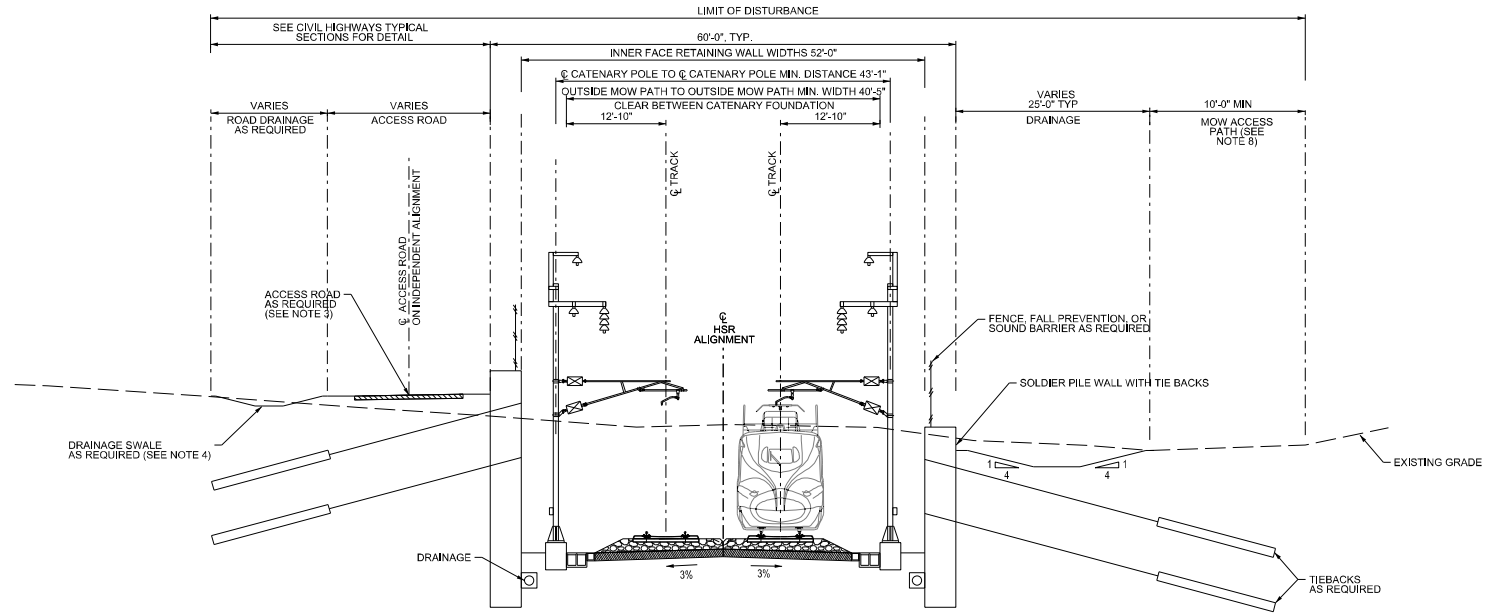
					DESIGNED BY D. PETRIN	DALLAS TO HOUSTON HIGH SPEED RAIL APPLICANT: TCR SWF-2011-00483 SWG-2014-00412	ARUP Arup Texas, Inc. 10070 Richmond Ave., Suite 475 Houston, Texas 77042 USA Tel (713) 783 2787 Fax (713) 343 1467 www.arup.com Texas Registered Engineering Firm: F-1990	FREES NICHOLS 2711 North Haskell Ave., Suite 3300 Dallas, Texas 75204 Tel (214) 217 2206 Fax (214) 217 2201 www.freesc.com Texas Registered Engineering Firm: F-2144	DALLAS TO HOUSTON HIGH-SPEED RAIL FINAL CONCEPTUAL ENGINEERING  TEXAS CENTRAL 1409 South Lamar Street, Suite 1022, Dallas, Texas 75215	Drawing Title GENERAL CIVIL RAIL TYPICAL SECTIONS SHEET 2 OF 13	Scale 1 1/4" = 10' Drawing Status FINAL Job No 234180 Drawing No CVL-00-03002 Rev 01
REV	DATE	BY	CHK	APP	DESCRIPTION						



9. LIMIT OF DISTURBANCE PROVIDED FOR ENVIRONMENTAL ANALYSIS AS SHOWN INCLUDES SPACE PROVISIONS FOR DRAINAGE SWALES AND CONSTRUCTION ACCESS ON EACH SIDE OF RAIL FORMATION. DURING MORE DETAILED ENGINEERING DESIGN DEVELOPMENT, SITE SPECIFIC DRAINAGE DESIGN WOULD BE DEVELOPED TO OPTIMIZE SWALE CONFIGURATIONS. ANALYSIS WAS DONE DURING CONCEPTUAL ENGINEERING TO CONFIRM THAT A MORE COMPACT FOOTPRINT ELIMINATING ONE SWALE AND ONE CONSTRUCTION ACCESS ALLOWANCE WAS FEASIBLE. LOCATIONS WHERE MORE COMPACT ARRANGEMENTS WERE USED IN THE FINAL CONCEPTUAL ENGINEERING DESIGN ARE SHOWN ON THE PLANS IN VOLUME 2.

Scale $1 \frac{1}{4}'' = 10'$		
Drawing Status <div style="text-align: center;">FINAL</div>		
Job No	Drawing No	Rev
234180	CVL-00-03003	01

22x34



D TYPICAL RETAINED CUT

NOTES:

- FOR DIMENSIONS OF TYPICAL TWO TRACK HSR SYSTEM, SEE DRAWING CVL-00-03013. FOR GENERAL NOTES ON TYPICAL SECTIONS, SEE DRAWINGS GEN-00-00008.
- CENTERLINE HSR ALIGNMENT IS CENTERLINE OF TWO TRACK HSR ALIGNMENT AS SHOWN IN VOLUME 2 PLAN AND PROFILE DRAWINGS.
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- CONCEPTUAL SECTION SHOWN WITH RETAINING WALLS ON BOTH SIDES. SIDE SLOPES MAY BE USED ON ONE SIDE BASED ON SITE SPECIFIC CONDITIONS. SEE TYPICAL CUT SECTION FOR DETAILS. LOCATION SPECIFIC CONFIGURATION WOULD BE ADVANCED DURING MORE DETAILED DESIGN.
- LIMIT OF DISTURBANCE PROVIDED FOR ENVIRONMENTAL ANALYSIS AS SHOWN INCLUDES 10FT BEYOND THE FOOTPRINT REQUIRED FOR CIVIL INFRASTRUCTURE, INCLUDING RAIL FORMATION, FENCING, ACCESS ROADS, AND DRAINAGE ELEMENTS. THIS 10FT SPACE ALLOWANCE WOULD BE CLEARED AND GRADED TO ALLOW FOR CONSTRUCTION ACCESS. FOLLOWING CONSTRUCTION, THIS 10FT SPACE ALLOWANCE WOULD BE GRADED, REVEGETATED, AND MAINTAINED AS AN MOW PATH TO PROVIDE FOR INSPECTION, MAINTENANCE, AND EMERGENCY RESPONSE ACCESS. IN WATERS OF THE U.S., PRECONSTRUCTION CONTOURS WOULD BE RESTORED WITHIN THE 10FT SPACE ALLOWANCE AND ALL TEMPORARY FILLS WOULD BE REMOVED IN THEIR ENTIRETY AFTER CONSTRUCTION IS COMPLETE. WHERE PERMANENT ACCESS ROAD IS PROVIDED AS SHOWN ON PLANS, CONSTRUCTION ACCESS WOULD BE PROVIDED WITHIN LIMITS OF THE PROPOSED ACCESS ROAD AND NO ADDITIONAL MOW PATH WOULD BE PROVIDED.
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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
D. PETRIN
DRAWN BY
S. PAUDEL
CHECKED BY
K. SEYMOUR
IN CHARGE
C. TAYLOR
DATE
02/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

ARUP

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DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1408 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

GENERAL
CIVIL RAIL
TYPICAL SECTIONS
SHEET 4 OF 13

Scale

1 1/4" = 10'

Drawing Status

FINAL

Job No

234180

Drawing No

CVL-00-03004

Rev

01



<p>FOR DIMENSIONS OF TYPICAL TWO TRACK HSR SYSTEM, SEE DRAWING CVL-00-30313. FOR GENERAL NOTES ON TYPICAL SECTIONS, SEE DRAWINGS GEN-00-0008.</p>	<p>5. THE TRACKWAY WILL BE ENTIRELY SECURED BETWEEN DALLAS AND HOUSTON TO PREVENT UNAUTHORIZED ACCESS OR INTRUSION ON TO THE OPERATING RAILWAY. SOUND BARRIERS WILL BE PROVIDED WHERE REQUIRED TO MITIGATE NOISE IMPACTS AS IDENTIFIED THROUGH DETAILED ENVIRONMENTAL ANALYSIS. VIBRATION ON ELEVATED STRUCTURE TRACKWAY, FENCING MAY BE REPLACED WITH FALL PREVENTION RAILINGS BASED ON SITE SPECIFIC CONDITIONS.</p>	<p>8. LIMIT OF DISTURBANCE PROVIDED FOR ENVIRONMENTAL ANALYSIS AS SHOWN INCLUDES 10FT BEYOND THE FOOTPRINT REQUIRED FOR CIVIL INFRASTRUCTURE, INCLUDING RAIL FORMATION, FENCING, ACCESS ROADS, AND DRAINAGE ELEMENTS. THIS 10FT SPACE ALLOWANCE WOULD BE CLEARED AND GRADED TO ALLOW FOR CONSTRUCTION ACCESS. FOLLOWING CONSTRUCTION, THIS 10FT SPACE ALLOWANCE WOULD BE GRADED, REVEGETATED TO PREVENT EROSION, AND MAINTAINED AS AN MOW PATH TO PROVIDE FOR INSPECTION, MAINTENANCE, AND EMERGENCY RESPONSE ACCESS. IN WATERS OF THE U.S., PRECONSTRUCTION CONTOURS WOULD BE RESTORED WITHIN THE 10FT SPACE ALLOWANCE AND ALL TEMPORARY FILLS WOULD BE REMOVED IN THEIR ENTIRETY AFTER THE CONSTRUCTION IS COMPLETE. WHERE PERMANENT ACCESS ROAD IS PROVIDED AS SHOWN ON PLANS, CONSTRUCTION ACCESS WOULD BE PROVIDED WITHIN LIMITS OF THE PROPOSED ACCESS ROAD AND NO ADDITIONAL MOW PATH WOULD BE PROVIDED.</p>	<p>10. WITH THE EXCEPTION OF VIADUCT COLUMN LOCATIONS, PRECONSTRUCTION CONTOURS WOULD BE RESTORED AND ALL TEMPORARY FILLS WOULD BE REMOVED FROM WATERS OF THE U.S. BENEATH VIADUCT SPANS.</p>
<p>2. CENTERLINE HSR ALIGNMENT IS CENTERLINE OF TWO TRACK HSR ALIGNMENT AS SHOWN IN VOLUME 2 PLAN AND PROFILE DRAWINGS.</p>	<p>6. FENCE LIMITS, LOCATION, HEIGHT, EMBEDMENT, AND OTHER DETAILS FOR THE MAINTENANCE AND SAFETY MORE DETAILED DESIGN. DETAILS FOR FENCING AND OTHER INTRUSION PROTECTION MEASURES WILL BE INFORMED BY HAZARDS AND RISKS ANALYSIS AND WOULD BE DEVELOPED IN CLOSE COORDINATION WITH APPLICABLE REGULATORY AUTHORITIES AND COMPLY WITH APPLICABLE REQUIREMENTS.</p>	<p>9. SITE SPECIFIC VIADUCT SPANS, VIADUCT DEPTHS, AND COLUMN WIDTHS SHALL BE DETERMINED DURING MORE DETAILED DESIGN BASED ON SITE SPECIFIC CONSIDERATIONS AND VIADUCT HEIGHTS. FOR CONCEPTUAL DESIGN, SPANS ARE ASSUMED TO BE 120 FT. VIADUCT DEPTH IS ASSUMED TO BE 10.5 FT, AND COLUMNS ARE ASSUMED TO BE RECTANGULAR IN SHAPE AND BETWEEN 28 SQUARE FT AND 196 SQUARE FT.</p>	
<p>3. TWO TYPES OF ACCESS ROADS ARE INCLUDED IN DESIGN: FACILITIES ACCESS ROADS AND SHARED ACCESS ROADS. ALIGNMENT OF ACCESS ROAD INDEPENDENT OF HSR ALIGNMENT AND IS SHOWN ON DRAWINGS INCLUDED IN VOLUMES 2 AND 4. REQUIREMENTS AND DESIGN CRITERIA FOR EACH TYPE OF ACCESS ROAD IS PROVIDED IN THE FINAL CONCEPTUAL ENGINEERING REPORT.</p>	<p>7. STAIRCASES NOT SHOWN WOULD BE PROVIDED AS REQUIRED TO SATISFY EMERGENCY ACCESS/EGRESS REQUIREMENTS. STAIRCASE LOCATIONS AND CONFIGURATIONS WOULD BE DEVELOPED DURING MORE DETAILED DESIGN IN CLOSE COORDINATION WITH EMERGENCY PROVIDERS AND BASED ON SITE SPECIFIC CONDITIONS.</p>		
<p>4. DRAINAGE SWALE SIZE AND LOCATION WILL BE BASED ON SITE SPECIFIC CONSTRAINTS, TOPOGRAPHY, AND DRAINAGE REQUIREMENTS. A TYPICAL MINIMUM SWALE WIDTH OF 25 FT HAS BEEN PROVIDED AS SHOWN. THE PLACEMENT OF DRAINAGE SWALES IN WATERS OF THE U.S. WILL BE AVOIDED AND, IF UNAVOIDABLE, MINIMIZED AND CONSTRUCTED TO NOT DRAIN WATERS OF THE U.S.</p>			
<p>5. FOUNDATION REQUIREMENTS WILL VARY BASED ON SITE SPECIFIC CONDITIONS INCLUDING VIADUCT HEIGHT AND GEOTECHNICAL CONDITIONS.</p>			

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
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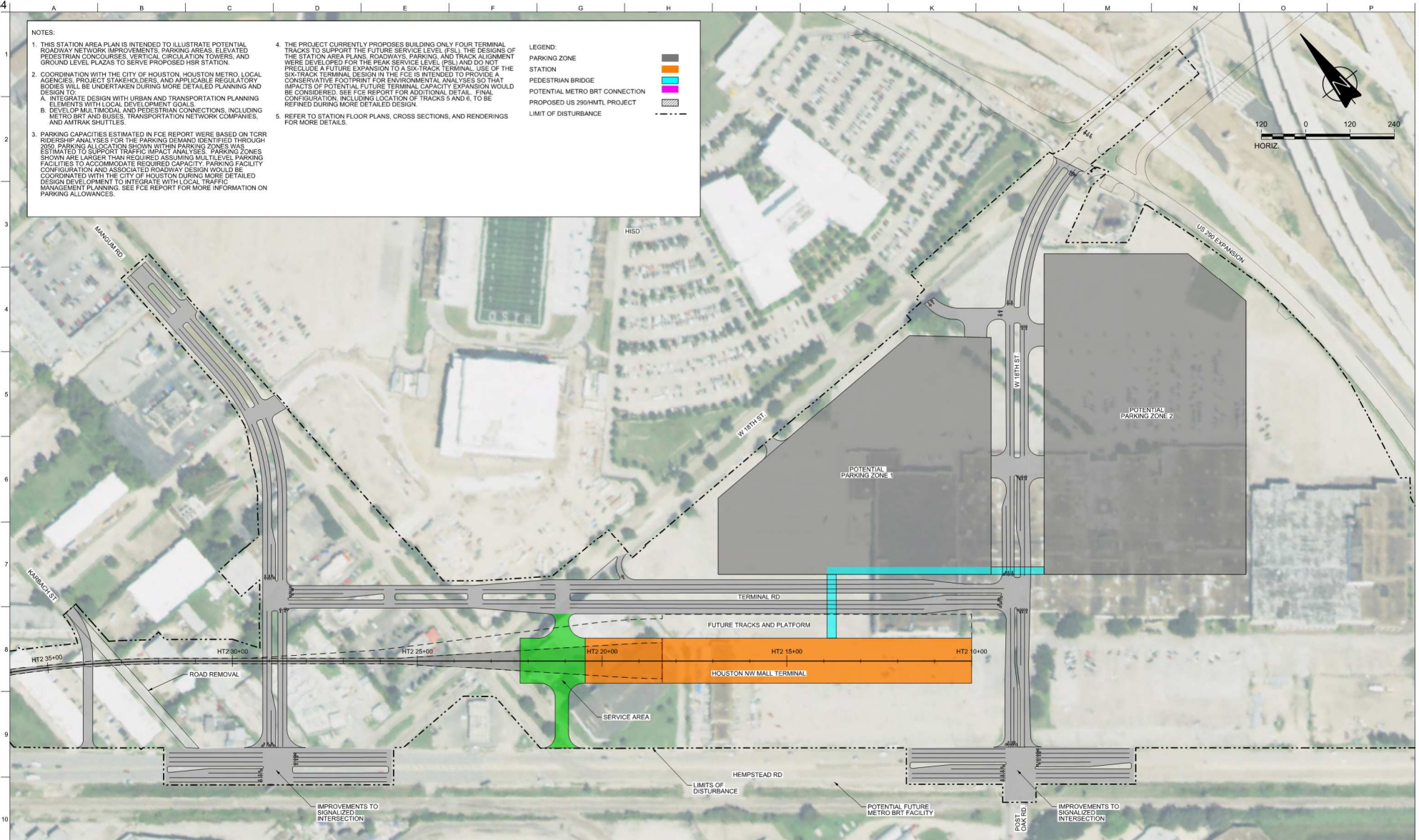
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1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

GENERAL
CIVIL RAIL
TYPICAL SECTIONS
SHEET 5 OF 13

234180



NOTES:

1. THIS STATION AREA PLAN IS INTENDED TO ILLUSTRATE POTENTIAL ROADWAY NETWORK IMPROVEMENTS, PARKING AREAS, ELEVATED PEDESTRIAN CONCOURSES, VERTICAL CIRCULATION TOWERS, AND GROUND LEVEL PLAZAS TO SERVE PROPOSED HSR STATION.

2. COORDINATION WITH THE CITY OF HOUSTON, HOUSTON METRO, LOCAL AGENCIES, PROJECT STAKEHOLDERS, AND APPLICABLE REGULATORY BODIES WILL BE UNDERTAKEN DURING MORE DETAILED PLANNING AND DESIGN TO:

A. INTEGRATE DESIGN WITH URBAN AND TRANSPORTATION PLANNING ELEMENTS WITH LOCAL DEVELOPMENT GOALS.

B. DEVELOP MULTIMODAL AND PEDESTRIAN CONNECTIONS, INCLUDING METRO BRT AND BUSES, TRANSPORTATION NETWORK COMPANIES, AND AMTRAK SHUTTLES.

3. PARKING CAPACITIES ESTIMATED IN FCE REPORT WERE BASED ON TCRR RIDERSHIP ANALYSES FOR THE PARKING DEMAND IDENTIFIED THROUGH 2050. PARKING ALLOCATION SHOWN WITHIN PARKING ZONES WAS ESTIMATED TO SUPPORT TRAFFIC IMPACT ANALYSES. PARKING ZONES SHOWN ARE LARGER THAN REQUIRED ASSUMING MULTILEVEL PARKING FACILITIES TO ACCOMMODATE REQUIRED CAPACITY. PARKING FACILITY CONFIGURATION AND ASSOCIATED ROADWAY DESIGN WOULD BE COORDINATED WITH THE CITY OF HOUSTON DURING MORE DETAILED DESIGN DEVELOPMENT TO INTEGRATE WITH LOCAL TRAFFIC MANAGEMENT PLANNING. SEE FCE REPORT FOR MORE INFORMATION ON PARKING ALLOWANCES.

4. THE PROJECT CURRENTLY PROPOSES BUILDING ONLY FOUR TERMINAL TRACKS TO SUPPORT THE FUTURE SERVICE LEVEL (FSL). THE DESIGNS OF THE STATION AREA PLANS, ROADWAYS, PARKING, AND TRACK ALIGNMENT WERE DEVELOPED FOR THE PEAK SERVICE LEVEL (PSL) AND DO NOT PRECLUDE A FUTURE EXPANSION TO A SIX-TRACK TERMINAL. USE OF THE SIX-TRACK TERMINAL DESIGN IN THE FCE IS INTENDED TO PROVIDE A CONSERVATIVE FOOTPRINT FOR ENVIRONMENTAL ANALYSES SO THAT IMPACTS OF POTENTIAL FUTURE TERMINAL CAPACITY EXPANSION WOULD BE CONSIDERED. SEE FCE REPORT FOR ADDITIONAL DETAIL. FINAL CONFIGURATION, INCLUDING LOCATION OF TRACKS 5 AND 6, TO BE REFINED DURING MORE DETAILED DESIGN.

5. REFER TO STATION FLOOR PLANS, CROSS SECTIONS, AND RENDERINGS FOR MORE DETAILS.

LEGEND:

PARKING ZONE

STATION

PEDESTRIAN BRIDGE

POTENTIAL METRO BRT CONNECTION

PROPOSED US 290/HMTL PROJECT

LIMIT OF DISTURBANCE

<table border="1"><tr><td>REV</td><td>DATE</td><td>BY</td><td>CHK</td><td>APP</td><td>DESCRIPTION</td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>					REV	DATE	BY	CHK	APP	DESCRIPTION																									<p>DESIGNED BY S. KIRBY</p> <p>DRAWN BY J. ALMAGUER</p> <p>CHECKED BY R. SUTTON</p> <p>IN CHARGE C. TAYLOR</p> <p>DATE 2/25/2019</p>		<p>DALLAS TO HOUSTON HIGH SPEED RAIL APPLICANT: TCRR SWF-2011-00483 SWG-2014-00412</p>		<p>ARUP</p> <p>Arup Texas, Inc. 10370 Richmond Ave., Suite 475 Houston, Texas 77042 USA Tel (713) 785 3287 Fax (713) 343 1487 www.arup.com Texas Registered Engineering Firm: F-1990</p>		<p>FREESSE NICHOLS</p> <p>2711 North Haskell Ave., Suite 3300 Dallas, Texas 75204 Tel (214) 217 2200 Fax (214) 217 2201 www.freess.com Texas Registered Engineering Firm: F-2144</p>		<p>DALLAS TO HOUSTON HIGH-SPEED RAIL FINAL CONCEPTUAL ENGINEERING</p> <p>TEXAS CENTRAL</p> <p>1409 South Lamar Street, Suite 1022, Dallas Texas 75215</p>		<p>Drawing Title HOUSTON SEGMENT STATIONS HOUSTON NORTHWEST MALL CIVIL SITE PLAN (FSL)</p>		<p>Scale AS SHOWN</p>	
REV	DATE	BY	CHK	APP	DESCRIPTION																																											
							<p>Drawing Status FINAL</p>																																									
							<p>Job No 234180</p>		<p>Drawing No STA-HN-01015</p>																																							
									<p>Rev</p>																																							



- PLOT BY: collen.zwiebel PLOT TIME: 5/8/2019 6:37:38 PM

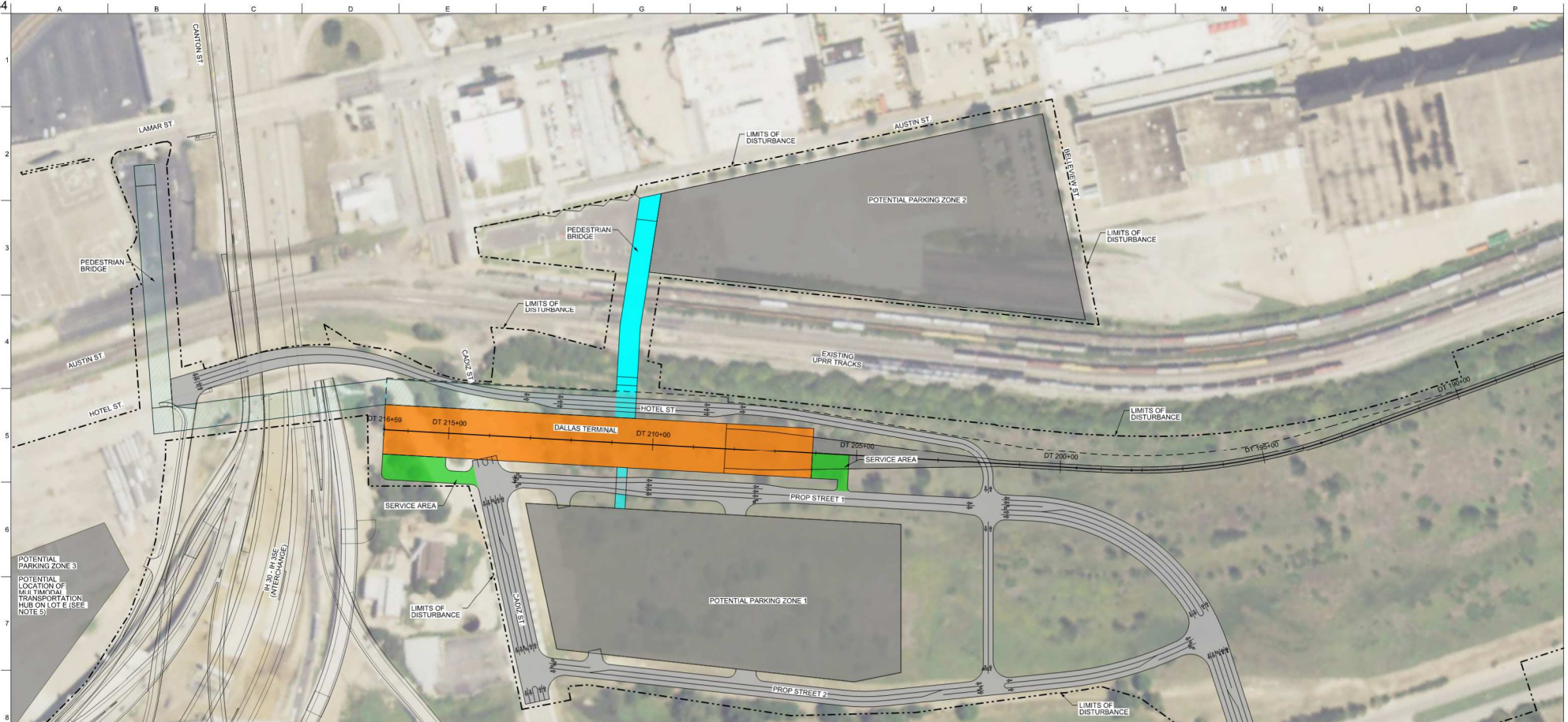
DESIGNED BY S. SPIVEY
DRAWN BY M. MARROQUIN
CHECKED BY T. SANSONE
IN CHARGE C. TAYLOR
DATE 2/25/2019

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING

 **TEXAS
CENTRAL**

1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Arup Texas Inc.



- NOTES:**
1. THIS STATION AREA PLAN IS INTENDED TO ILLUSTRATE POTENTIAL ROADWAY NETWORK IMPROVEMENTS, PARKING AREAS, ELEVATED PEDESTRIAN CONCOURSES, VERTICAL CIRCULATION TOWERS, AND GROUND LEVEL PLAZAS TO SERVE PROPOSED HSR STATION.
 2. COORDINATION WITH THE CITY OF DALLAS, DART, LOCAL AGENCIES, PROJECT STAKEHOLDERS, AND APPLICABLE REGULATORY BODIES WILL BE UNDERTAKEN DURING MORE DETAILED PLANNING AND DESIGN TO:
A. INTEGRATE DESIGN WITH URBAN AND TRANSPORTATION PLANNING ELEMENTS WITH LOCAL DEVELOPMENT GOALS.
B. DEVELOP MULTIMODAL AND PEDESTRIAN CONNECTIONS, INCLUDING BUSES, TRANSPORTATION NETWORK COMPANIES, AND AMTRAK SHUTTLES.
 3. PARKING CAPACITIES ESTIMATED IN FCE REPORT WERE BASED ON TCRR RIDERSHIP ANALYSES FOR THE PARKING DEMAND IDENTIFIED THROUGH 2050. PARKING ALLOCATION SHOWN WITHIN PARKING ZONES WAS ESTIMATED TO SUPPORT TRAFFIC IMPACT ANALYSES. PARKING ZONES SHOWN ARE LARGER THAN REQUIRED ASSUMING MULTILEVEL PARKING FACILITIES TO ACCOMMODATE REQUIRED CAPACITY. PARKING FACILITY CONFIGURATION AND ASSOCIATED ROADWAY DESIGN WOULD BE COORDINATED WITH THE CITY OF HOUSTON DURING MORE DETAILED DESIGN DEVELOPMENT TO INTEGRATE WITH LOCAL TRAFFIC MANAGEMENT PLANNING. SEE FCE REPORT FOR MORE INFORMATION ON PARKING ALLOWANCES.
 4. THE PROJECT CURRENTLY PROPOSES BUILDING ONLY FOUR TERMINAL TRACKS TO SUPPORT THE FUTURE SERVICE LEVEL (FSL). THE DESIGNS OF THE STATION AREA PLANS, ROADWAYS, PARKING, AND TRACK ALIGNMENT WERE DEVELOPED FOR THE PEAK SERVICE LEVEL (PSL) AND DO NOT PRECLUDE A FUTURE EXPANSION TO A SIX-TRACK TERMINAL. USE OF THE SIX-TRACK TERMINAL DESIGN IN THE FCE IS INTENDED TO PROVIDE A CONSERVATIVE FOOTPRINT FOR ENVIRONMENTAL ANALYSES SO THAT IMPACTS OF POTENTIAL FUTURE TERMINAL CAPACITY EXPANSION WOULD BE CONSIDERED. SEE FCE REPORT FOR ADDITIONAL DETAIL.
 5. CITY OF DALLAS SUSTAINABILITY COMMITTEE RECOMMENDED A FEASIBILITY STUDY FOR A NEW TRANSPORTATION HUB ON LOT E TO ACCESS AMTRAK, DART, TRE, PASSENGER BUSES, AUTOMOBILES, BICYCLES, AND OTHER TRANSIT MODES ON OCTOBER 8, 2018. DEVELOPMENT OF STATION AREA PLAN DURING MORE DETAILED DESIGN WILL BE COORDINATED WITH THE CITY OF DALLAS TO INCORPORATE FINDINGS FROM THAT SEPARATE EFFORT.
 6. REFER TO STATION FLOOR PLANS, CROSS SECTIONS, AND RENDERINGS FOR MORE DETAILS.

LEGEND:

- SERVICE AREA
- PARKING ZONE
- STATION
- PEDESTRIAN BRIDGE
- POTENTIAL PEDESTRIAN BRIDGE (SEE NOTE 5)
- LIMIT OF DISTURBANCE

					DESIGNED BY S. KIRBY
					DRAWN BY J. ALMAGUER
					CHECKED BY R. SUTTON
					IN CHARGE C. TAYLOR
					DATE 2/25/2019
REV	DATE	BY	CHK	APP	DESCRIPTION

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

ARUP
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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING

1409 South Lamar Street, Suite 1022, Dallas Texas 75215

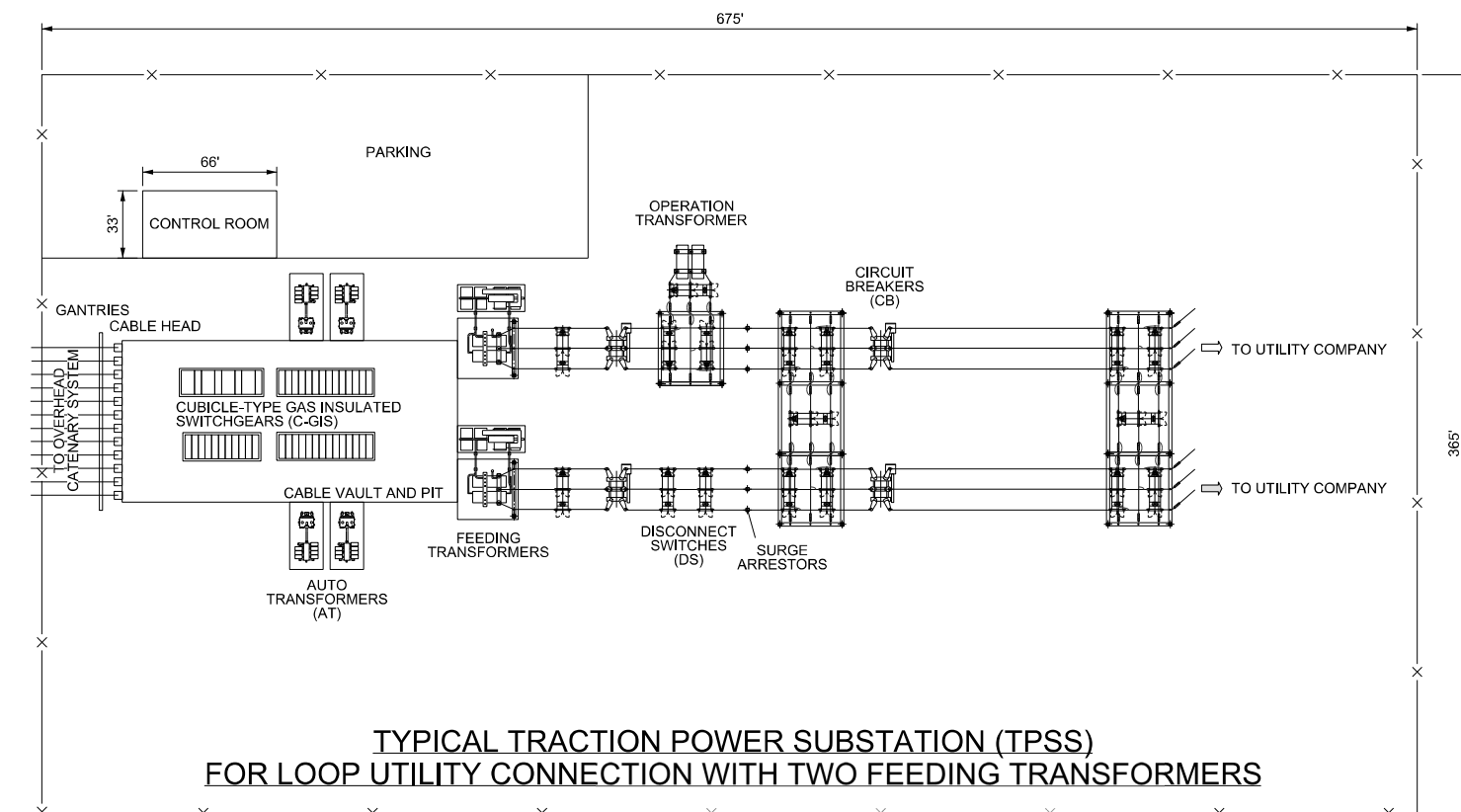
Drawing Title
**DALLAS SEGMENT
STATIONS
DALLAS STATION
CIVIL SITE PLAN**

Scale AS SHOWN	Drawing Status FINAL	Job No 234180	Drawing No STA-DS-01049	Rev 01
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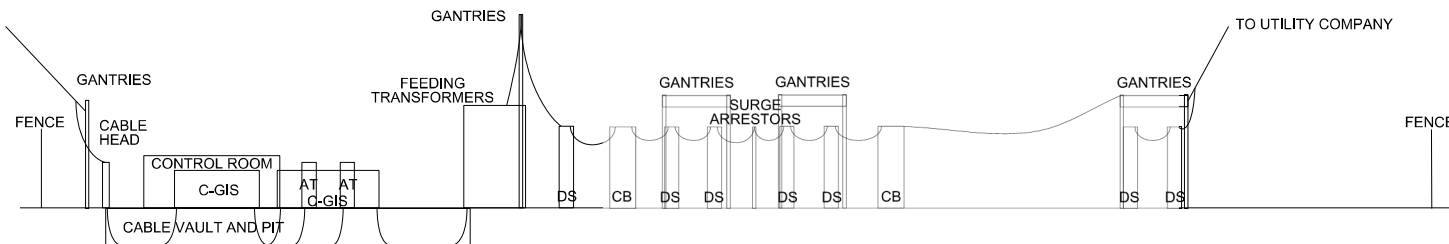
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NOTES:

1. TYPICAL ARRANGEMENT OF TRACTION POWER SUBSTATION SHOWN FOR PURPOSES OF ENVIRONMENTAL IMPACT ANALYSES. ARRANGEMENT SHOWN INCLUDES ALLOWANCE FOR UTILITY SUBSTATIONS, REQUIRED TRACTION POWER DISTRIBUTION EQUIPMENT, PARKING, ADEQUATE WORK AREA FOR MAINTENANCE AND STAGING OF EQUIPMENT INSIDE FENCE, AND GENERAL SITE GRADING AND IMPROVEMENTS.
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5. ACCESS ROAD LOCATION RELATIVE TO SITE ARRANGEMENTS VARIES BY LOCATION. SEE PLAN AND PROFILE DRAWINGS FOR LOCATIONS AND ASSOCIATED LIMIT OF DISTURBANCE.
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7. TPSS-HN-2, TPSS-HN-4, TPSS-HN-6, AND TPSS-DS-3 WOULD HAVE 200FT WIDE LOOP CONNECTIONS. OTHER TPSS WOULD HAVE 100FT WIDE RADIAL CONNECTIONS.
8. BASED ON PRELIMINARY DESIGN, THERE WILL BE
A. 546KG OF SF6 GAS WITHIN THE C-GIS PANELS FOR EACH TPSS. THE ANNUAL LEAKAGE RATE WILL BE NO MORE THAN 0.5%.
B. 40KG OF SF6 GAS WITHIN EACH 138KV BREAKERS. THE ANNUAL LEAKAGE RATE WILL BE NO MORE THAN 1%. FOR ALTERNATIVE ALIGNMENT A:
-TWO (2) WITH FOUR (4) 138KV BREAKERS EACH
-ONE (1) WITH THREE (3) 138KV BREAKERS
-TWO (2) WITH TWO (2) 138KV BREAKERS EACH
-NINE (9) WITH ONE (1) 138KV BREAKERS EACH



TYPICAL TRACTION POWER SUBSTATION (TPSS) FOR LOOP UTILITY CONNECTION WITH TWO FEEDING TRANSFORMERS



ELEVATION A-A



DESIGNED BY J. HAMMOND	REV	DATE	BY	CHK	APP
DRAWN BY J. GIBBORT					
CHECKED BY T. SMITH					
IN CHARGE C. TAYLOR					
DATE 2/25/2019					

DESCRIPTION

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1400 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

HN, WT, NW, EW, DS
RAILWAY FACILITIES
TPSS LOOP 2FDR
TYPICAL LAYOUT PLAN

Scale

AS SHOWN

Drawing Status

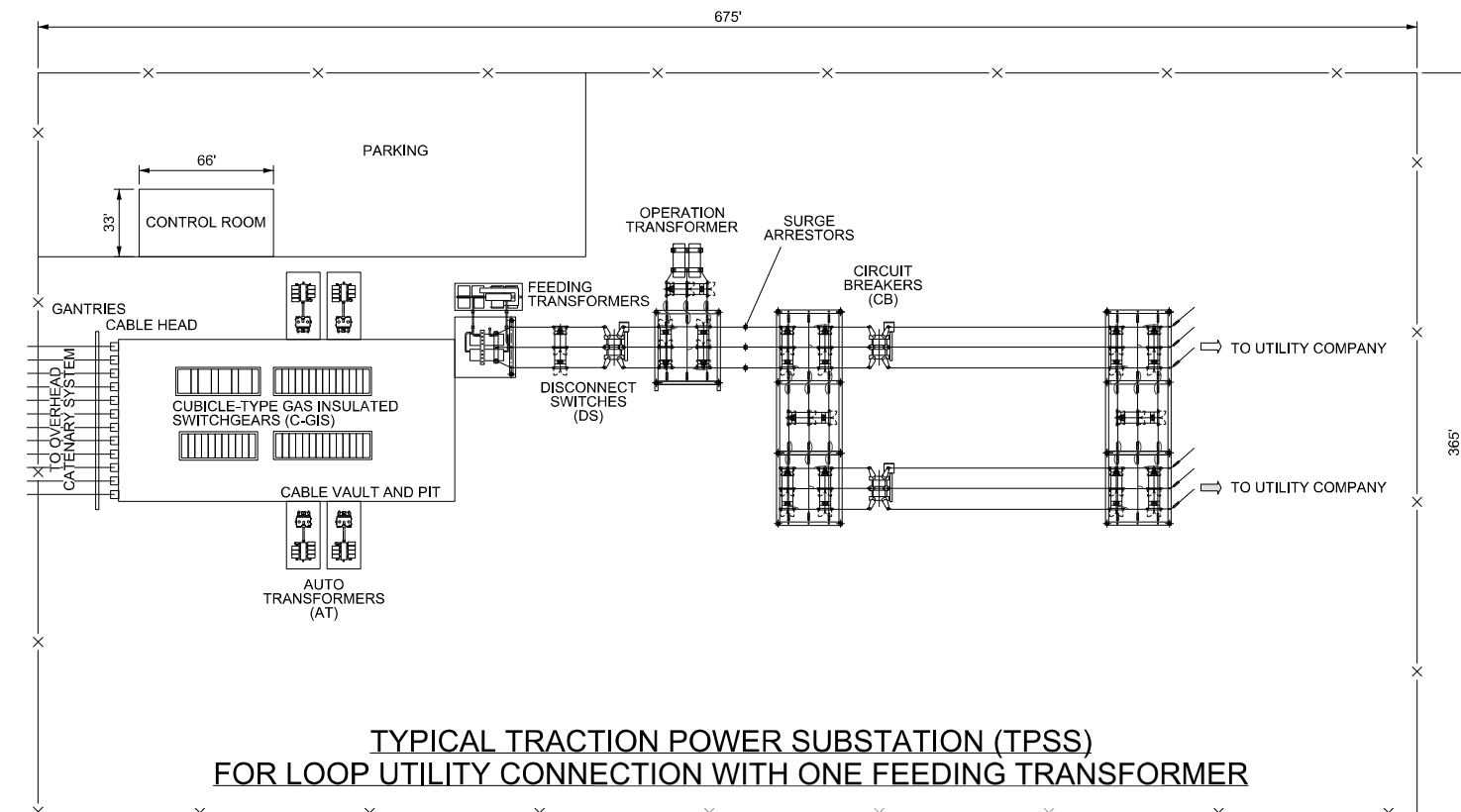
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JOB No	Drawing No	Rev
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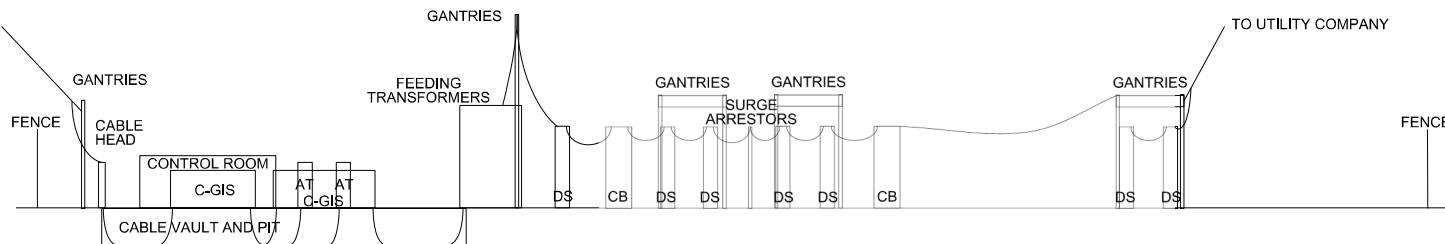
22x34

NOTES:

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B. 40KG OF SF6 GAS WITHIN EACH 138KV BREAKERS. THE ANNUAL LEAKAGE RATE WILL BE NO MORE THAN



**TYPICAL TRACTION POWER SUBSTATION (TPSS)
FOR LOOP UTILITY CONNECTION WITH ONE FEEDING TRANSFORMER**



ELEVATION A-A

DESIGNED BY	J. HAMMOND
DRAWN BY	J. GIBBORT
CHECKED BY	T. SMITH
IN CHARGE	C. TAYLOR
DATE	2/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1400 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

HN, WT, NW, EW, DS
RAILWAY FACILITIES
TPSS LOOP 1FDR
TYPICAL LAYOUT PLAN

Scale
AS SHOWN

Drawing Status

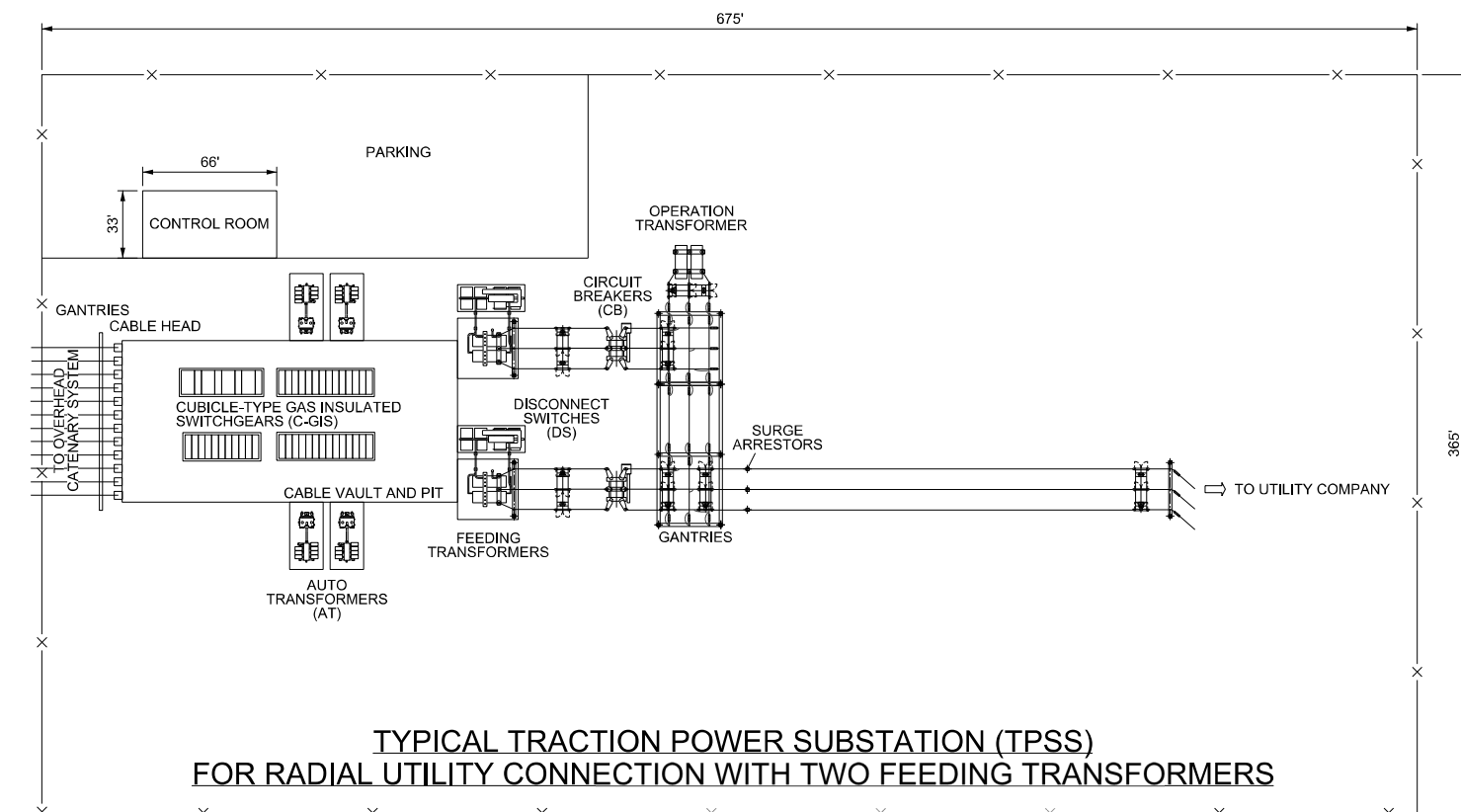
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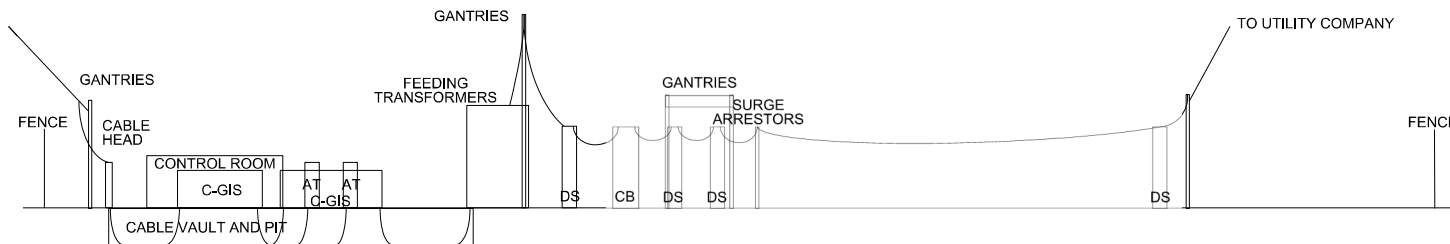
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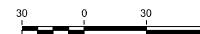
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TYPICAL TRACTION POWER SUBSTATION (TPSS) FOR RADIAL UTILITY CONNECTION WITH TWO FEEDING TRANSFORMERS



ELEVATION A-A



DESIGNED BY	J. HAMMOND
DRAWN BY	J. GIBBORT
CHECKED BY	T. SMITH
IN CHARGE	C. TAYLOR
DATE	2/25/2019

REV	DATE	BY	CHK	APP	DESCRIPTION

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



**TEXAS
CENTRAL**

1400 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

HN, WT, NW, EW, DS
RAILWAY FACILITIES
TPSS RADIAL 2FDR
TYPICAL LAYOUT PLAN

Scale
AS SHOWN

Drawing Status

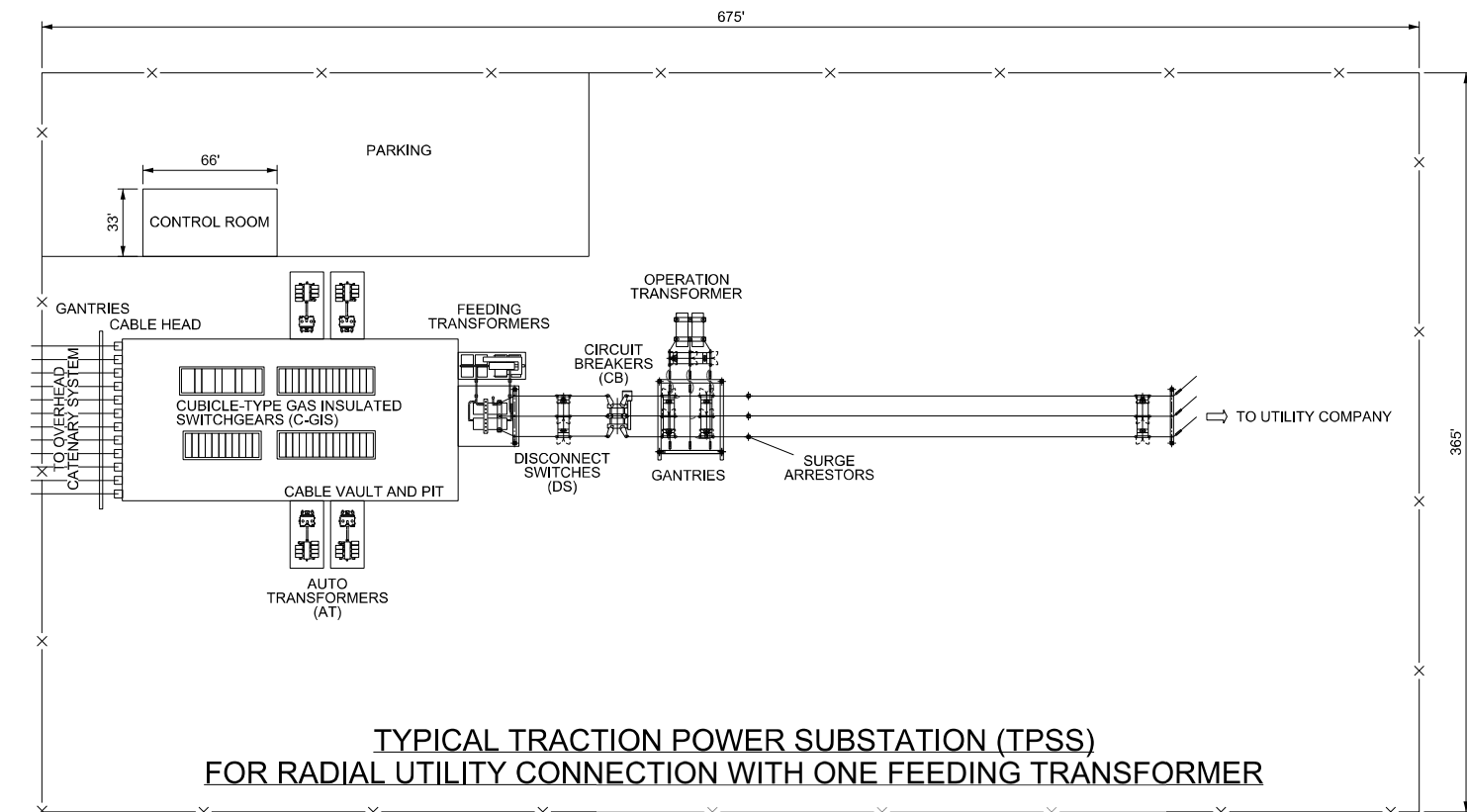
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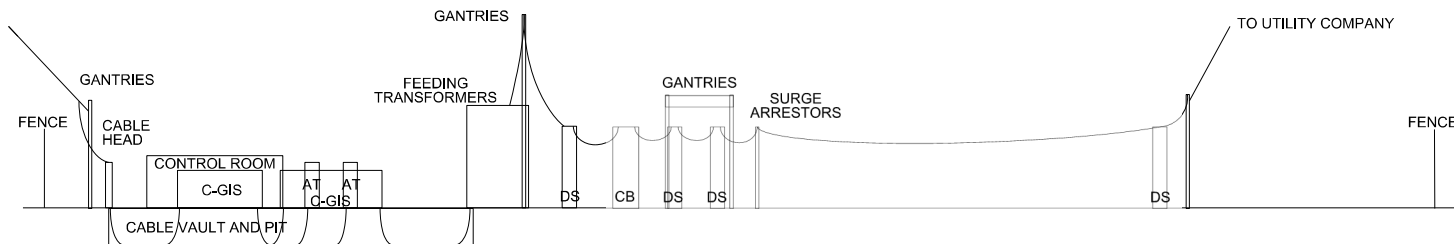
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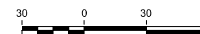
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TYPICAL TRACTION POWER SUBSTATION (TPSS) FOR RADIAL UTILITY CONNECTION WITH ONE FEEDING TRANSFORMER



ELEVATION A-A



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
J. HAMMOND

DRAWN BY
J. GIBBORT

CHECKED BY
T. SMITH

IN CHARGE
C. TAYLOR

DATE
2/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



**TEXAS
CENTRAL**

1400 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

HN, WT, NW, EW, DS
RAILWAY FACILITIES
TPSS RADIAL 1FDR
TYPICAL LAYOUT PLAN

Scale
AS SHOWN

Drawing Status

FINAL

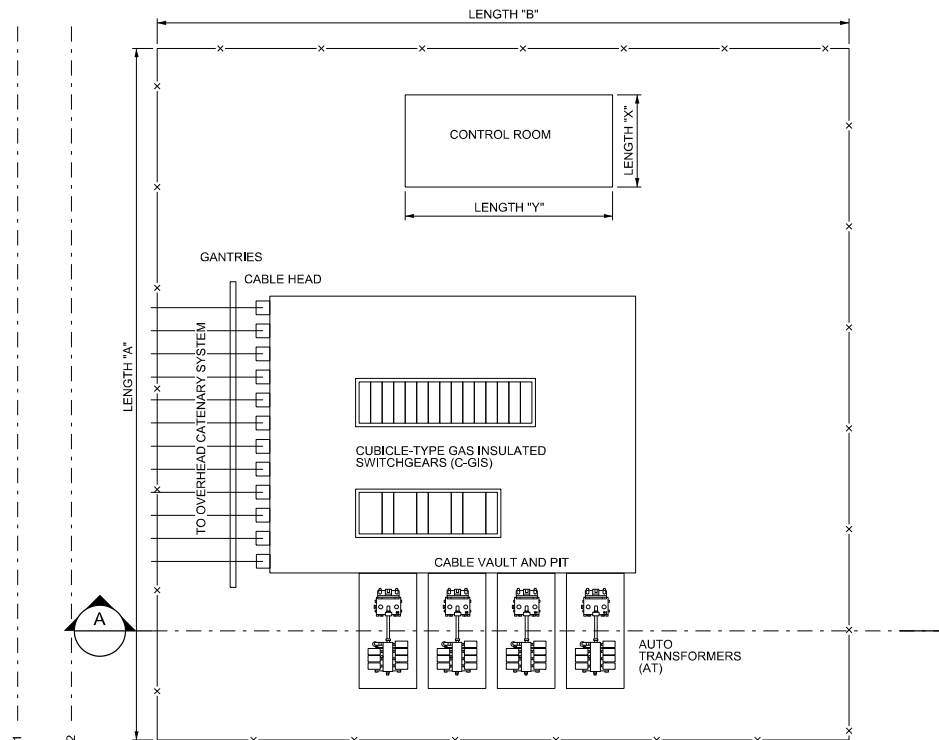
Doc No	Drawing No	Rev
234180	SYS-00-01006	01

22x34

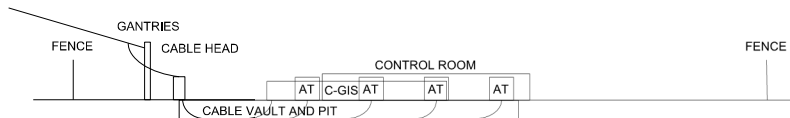
NOTES:

1. TYPICAL ARRANGEMENT OF SECTIONING POST/SUB-SECTIONING POST/AUTO TRANSFORMER POST SHOWN FOR PURPOSES OF ENVIRONMENTAL IMPACT ANALYSES.
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POWER FACILITIES ADJACENT TO ROW				
FACILITY NAME	TLA	CONTROL ROOM		YARD
		X (FT)	Y (FT)	A (FT) B (FT)
AUTO TRANSFORMER POST	ATP	27	60	130 150
SECTIONING POST	SP	27	60	200 200
SUB-SECTIONING POST	SSP	27	60	150 150



POWER FACILITIES ADJACENT TO ROW



ELEVATION A-A

DESIGNED BY	J. HAMMOND
DRAWN BY	C. ZWIEBEL
CHECKED BY	T. SMITH
IN CHARGE	C. TAYLOR
DATE	2/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

HN, WT, NW, EW, DS
RAILWAY FACILITIES
SP, SSP, ATP
TYPICAL LAYOUT PLAN

Scale

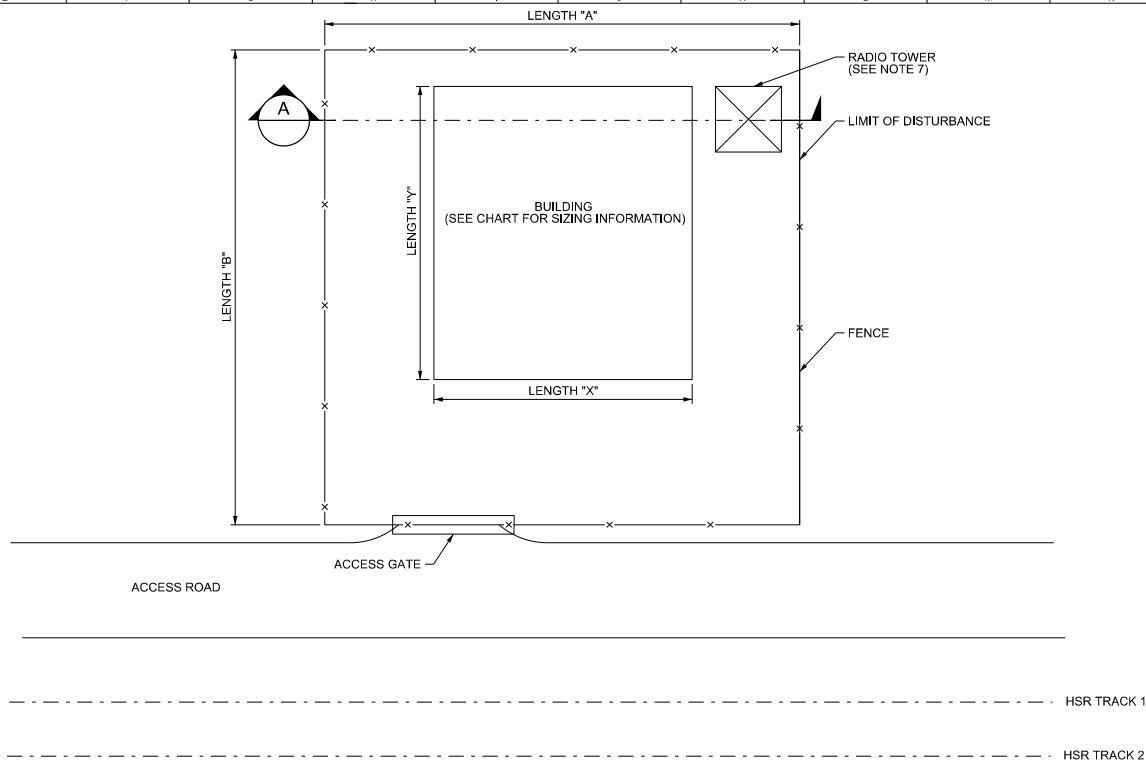
NOT TO SCALE

Drawing Status

FINAL

Job No	Drawing No	Rev
234180	SYS-00-01001	01

22x34

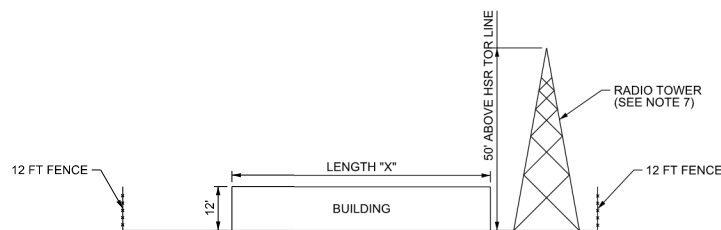


NOTES:

1. TYPICAL ARRANGEMENT OF SIGNALING AND COMMUNICATIONS FACILITIES SHOWN FOR PURPOSES OF ENVIRONMENTAL IMPACT ANALYSES.
2. SITE SPECIFIC CONSTRAINTS AT EACH LOCATION WILL INFLUENCE EQUIPMENT ARRANGEMENTS DEPENDING ON THE COMPLEXITY OF THE TRACK LOCATION BEING CONTROLLED AND THE AMOUNT OF EQUIPMENT REQUIRED AT EACH LOCATION.
3. SIGNALING AND COMMUNICATION NEEDS AND ASSOCIATED INFRASTRUCTURE REQUIREMENTS AT EACH LOCATION WILL BE DETERMINED THROUGH DETAILED SYSTEM ANALYSES DURING MORE ADVANCED DESIGN.
4. COMMUNICATION HOUSES AND ASSOCIATED RADIO TOWER MAY BE INTEGRATED INTO SIGNALING FACILITIES WHERE PRACTICABLE TO MINIMIZE ROW REQUIREMENTS AND IMPACTS.
5. ACCESS ROAD LOCATION RELATIVE TO SITE ARRANGEMENTS VARIES BY LOCATION. SEE PLAN AND PROFILE DRAWINGS FOR LOCATIONS AND ASSOCIATED LIMIT OF DISTURBANCE.
6. THESE FACILITIES WILL BE LOCATED CLOSE TO THE ROW TO SUPPORT CONNECTIONS TO THE TRACK AND TO FACILITATE RADIO COMMUNICATIONS WITH CONTROL SYSTEMS WITHIN THE TRAIN AND MAINTENANCE CREWS ALONG THE ROW. SEE PLAN AND PROFILE DRAWINGS FOR LOCATIONS AND ASSOCIATED LIMIT OF DISTURBANCE.
7. RADIO ANTENNA SHALL BE LOCATED ONLY IF FACILITY IS A COMMUNICATION HOUSE.

SIGNALING AND COMMUNICATIONS FACILITIES ADJACENT TO ROW					
FACILITY NAME	TLA	BUILDING X (FT)	Y (FT)	YARD A (FT)	B (FT)
COMMUNICATION HOUSE	CH	16	16	30	30
SUB-SIGNAL HOUSE	SSH	50	50	60	80
MAIN SIGNAL HOUSE	MSH	100	43	130	100
INTERMEDIATE SIGNAL HOUSE	ISH	66	46	100	115

SIGNALING AND COMMUNICATIONS FACILITIES ADJACENT TO ROW



ELEVATION A-A

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
J. HAMMOND
DRAWN BY
C. ZWIEBEL
CHECKED BY
T. SMITH
IN CHARGE
C. TAYLOR
DATE
2/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCR
SWF-2011-00483
SWG-2014-00412

ARUP

Arup Texas, Inc.
10370 Richmond Ave., Suite 475
Houston, Texas 77042 USA
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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

HN, WT, NW, EW, DS
RAILWAY FACILITIES
MSH, SSH, ISH, CH
TYPICAL LAYOUT PLAN

Scale
NOT TO SCALE

Drawing Status

FINAL

Job No	Drawing No	Rev
234180	SYS-00-01002	01

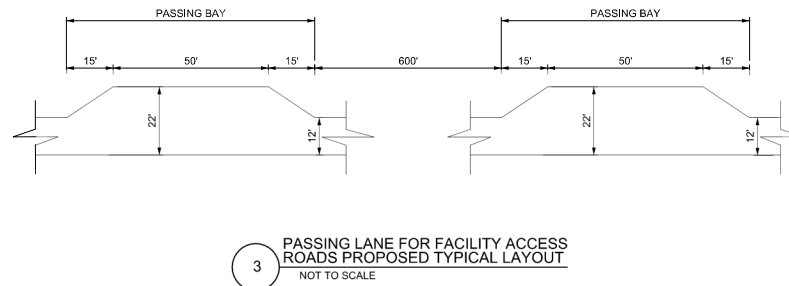
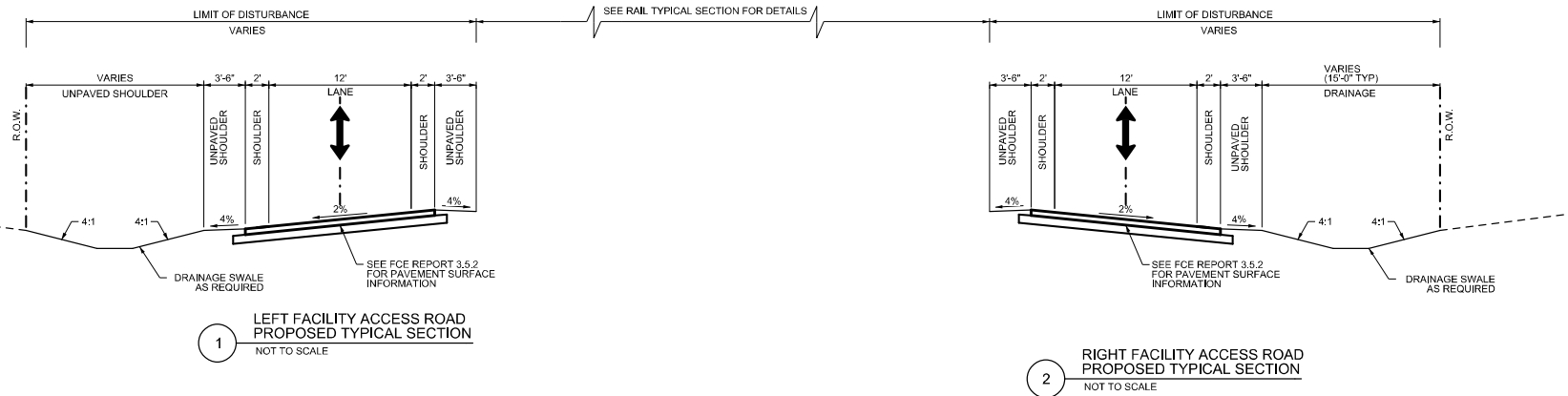
22x34

PLOT TIME: 6/28/2019 10:27:37 AM

PLOT BY: collins.zambelli

PLOT BY: collins.zambelli

Arup Texas Inc.



NOTES:

1. ACCESS ROADS PROVIDED FOR MAINTENANCE ACCESS, FACILITIES ACCESS, AND EMERGENCY RESPONSE. FOR DEFINITION OF ACCESS ROAD TYPES, INTENDED USE, AND DESIGN CRITERIA, SEE FCE REPORT SECTION 3.5.2.

DESIGNED BY	T. SANSONE
DRAWN BY	S. PAUDEL
CHECKED BY	D. PETRIN
IN CHARGE	C. TAYLOR
DATE	02/25/2019

REV	DATE	BY	CHK	APP	DESCRIPTION

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCR
SWF-2011-00483
SWG-2014-00412

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www.frees.com
Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

GENERAL
CIVIL HIGHWAY
TYPICAL SECTIONS
SHEET 1 OF 4

Scale

NOT TO SCALE

Drawing Status

FINAL

Job No

234180

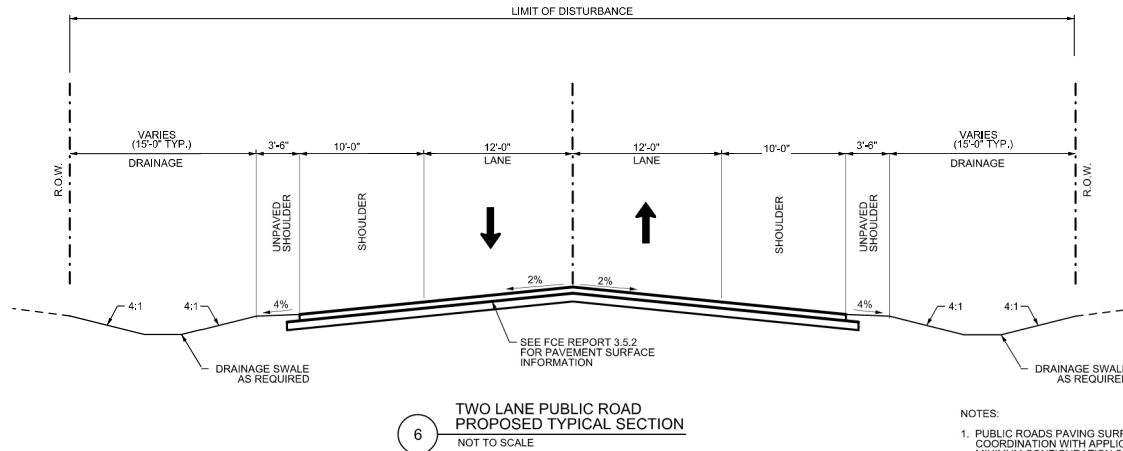
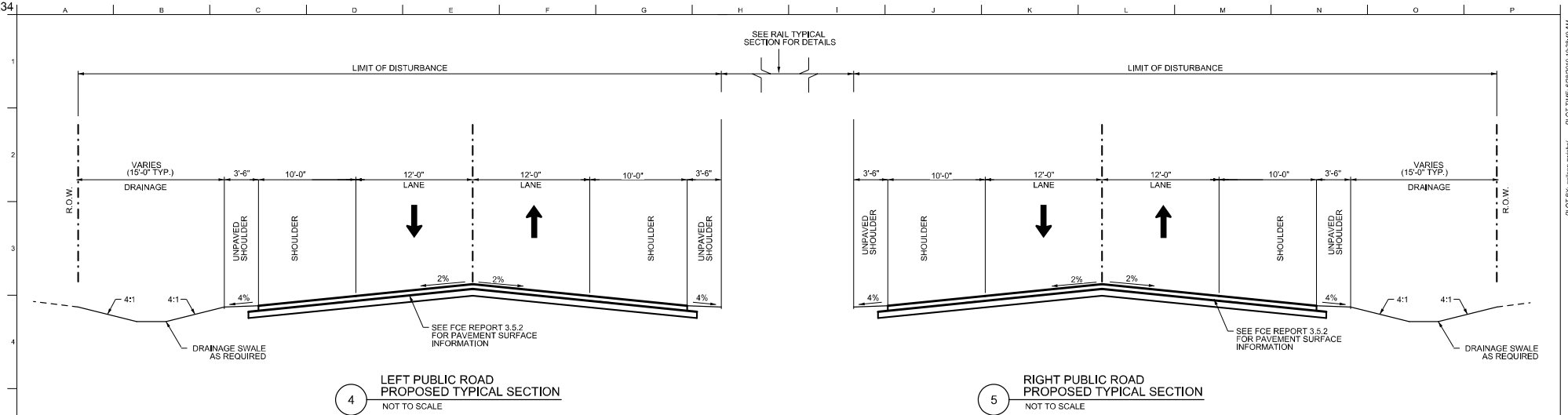
Drawing No

CVL-00-03030

Rev

01

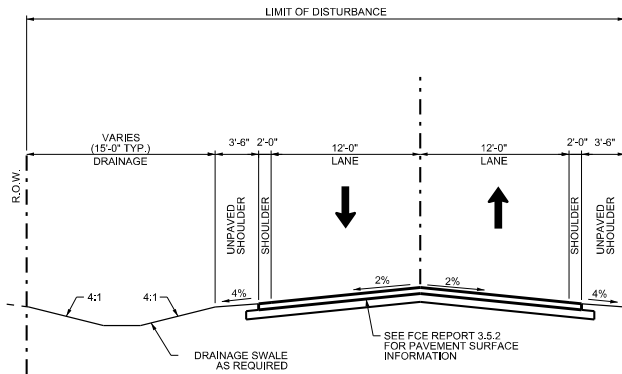
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22x34

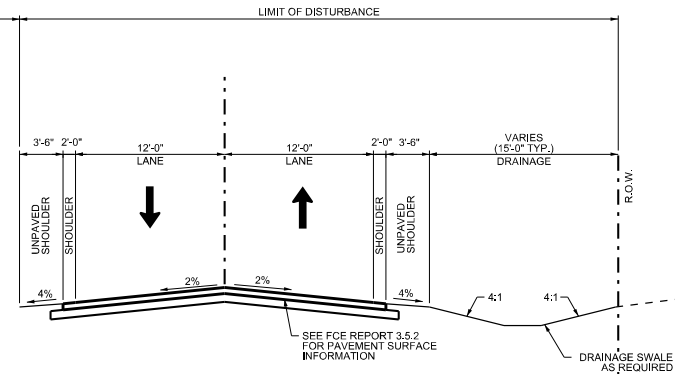
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PLOT TIME: 6/27/2019 10:38:27 AM

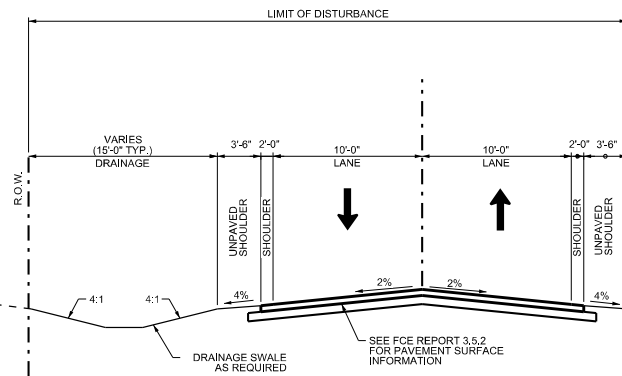


7 LEFT FACILITY ACCESS
ROAD PROPOSED TYPICAL SECTION
NOT TO SCALE

SEE RAIL TYPICAL SECTION FOR DETAILS

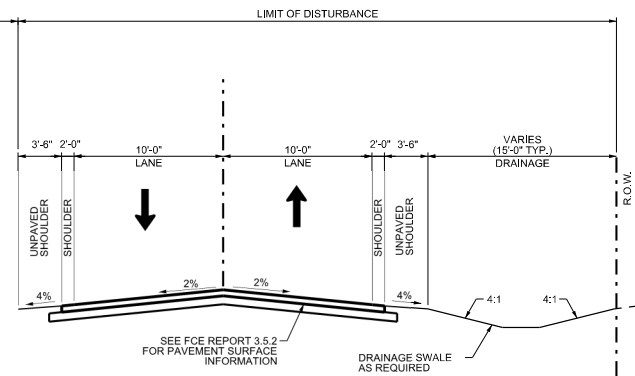


8 RIGHT FACILITY ACCESS
ROAD PROPOSED TYPICAL SECTION
NOT TO SCALE



9 LEFT SHARED ACCESS ROAD
PROPOSED TYPICAL SECTION
NOT TO SCALE

SEE RAIL TYPICAL SECTION FOR DETAILS



10 RIGHT SHARED ACCESS ROAD
PROPOSED TYPICAL SECTION
NOT TO SCALE

NOTES:

1. SHARED ACCESS ROADS PAVING SURFACES AND LANE CONFIGURATIONS SHALL BE DEVELOPED IN CLOSE COORDINATION WITH APPLICABLE ROADWAY AUTHORITY DURING MORE DETAILED DESIGN. MINIMUM CONFIGURATION SHOWN. FOR SHARED ACCESS ROAD LOCATIONS SEE PLANS.
2. SEE FCE REPORT SECTION 3.5.2 FOR DESCRIPTION, PURPOSE AND DESIGN CRITERIA OF SHARED ACCESS ROADS.
3. SEE FCE REPORT 3.5.2 FOR DESCRIPTION, PURPOSE AND DESIGN CRITERIA OF MOW AND TMF FACILITY ACCESS ROADS.

						DESIGNED BY G. VOWEL
						DRAWN BY S. PAUDEL
						CHECKED BY D. PETRIN
						IN CHARGE C. TAYLOR
						DATE 02/25/2019
REV.	DATE	BY	CHK	APP		DESCRIPTION

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

GENERAL
CIVIL HIGHWAY
TYPICAL SECTIONS
SHEET 3 OF 4

Scale

NOT TO SCALE

Drawing Status

FINAL

Job No

234180

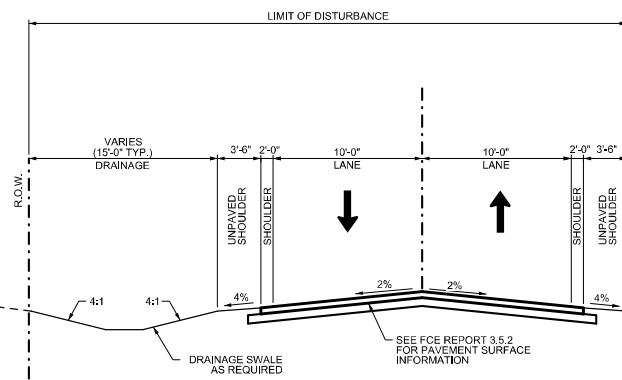
Drawing No

CVL-00-03032

Rev

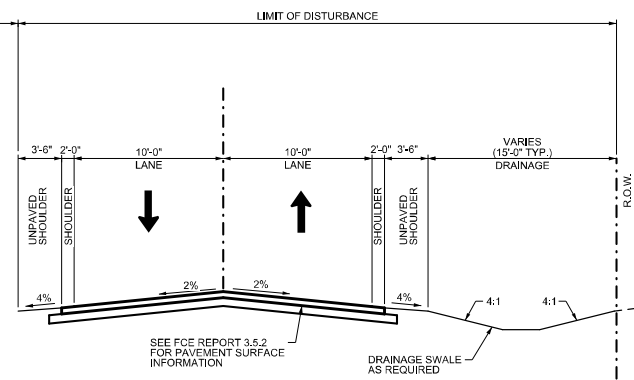
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22x34



11 LEFT PRIVATE ACCESS ROAD
PROPOSED TYPICAL SECTION
NOT TO SCALE

SEE RAIL TYPICAL SECTION FOR DETAILS



12 RIGHT PRIVATE ACCESS ROAD
PROPOSED TYPICAL SECTION
NOT TO SCALE

NOTES:

1. SEE FCE REPORT SECTION 3.5.2 FOR DESCRIPTION, PURPOSE AND DESIGN CRITERIA OF PRIVATE ACCESS ROADS.
2. PRIVATE ACCESS ROAD TYPICALLY SERVES TO PROVIDE PROPERTY ACCESS TO ADJACENT LAND OWNERS.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
G. VOWELS

DRAWN BY
S. PAUDEL

CHECKED BY
D. PETRIN

IN CHARGE
C. TAYLOR

DATE
02/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1408 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

GENERAL
CIVIL HIGHWAY
TYPICAL SECTION
SHEET 4 OF 4

Scale

NOT TO SCALE

Drawing Status

FINAL

Job No

234180

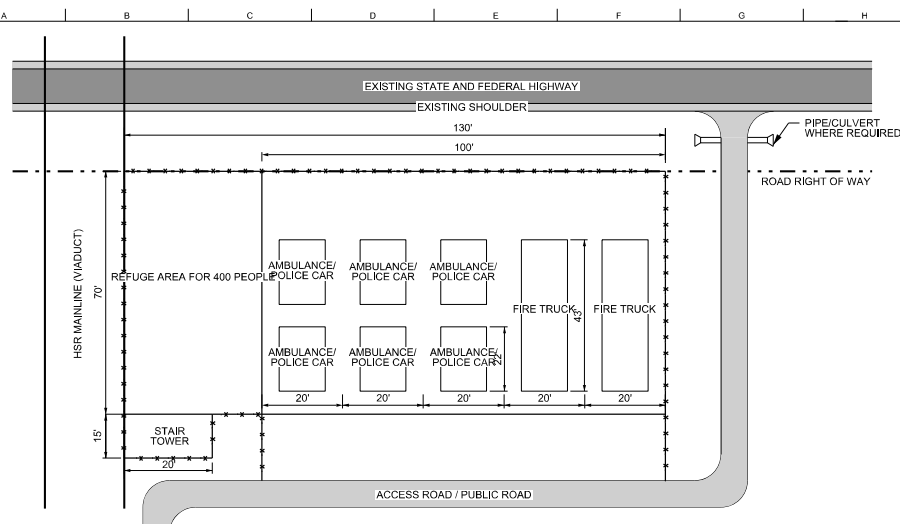
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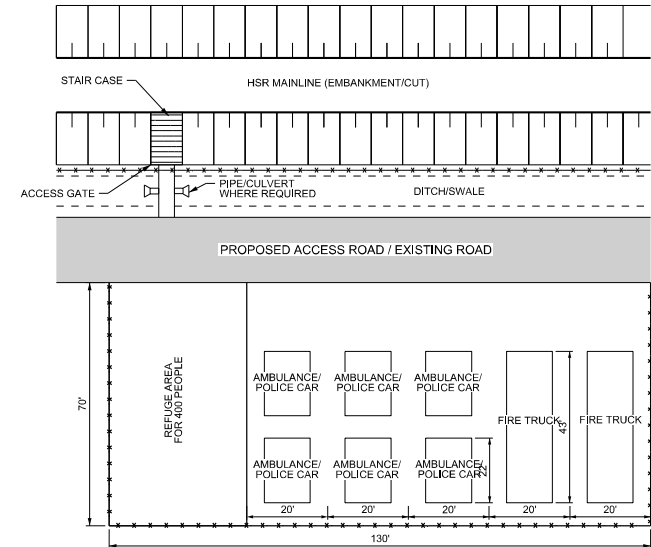
Rev

01

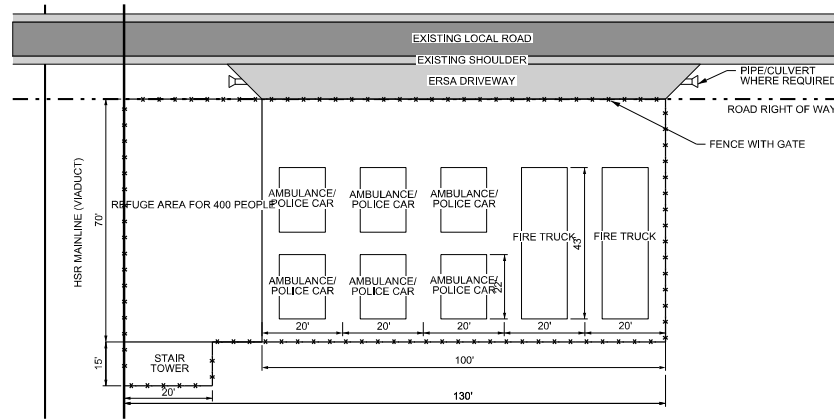
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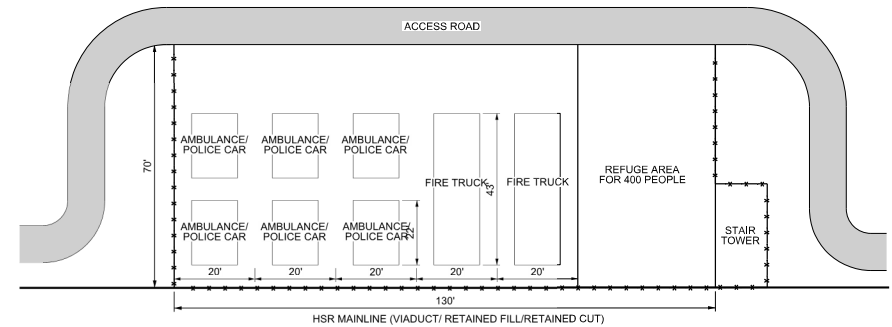
PROPOSED LAYOUT FOR EMERGENCY RESPONSE AND MAINTENANCE STAGING AREA ON VIADUCTS ALONG STATE AND FEDERAL HIGHWAYS



PROPOSED LAYOUT FOR EMERGENCY RESPONSE AND MAINTENANCE STAGING AREA ALONG EMBANKMENT OR CUT SECTION



PROPOSED LAYOUT FOR EMERGENCY RESPONSE AND MAINTENANCE STAGING AREA ON VIADUCTS ALONG LOCAL ROADS OR ACCESS ROADS



PROPOSED LAYOUT FOR EMERGENCY RESPONSE AND MAINTENANCE STAGING AREA ON VIADUCT/RETAINED FILL/RETAINED CUT ALONG ACCESS ROADS

DESIGNED BY	G. VOWELS
DRAWN BY	J. ALMAGUER
CHECKED BY	D. PETRIN
IN CHARGE	C. TAYLOR
DATE	02/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCR
SWF-2011-00483
SWG-2014-00412

ARUP

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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

GENERAL
CIVIL HIGHWAY
EMERG. RESPONSE MAINT.
AND STAGING AREA LAYOUTS

Scale

NOT TO SCALE

Drawing Status

FINAL

Job No

234180

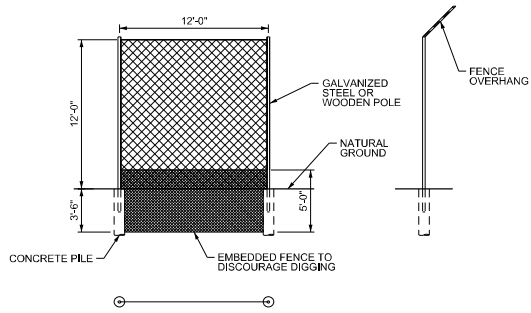
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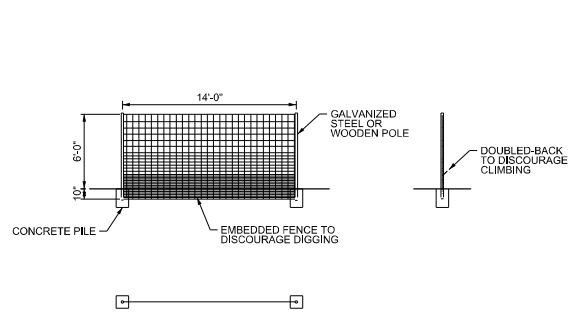
Rev

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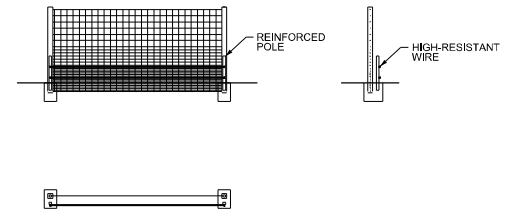
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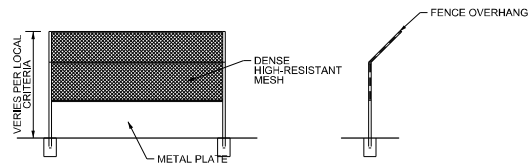
**STANDARD FENCE
FOR LARGE ANIMALS**



**STANDARD FENCE
FOR SMALL ANIMALS**



REINFORCED FENCE



INTRUSION PROTECTION FENCE

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
R. ALDREDGE
DRAWN BY
S. PAUDEL
CHECKED BY
R. ZARATE
IN CHARGE
C. TAYLOR
DATE
2/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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Texas Registered Engineering Firm: F-1990

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2711 North Haskell Ave., Suite 3300
Dallas, Texas 75204
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www.fnec.com
Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1400 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

**GENERAL
CIVIL STRUCTURES
WILDLIFE CROSSING
FENCE DETAILS**

Scale

1"= 10'

Drawing Status

FINAL

Doc No

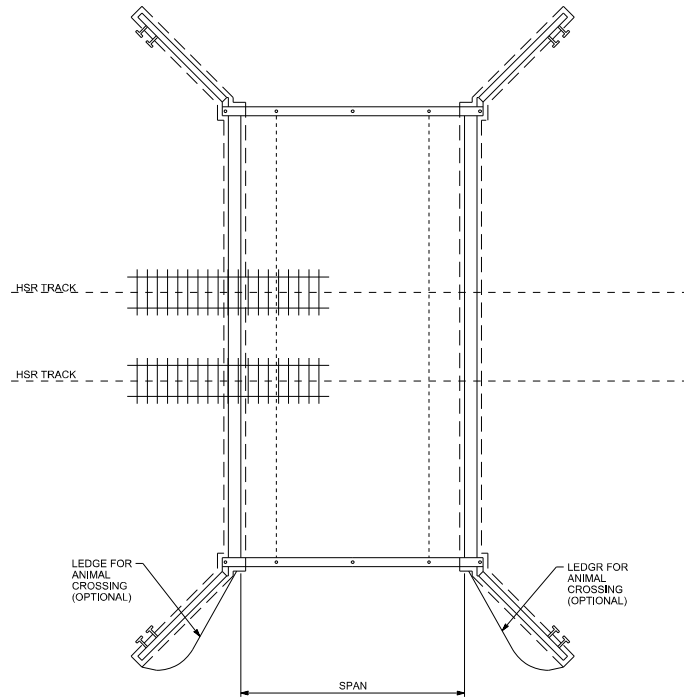
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Drawing No

WLC-00-04002

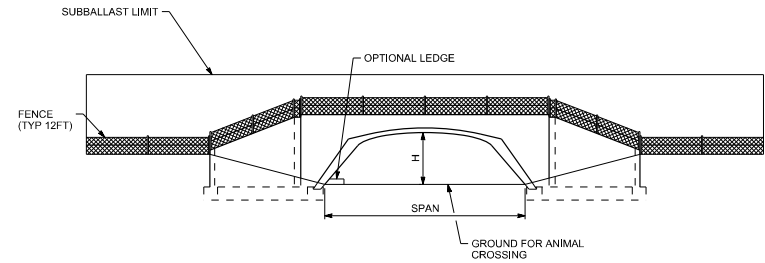
Rev

22x34



CULVERT AND ANIMAL CROSSING PLAN

SCALE 1" = 10'



OPEN BOTTOM CULVERT AND ANIMAL CROSSING ELEVATION

SCALE 1" = 10'

USAGE	STRUCTURAL TYPE	RECOMMENDED DIMENSIONS (FT)		DRAWING No.
		S	H	
LARGE ANIMALS	OPEN BOTTOM CULVERT	20	10	CST-00-03020
MEDIUM ANIMALS	OPEN BOTTOM CULVERT	10	6	CST-00-03020
SMALL ANIMALS 1	OPEN BOTTOM CULVERT	10	4	CST-00-03020
SMALL ANIMALS 2	BOX	4	2	CST-00-03021

NOTE:

1. SEE FINAL CONCEPTUAL ENGINEERING REPORT, SECTION 3.6.2.6 FOR ADDITIONAL DETAILS.
2. NUMBER OF CELLS VARIES BY CROSSING, REFER FCE, APPENDIX D HYDROLOGY AND HYDRAULICS SUMMARY.
3. WHERE THE CROSSING WOULD BE COLOCATED WITH A DRAINAGE FEATURE, A LEDGE WOULD BE INCLUDED DURING DETAILED DESIGN EFFORTS TO FACILITATE USE OF THE CROSSING BY ANIMALS DURING PERIODS OF FLOODING.

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
S.T. MAK
DRAWN BY
S. PAUDEL
CHECKED BY
J. DIXON
IN CHARGE
C. TAYLOR
DATE
02/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

**GENERAL
CIVIL STRUCTURES
CULVERT & ANIMAL CROSSING
SHEET 1 OF 2**

Scale
AS SHOWN

Drawing Status

FINAL

Job No

234180

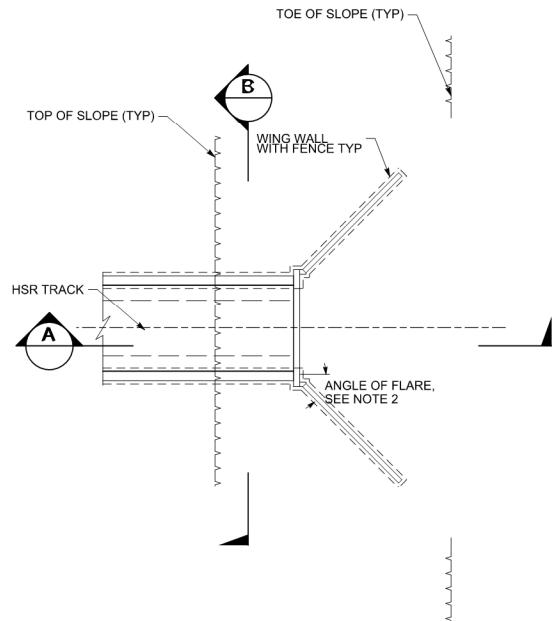
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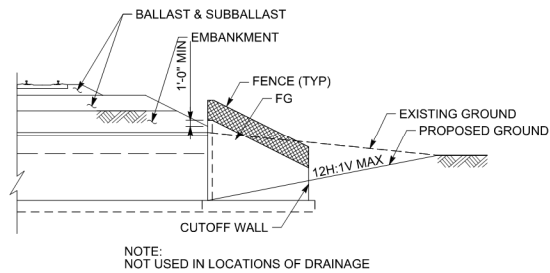
Rev

01

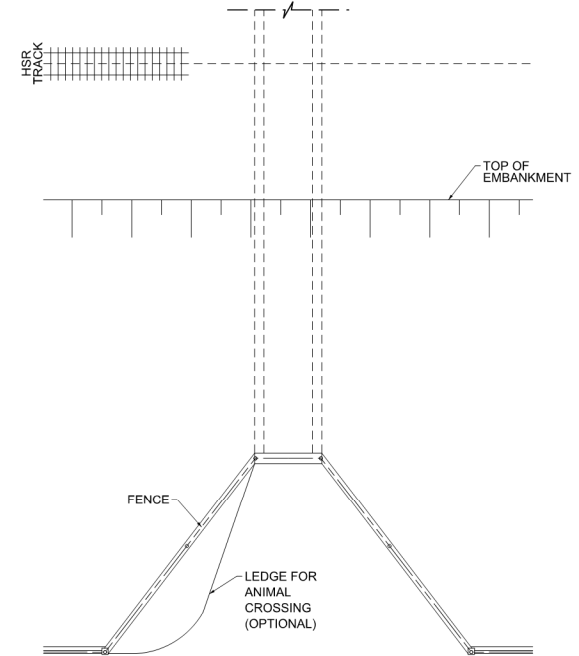
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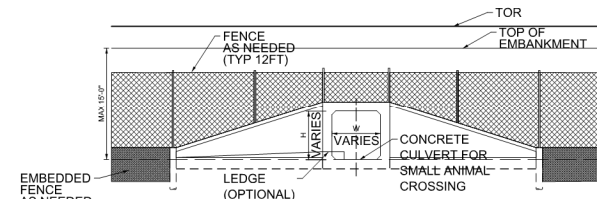
SINGLE-CELL BOX PLAN
SCALE: 1" = 10'



**MODIFICATION FOR WILDLIFE
CROSSING WITH LOW CLEARANCE**



SINGLE-CELL BOX - PLAN
SMALL ANIMAL (MAMMAL, REPTILE, OR AMPHIBIAN)



SINGLE CELL BOX-SECTION
SMALL ANIMAL (MAMMAL, REPTILE, OR AMPHIBIAN)

- NOTES:
- WHERE THE CROSSING WOULD BE COLOCATED WITH A DRAINAGE FEATURE, A LEDGE WOULD BE INCLUDED DURING DETAILED DESIGN EFFORTS TO FACILITATE USE OF THE CROSSING BY ANIMALS DURING PERIODS OF FLOODING.
 - ANGLE OF FLARE TO BE DETERMINED BASED ON FIELD CONDITION.

DESIGNED BY	S.T. MAK
DRAWN BY	S. PAUDEL
CHECKED BY	L. CHEN
IN CHARGE	C. TAYLOR
DATE	02/25/2019

DALLAS TO HOUSTON
HIGH SPEED RAIL
APPLICANT: TCRR
SWF-2011-00483
SWG-2014-00412

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Texas Registered Engineering Firm: F-2144

DALLAS TO HOUSTON HIGH-SPEED RAIL
FINAL CONCEPTUAL ENGINEERING



1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

GENERAL
CIVIL STRUCTURES
CULVERT & ANIMAL CROSSING
SHEET 2 OF 2

Scale

AS SHOWN

Drawing Status

FINAL

Job No

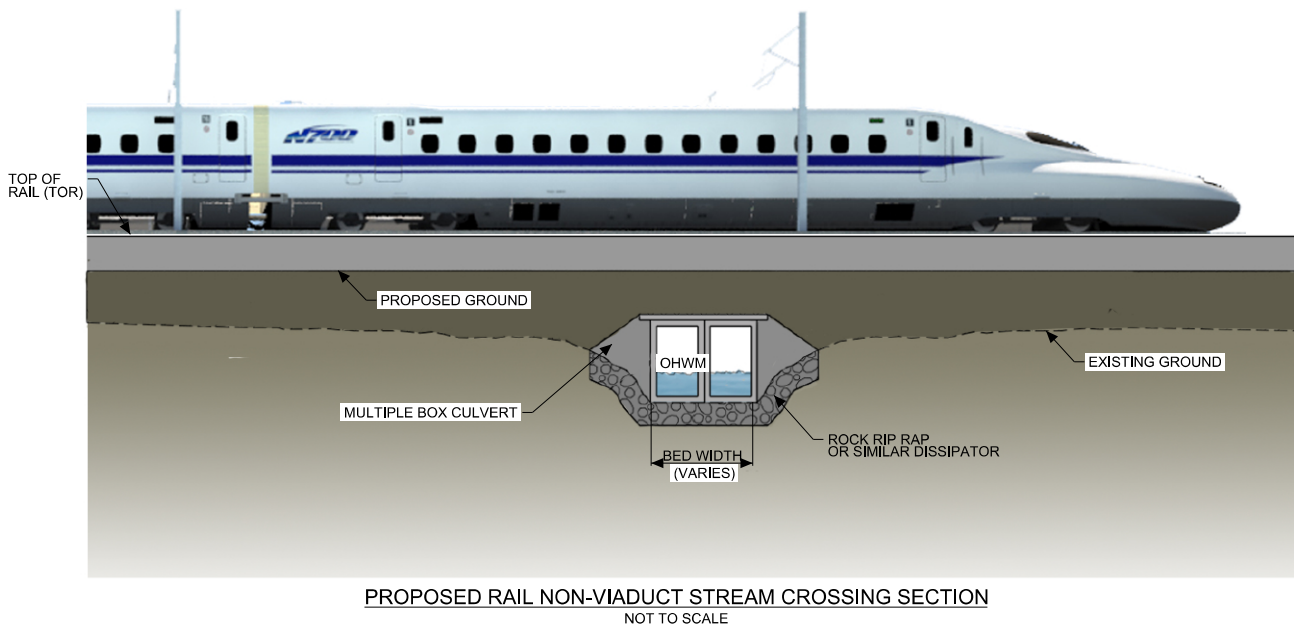
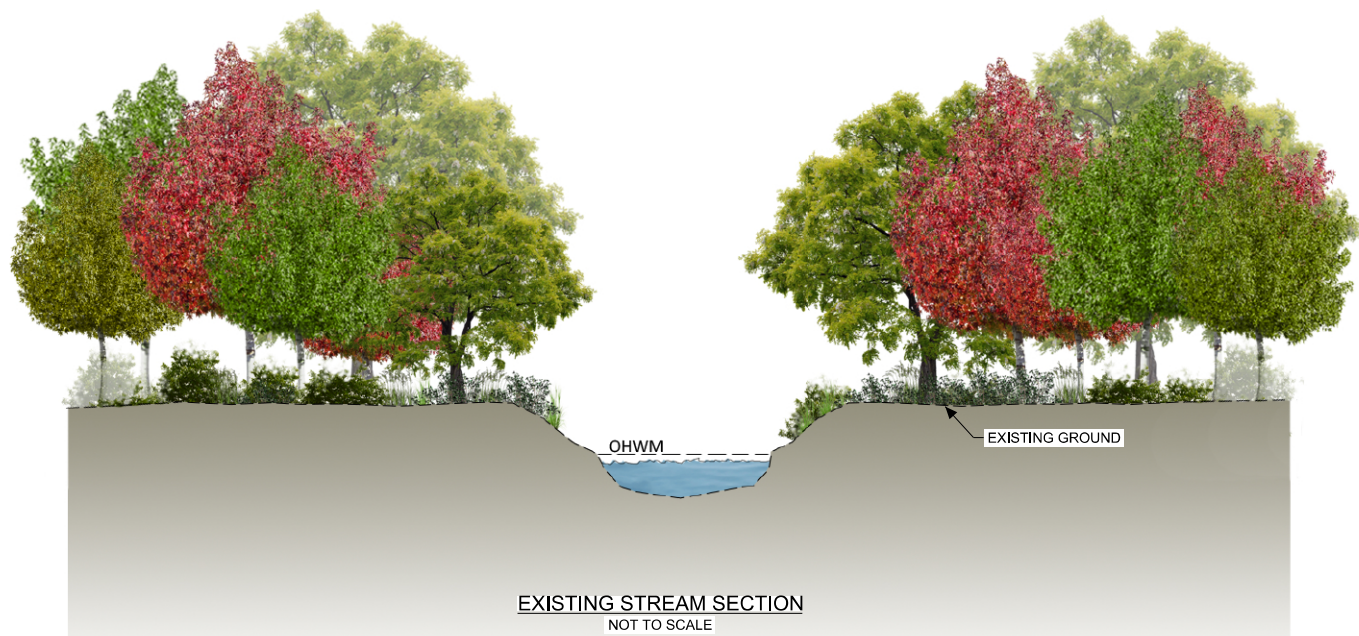
234180

Drawing No

CST-00-03021

Rev

01



NOTES:

- 1.DETAILED DETAILS ARE PROVIDED FOR VISUALIZATION PURPOSES ONLY AND ARE NOT MEANT FOR CONSTRUCTION.
- 2.ALL STREAMS WILL BE PROPERLY CULVERTED TO MAINTAIN DOWNSTREAM FLOWS.
- 3.NON-VIADUCT CONSISTS OF EMBANKMENT, CUT, RETAINED FILL AND RETAINED CUT.
- 4.CULVERT STRUCTURE DESIGN LIFE TO BE MINIMUM 75 YEARS.
- 5.FINAL CULVERT ARRAY & NUMBERS VARY BY LOCATION.

DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY
R. ZARATE
DRAWN BY
J. ALMAGUER
CHECKED BY
D. GISE
IN CHARGE
R. ZARATE
DATE
OCT. 2019

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**FREESE
& NICHOLS**

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Dallas, Texas 75204
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www.freese.com
Texas Registered Engineering Firm: F-2144

Client



**TEXAS
CENTRAL**

1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

**DETAIL 1
RAIL NON-VIADUCT
CULVERTED
STREAM CROSSING**

Scale
NOT TO SCALE

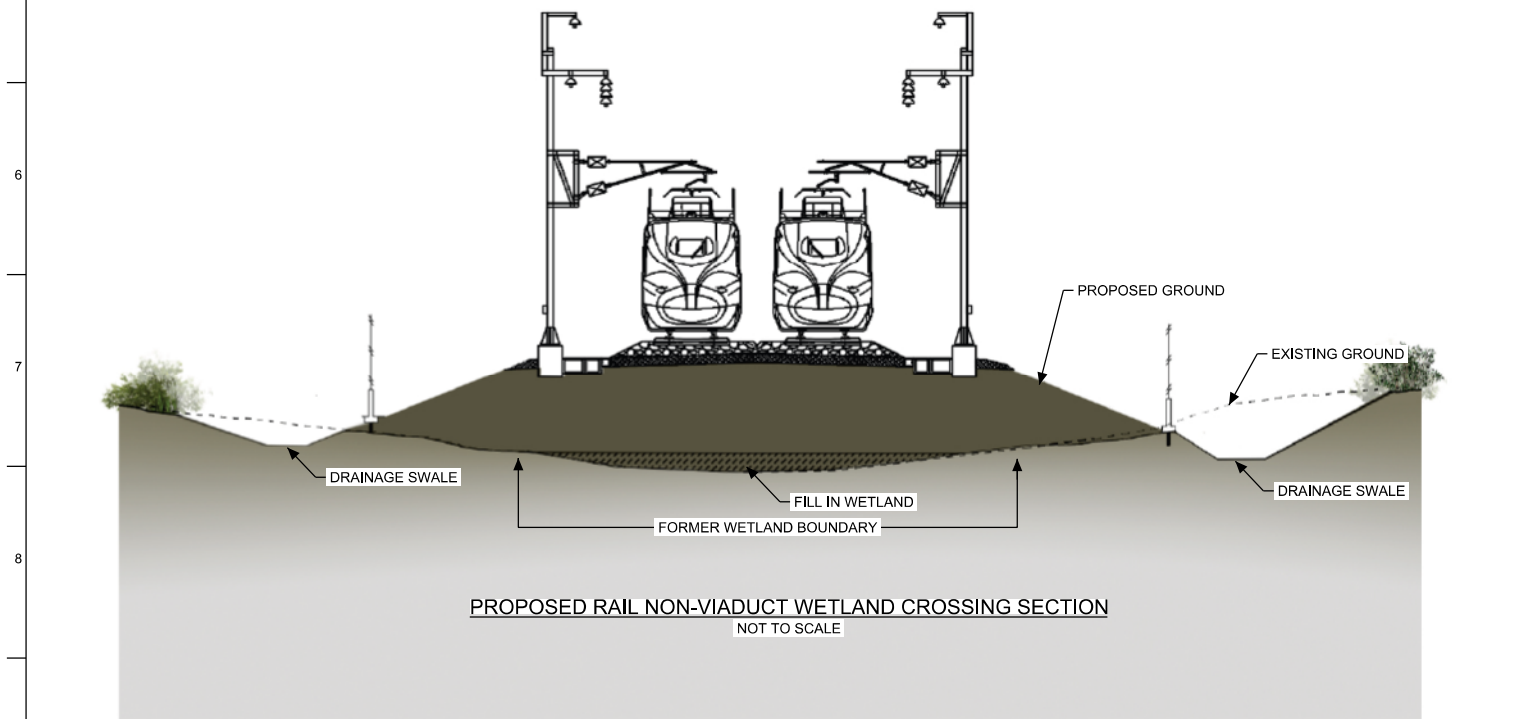
Drawing Status

FINAL REV.1

Job No
234180

Drawing No

Rev
02



NOTES:

- 1.DETAILED ARE PROVIDED FOR VISUALIZATION PURPOSES ONLY AND ARE NOT MEANT FOR CONSTRUCTION.
- 2.NON-VIADUCT CONSISTS OF EMBANKMENT, CUT, RETAINED FILL AND RETAINED CUT.
- 3.REFER TO PLAN VIEW TO DETERMINE SPECIFIC TYPE OF WETLAND CROSSING.

DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY
R. ZARATE
DRAWN BY
J. ALMAGUER
CHECKED BY
D. GISE
IN CHARGE
R. ZARATE
DATE
OCT. 2019

ARUP

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www.arup.com
Texas Registered Engineering Firm F-1990

**FREESE
& NICHOLS**

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Dallas, Texas 75204
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Texas Registered Engineering Firms F-2144

Client



**TEXAS
CENTRAL**

1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

**DETAIL 2
RAIL NON-VIADUCT
WETLAND CROSSING**

Scale
NOT TO SCALE

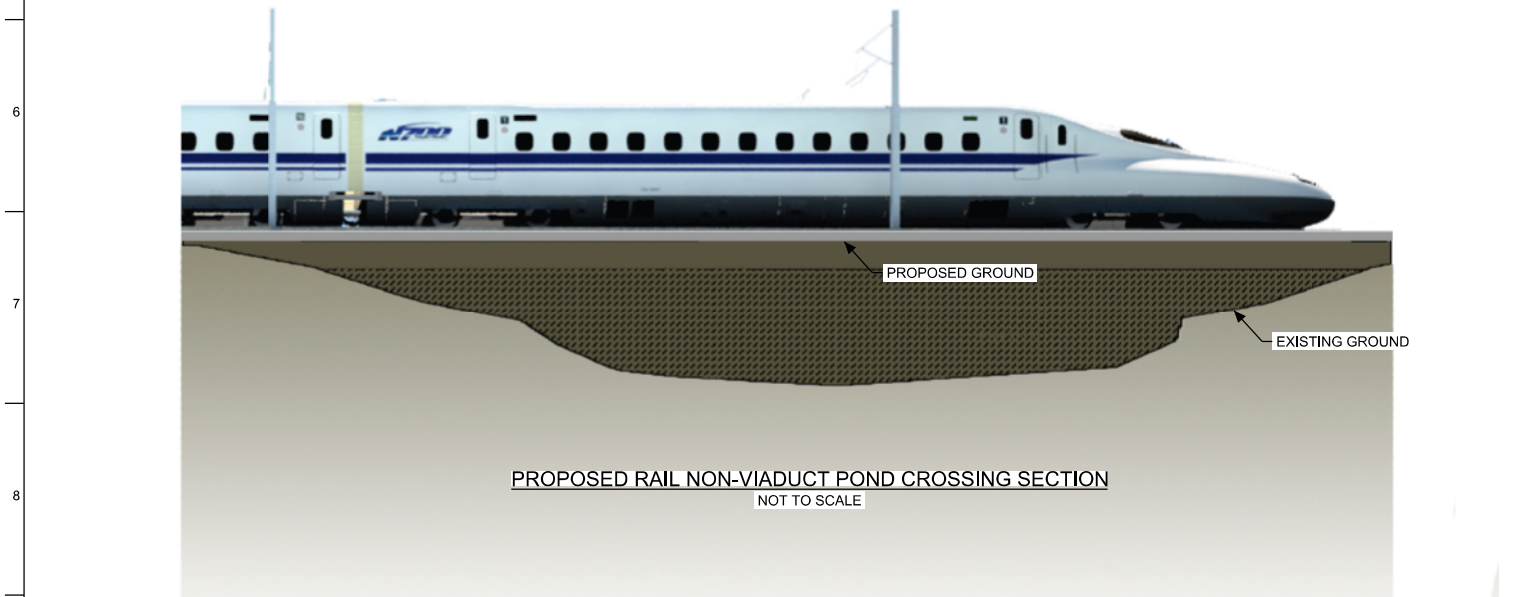
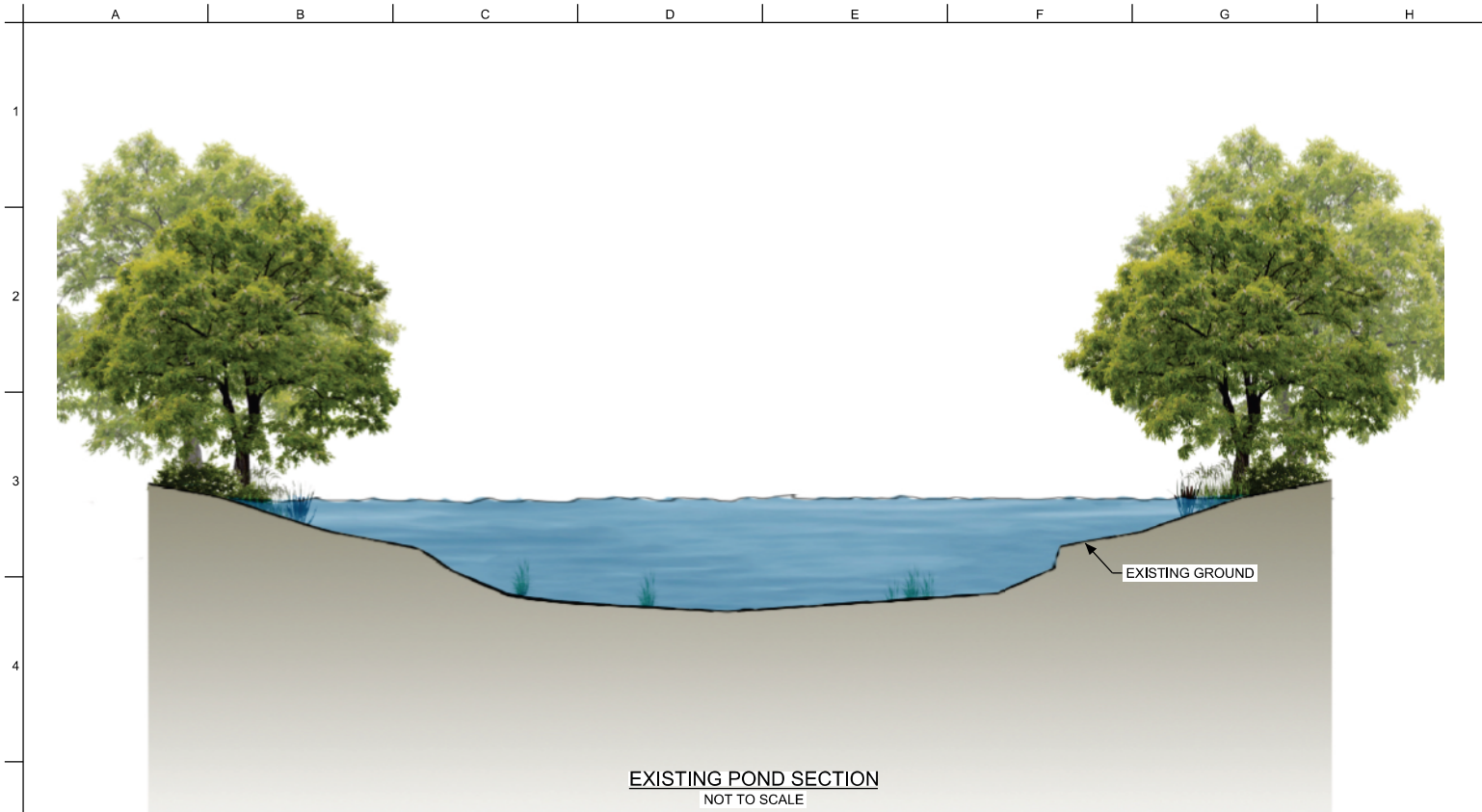
Drawing Status

FINAL REV.1

Job No
234180

Drawing No

Rev
02



NOTES:

- 1.DETAILS ARE PROVIDED FOR VISUALIZATION PURPOSES ONLY AND ARE NOT MEANT FOR CONSTRUCTION.
- 2.NON-VIADUCT CONSISTS OF EMBANKMENT, CUT, RETAINED FILL AND RETAINED CUT.

DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY
R. ZARATE
DRAWN BY
J. ALMAGUER
CHECKED BY
D. GISE
IN CHARGE
R. ZARATE
DATE
OCT. 2019

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**TEXAS
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Drawing Title

**DETAIL 3
RAIL NON-VIADUCT
POND CROSSING**

Scale
NOT TO SCALE

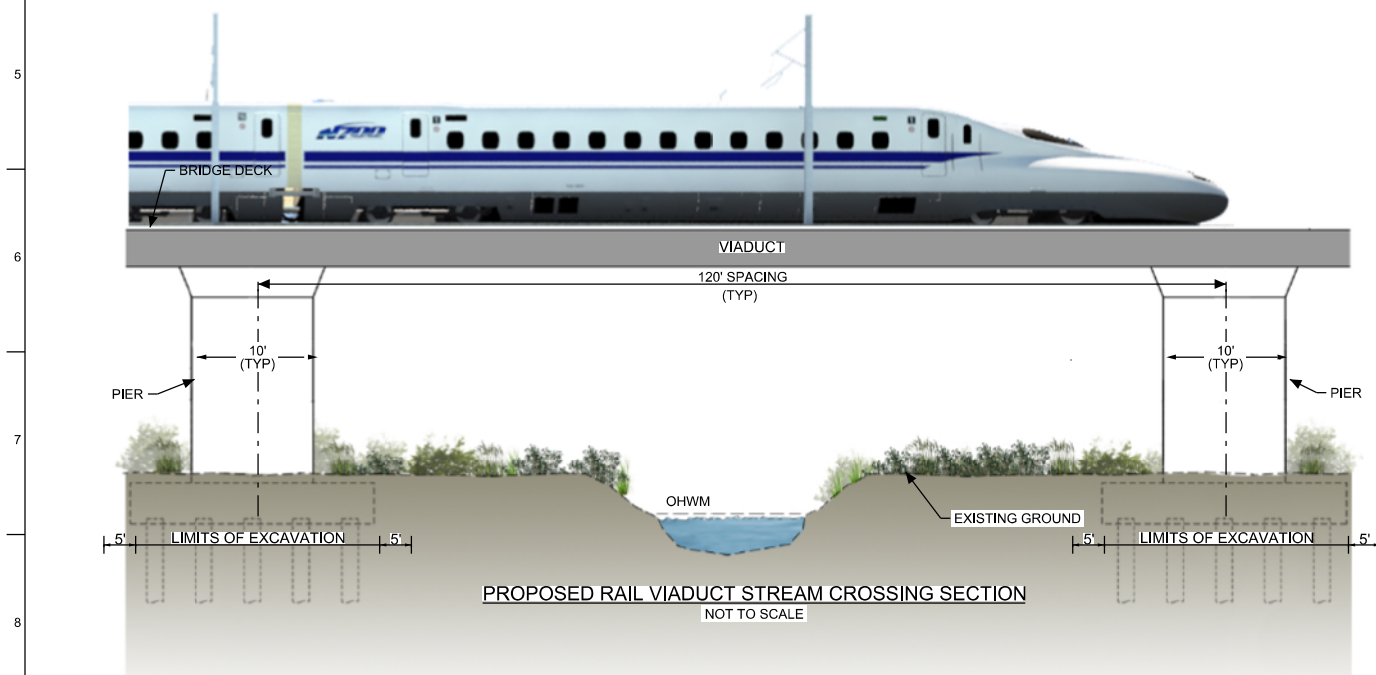
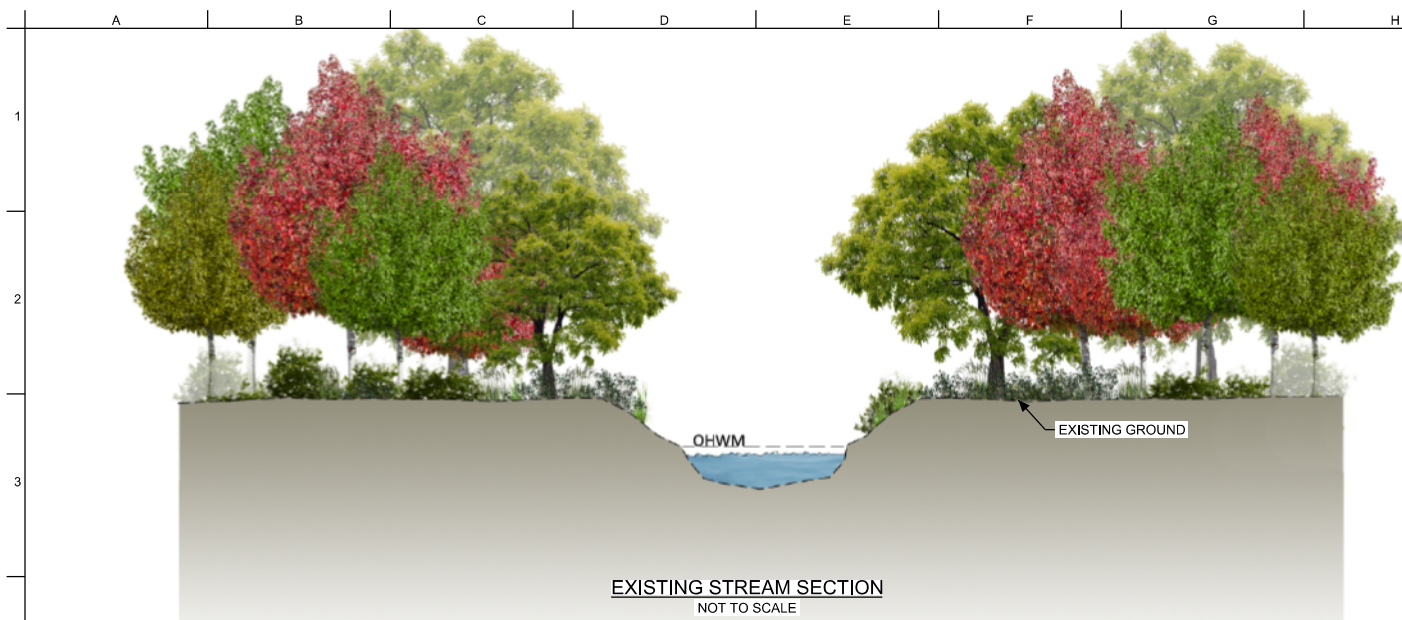
Drawing Status

FINAL REV.1

Job No
234180

Drawing No

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02



NOTES:

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DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY
R. ZARATE
DRAWN BY
J. ALMAGUER
CHECKED BY
D. GISE
IN CHARGE
R. ZARATE
DATE
OCT. 2019

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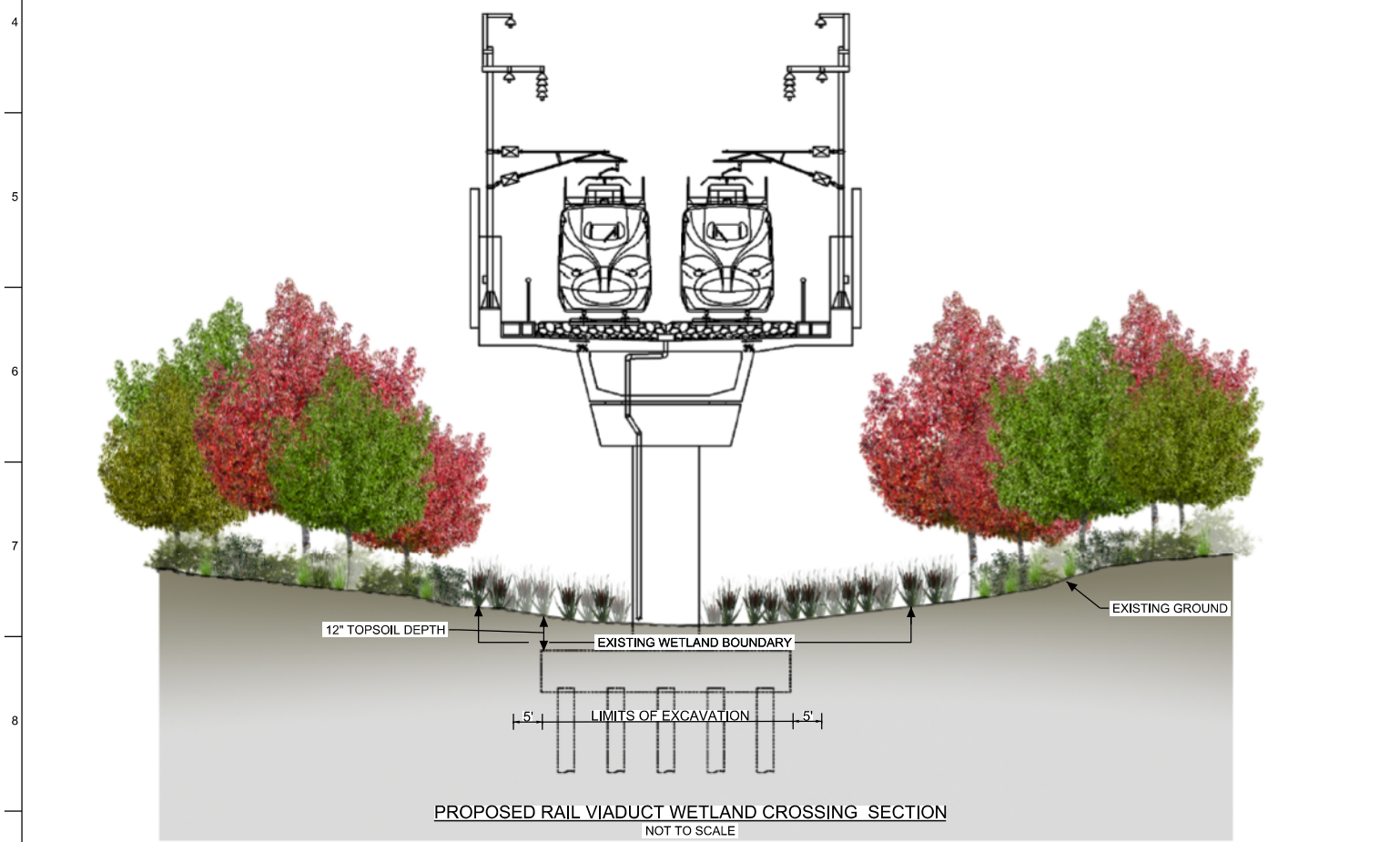
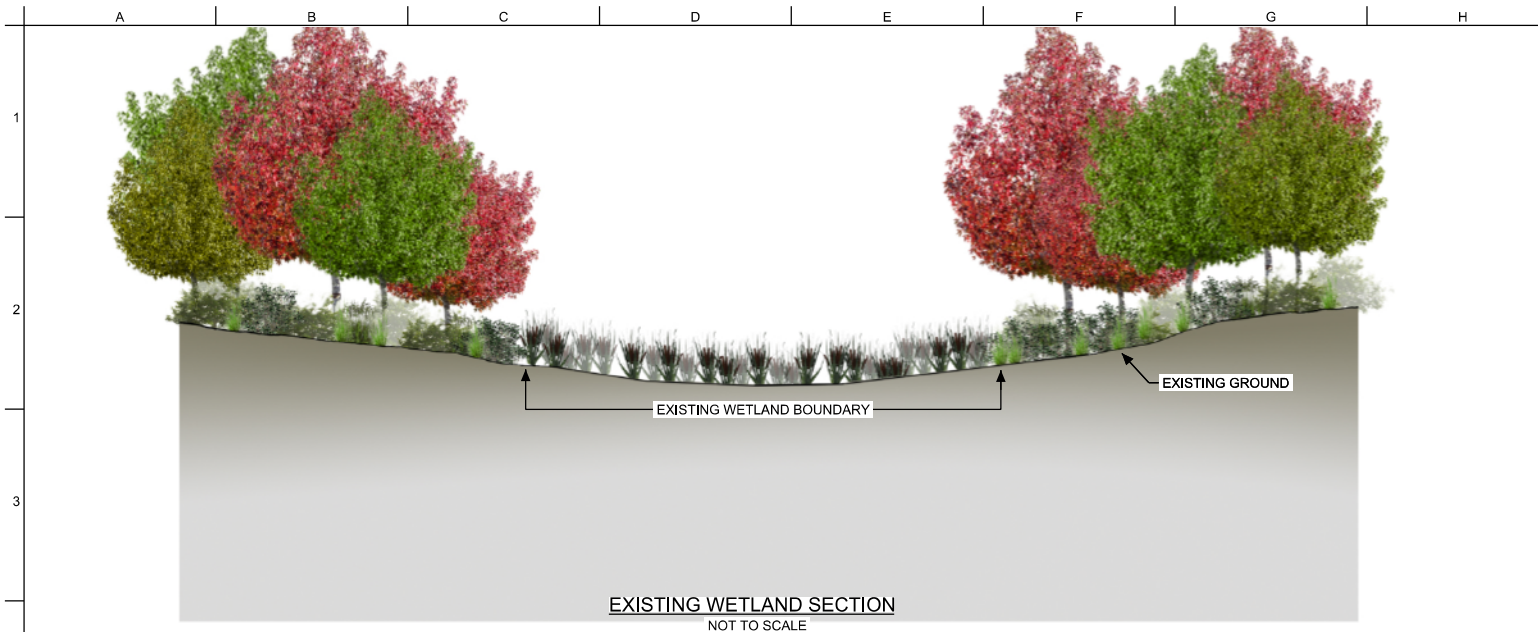
Client
**TEXAS
CENTRAL**
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Drawing Title
**DETAIL 4
RAIL VIADUCT
STREAM CROSSING**

Scale
NOT TO SCALE

Drawing Status
FINAL REV.1

Job No	Drawing No	Rev
234180		02



NOTES:

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DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY
R. ZARATE
DRAWN BY
J. ALMAGUER
CHECKED BY
D. GISE
IN CHARGE
R. ZARATE
DATE
OCT. 2019

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Drawing Title

**DETAIL 5
RAIL VIADUCT
WETLAND CROSSING**

Scale
NOT TO SCALE

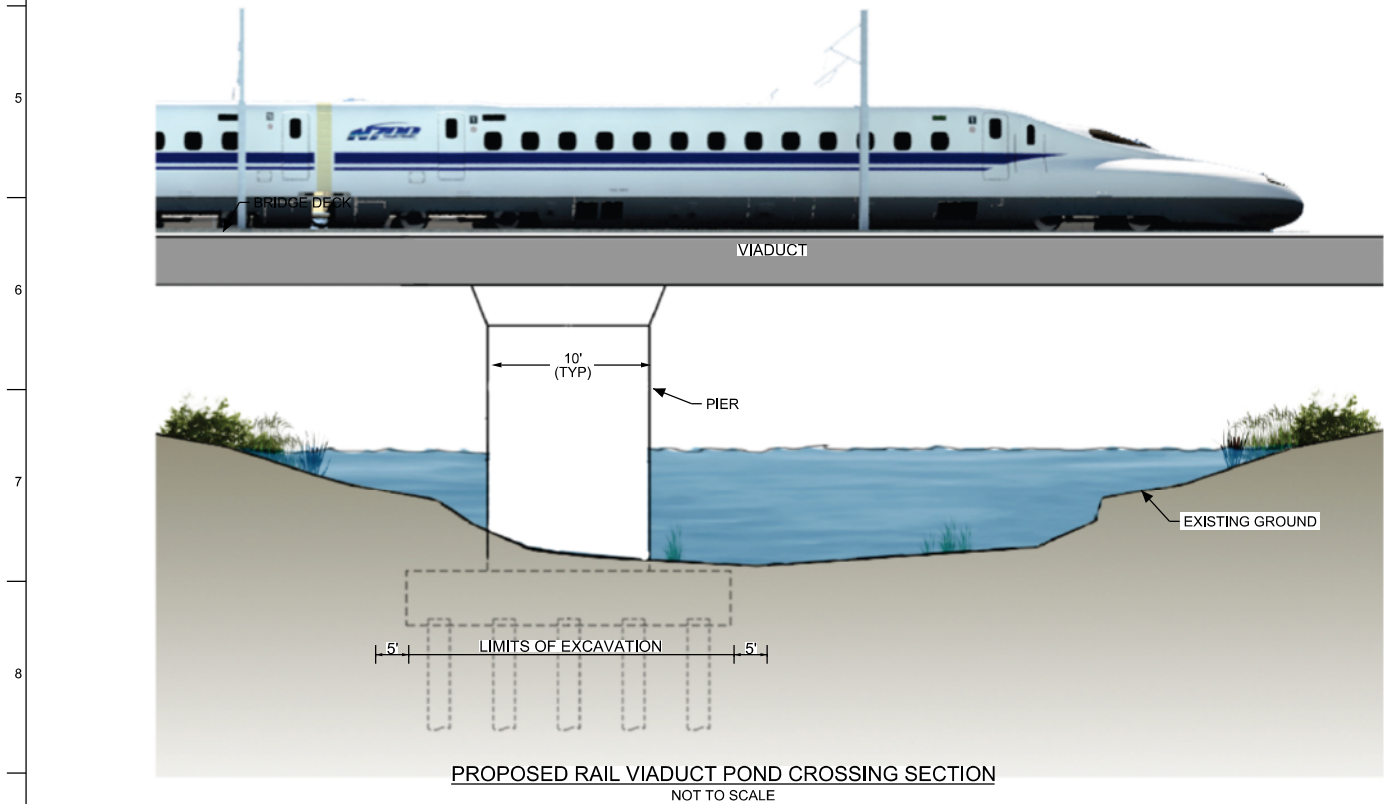
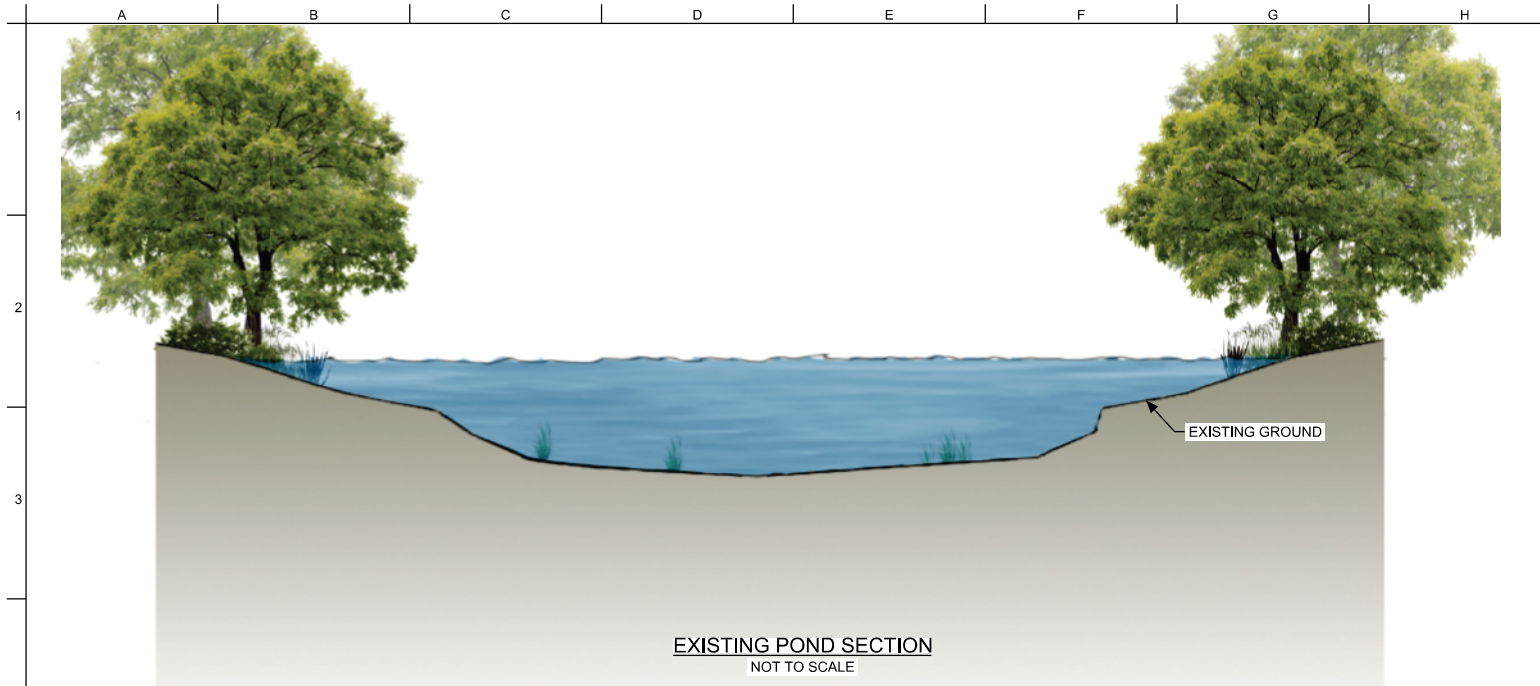
Drawing Status

FINAL REV.1

Job No
234180

Drawing No

Rev
02



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DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY
R. ZARATE
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J. ALMAGUER
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Drawing Title

**DETAIL 6
RAIL VIADUCT
POND CROSSING**

Scale
NOT TO SCALE

Drawing Status

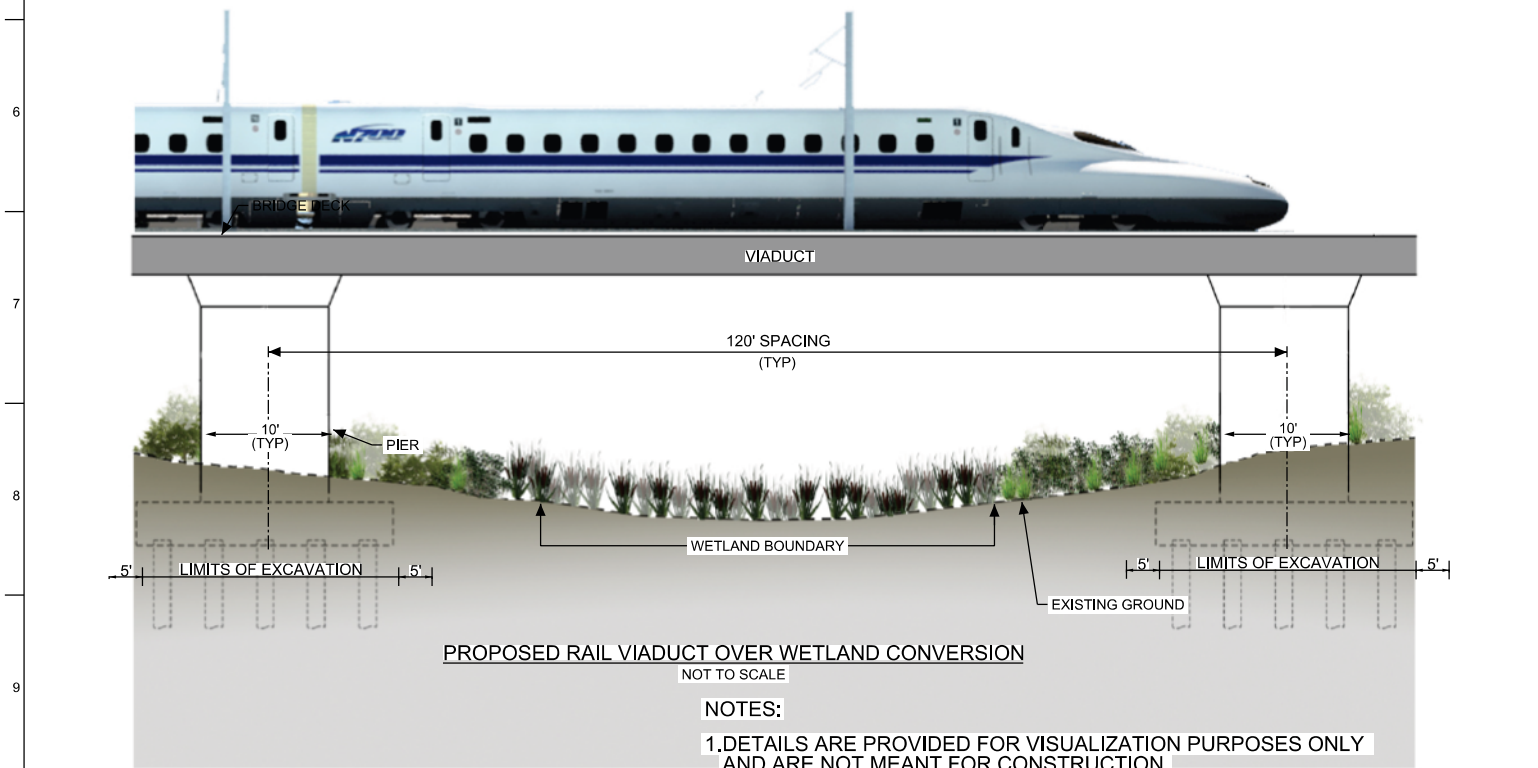
FINAL REV.1

Job No
234180

Drawing No

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02



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DALLAS TO HOUSTON HIGH-SPEED RAIL
 APPLICANT: TCR
 SWG-2014-00412 & SWF-2011-00483

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CHECKED BY	D. GISE
IN CHARGE	R. ZARATE
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Drawing Title

**DETAIL 7
 RAIL VIADUCT
 WETLAND CONVERSION**

Scale
 NOT TO SCALE

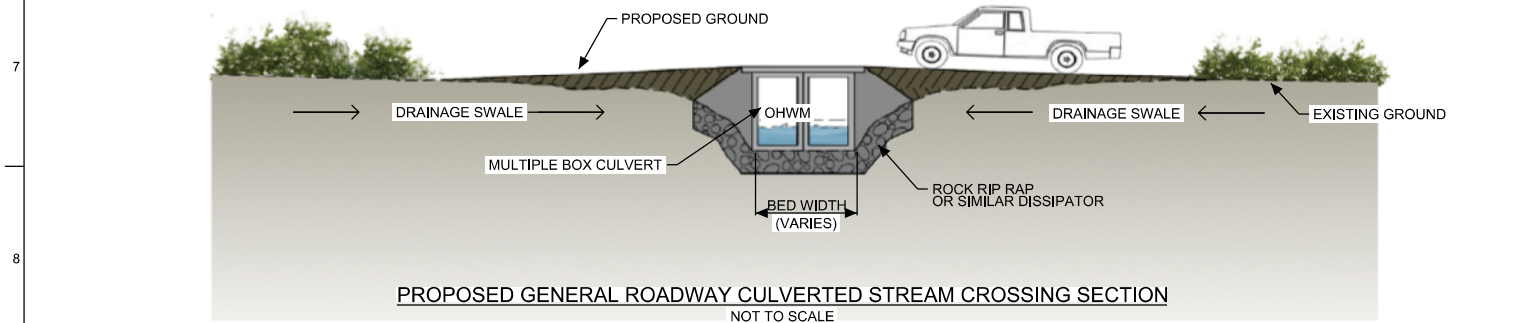
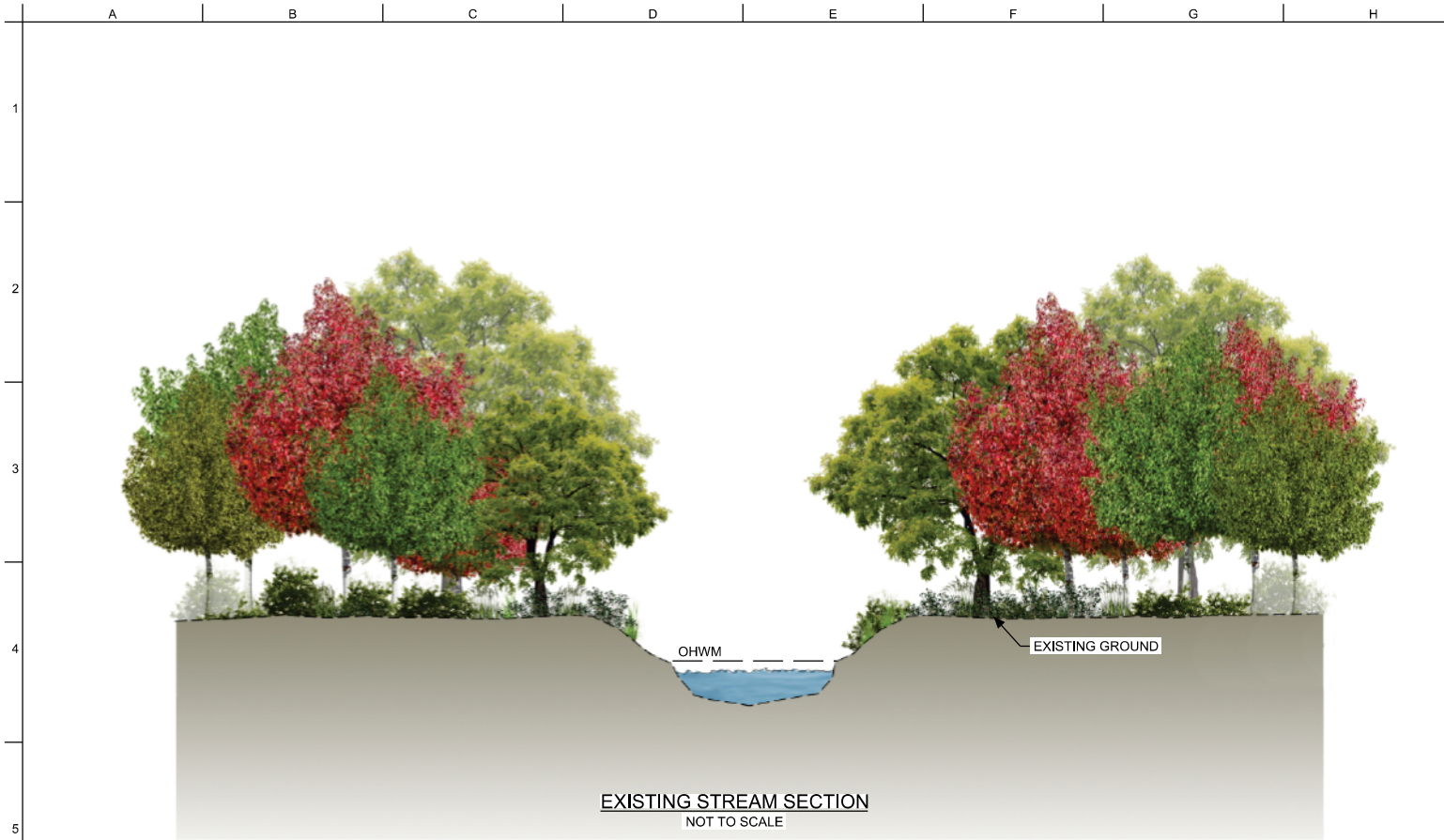
Drawing Status

FINAL REV.1

Job No
 234180

Drawing No

Rev
 02



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DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

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**DETAIL 8
GENERAL ROADWAY
CULVERTED
STREAM CROSSING**

Scale
NOT TO SCALE

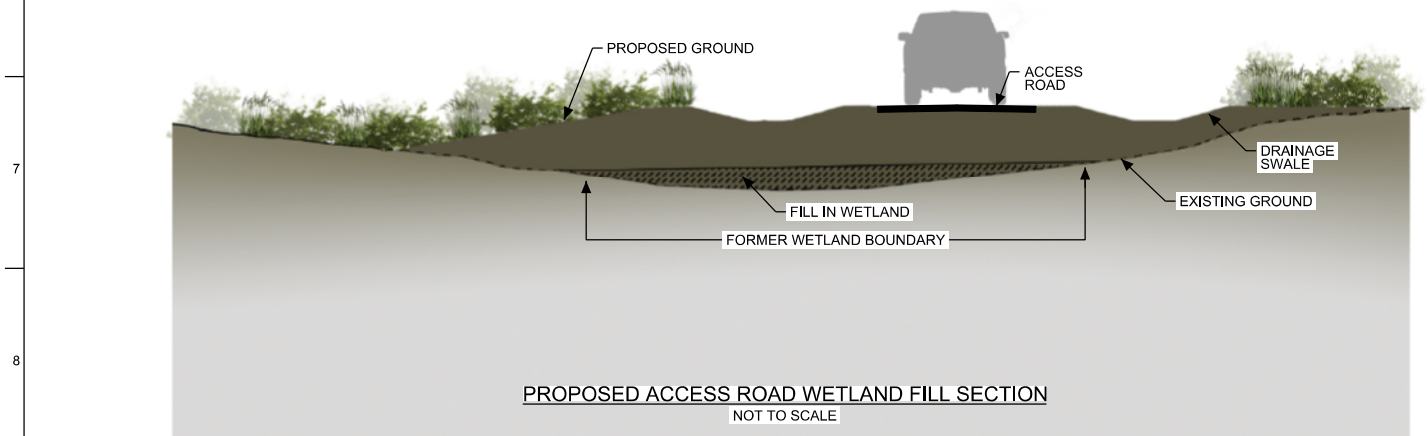
Drawing Status

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Job No
234180

Drawing No

Rev
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DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

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Drawing Title

**DETAIL 9
ACCESS ROAD
WETLAND FILL**

Scale
NOT TO SCALE

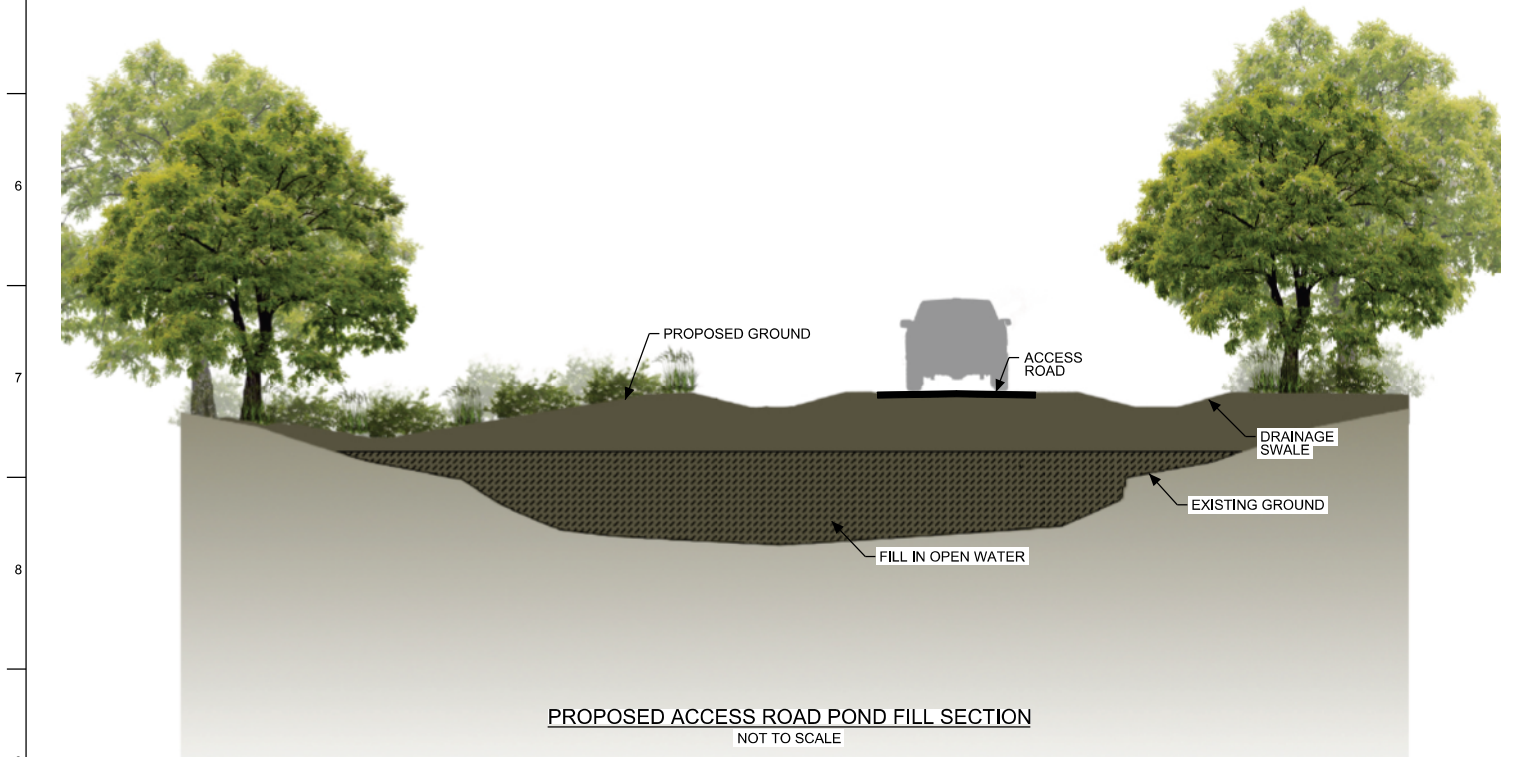
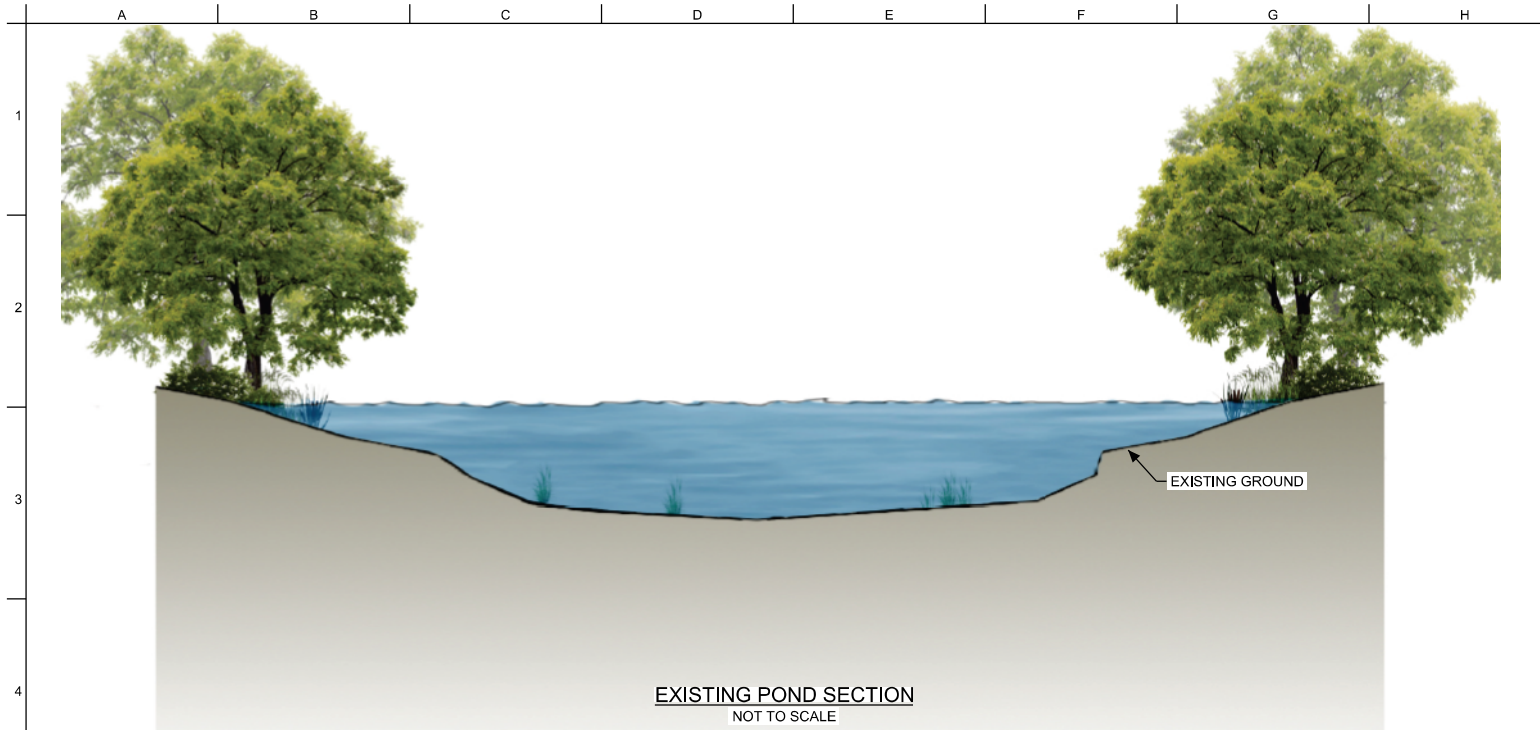
Drawing Status

FINAL REV.1

Job No
234180




Drawing No

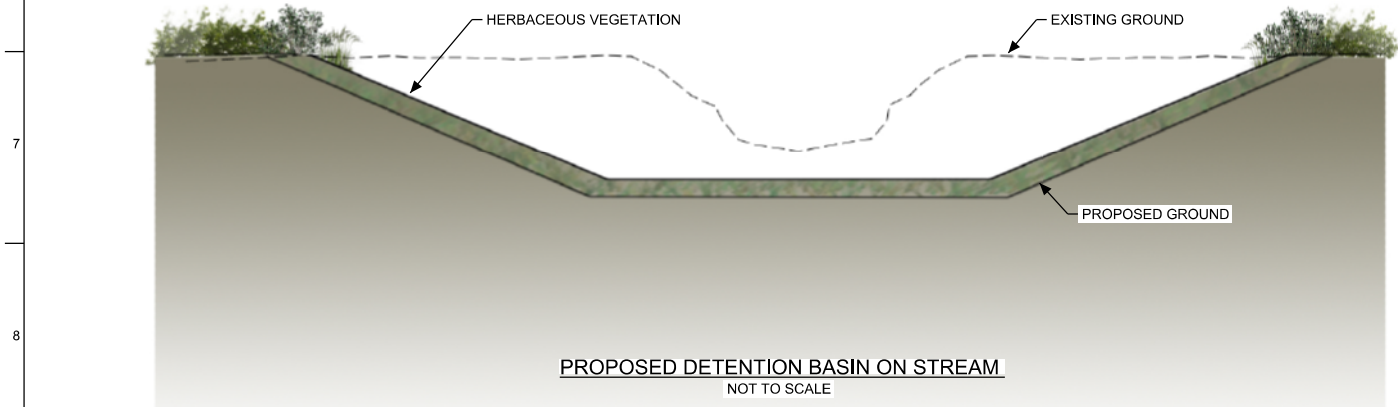
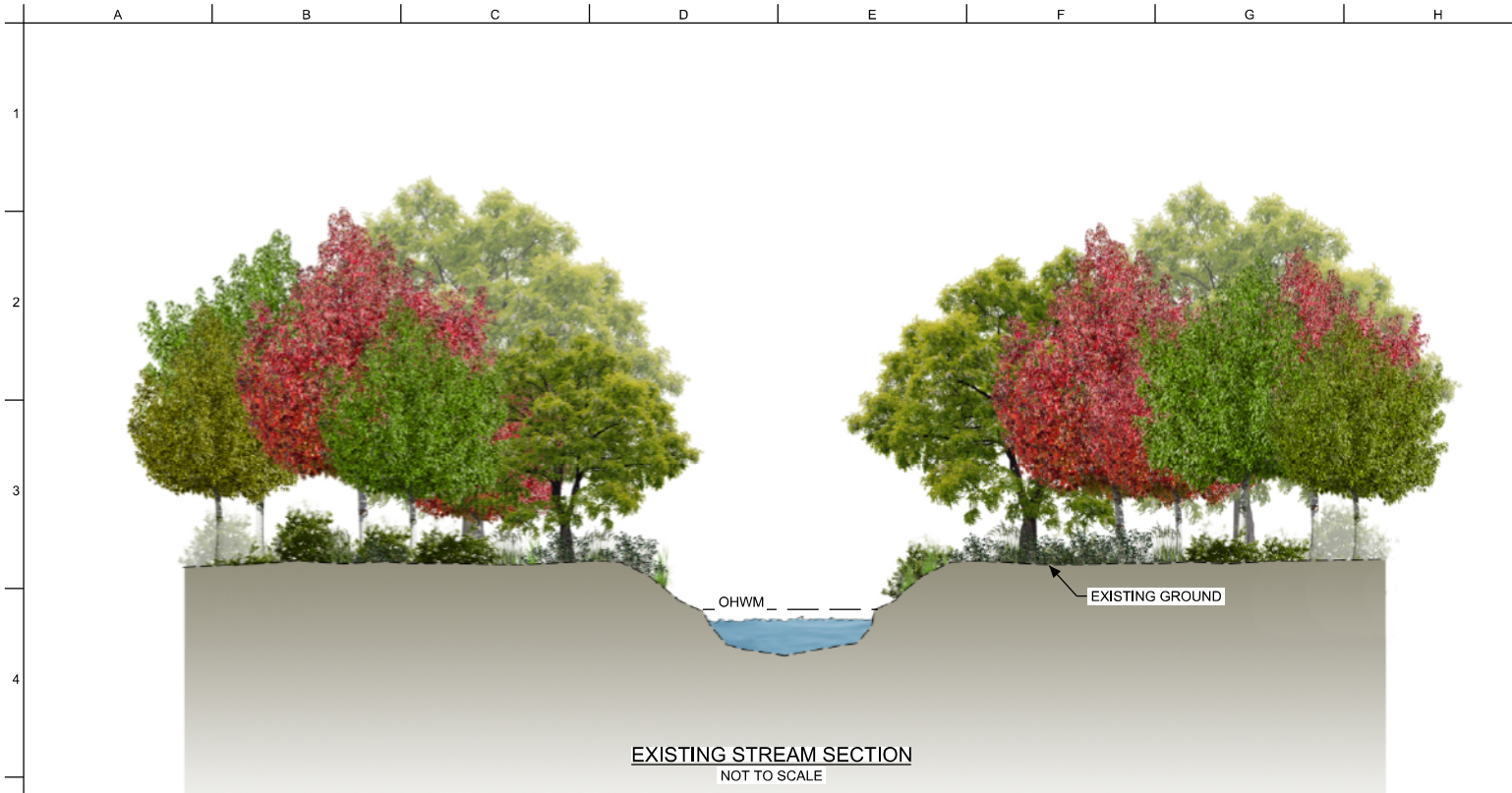
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DALLAS TO HOUSTON HIGH-SPEED RAIL
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10	DESIGNED BY R. ZARATE	 <small>Arup Texas, Inc. 10370 Richmond Ave., Suite 475 Houston, Texas 77042 USA Tel (713) 783 2787 Fax (713) 343 1487 www.arup.com Texas Registered Engineering Firm F-1990</small>	 <small>2711 North Haskell Ave., Suite 3300 Dallas, Texas 75204 Tel (214) 217 2200 Fax (214) 217 2201 www.freese.com Texas Registered Engineering Firm F-2144</small>	<small>Client</small>  TEXAS CENTRAL <small>1409 South Lamar Street, Suite 1022, Dallas, Texas 75215</small>	<small>Drawing Title</small> DETAIL 10 ACCESS ROAD POND FILL	<small>Scale</small> NOT TO SCALE	<small>Drawing Status</small> FINAL REV.1	<table><tr><td><small>Job No</small></td><td><small>Drawing No</small></td><td><small>Rev</small></td></tr><tr><td>234180</td><td></td><td>02</td></tr></table>	<small>Job No</small>	<small>Drawing No</small>	<small>Rev</small>	234180		02
<small>Job No</small>	<small>Drawing No</small>								<small>Rev</small>					
234180									02					
DRAWN BY J. ALMAGUER	CHECKED BY D. GISE								IN CHARGE R. ZARATE	DATE				



DALLAS TO HOUSTON HIGH-SPEED RAIL
 APPLICANT: TCRR
 SWG-2014-00412 & SWF-2011-00483

NOTES:

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 DRAWN BY
J. ALMAGUER
 CHECKED BY
D. GISE
 IN CHARGE
R. ZARATE
 DATE
OCT. 2019

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Drawing Title

**DETAIL 11
 DETENTION BASIN
 ON STREAM**

Scale
NOT TO SCALE

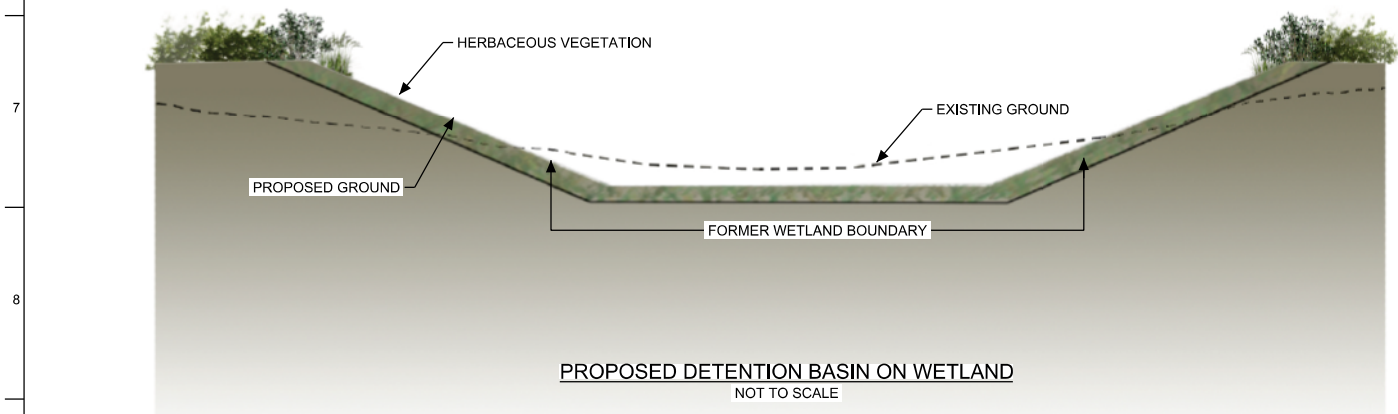
Drawing Status

FINAL REV.1

Job No
234180

Drawing No

Rev
02



NOTES:

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DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

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1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

**DETAIL 12
DETENTION BASIN
ON WETLAND**

Scale
NOT TO SCALE

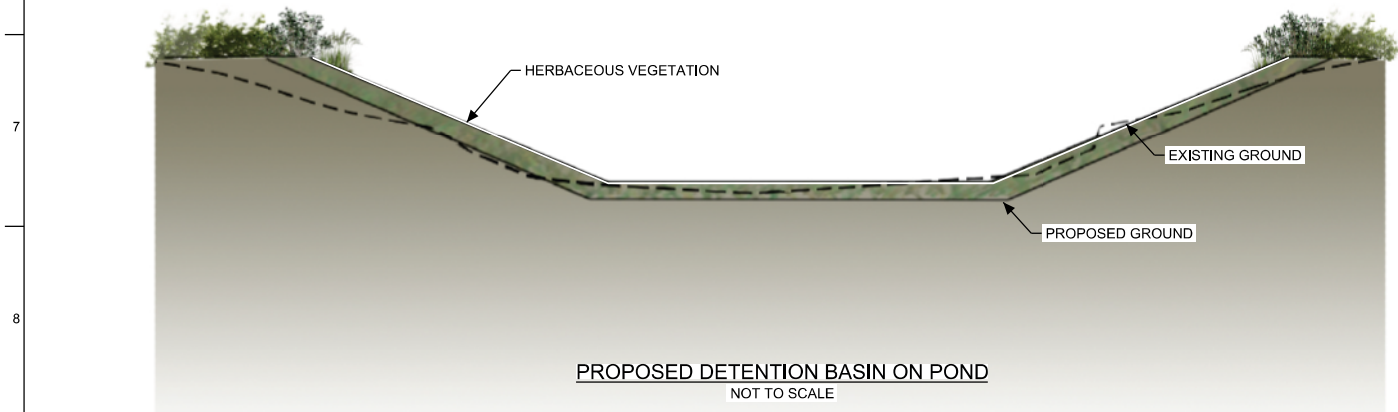
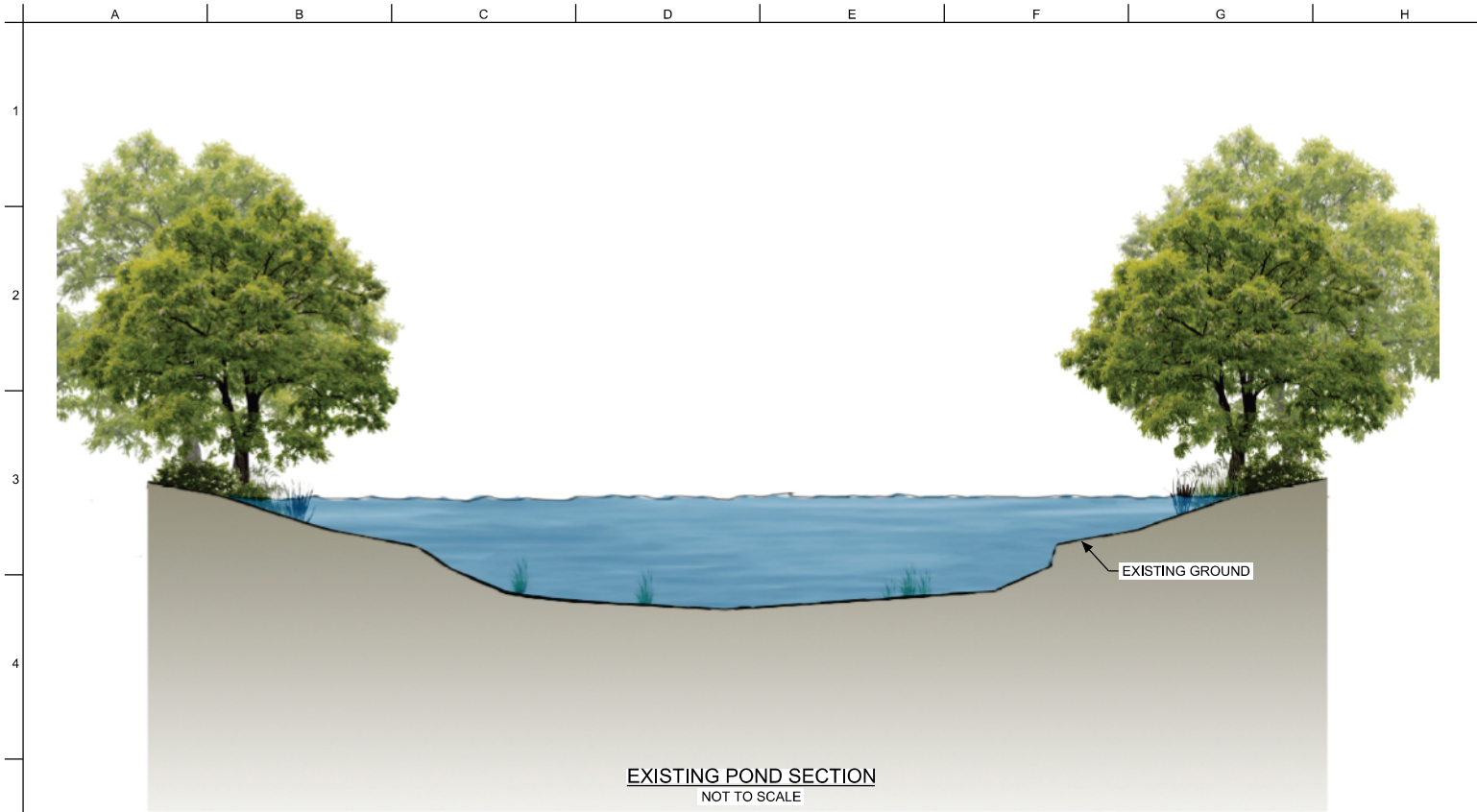
Drawing Status

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234180

Drawing No

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NOTES:

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- 2.POND DEWATERED TO PROVIDE DETENTION CAPACITY.

DALLAS TO HOUSTON HIGH-SPEED RAIL
 APPLICANT: TCRR
 SWG-2014-00412 & SWF-2011-00483

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R. ZARATE
 DRAWN BY
J. ALMAGUER
 CHECKED BY
D. GISE
 IN CHARGE
R. ZARATE
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Drawing Title

**DETAIL 13
 DETENTION BASIN
 ON POND**

Scale
NOT TO SCALE

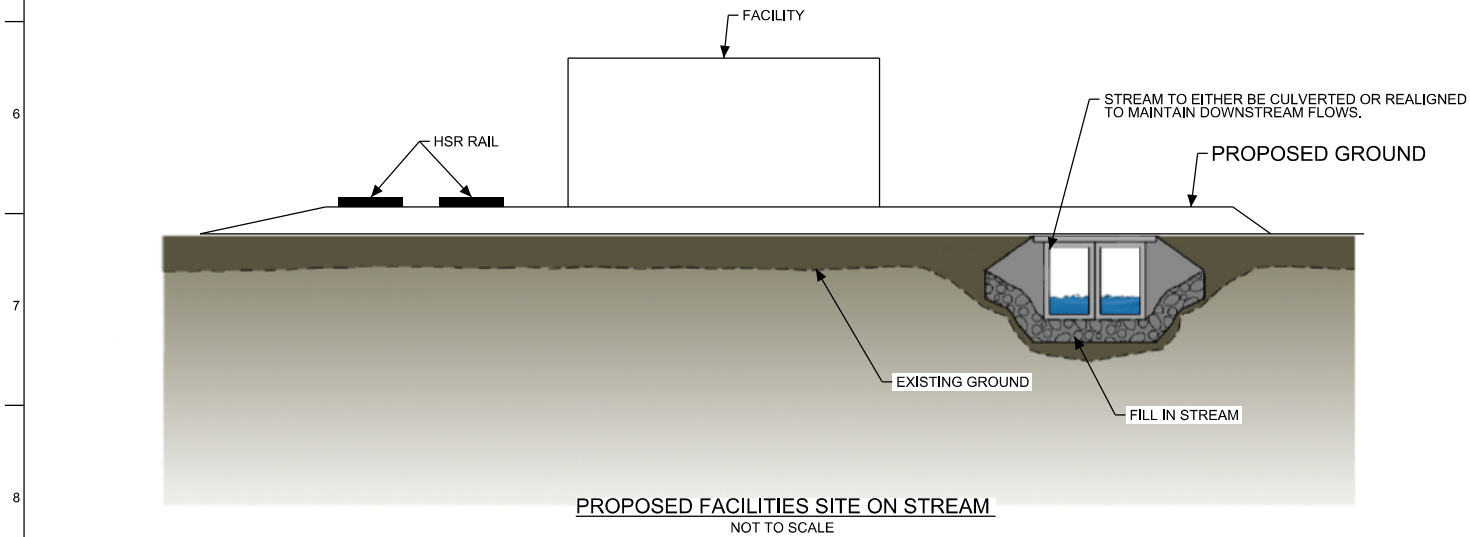
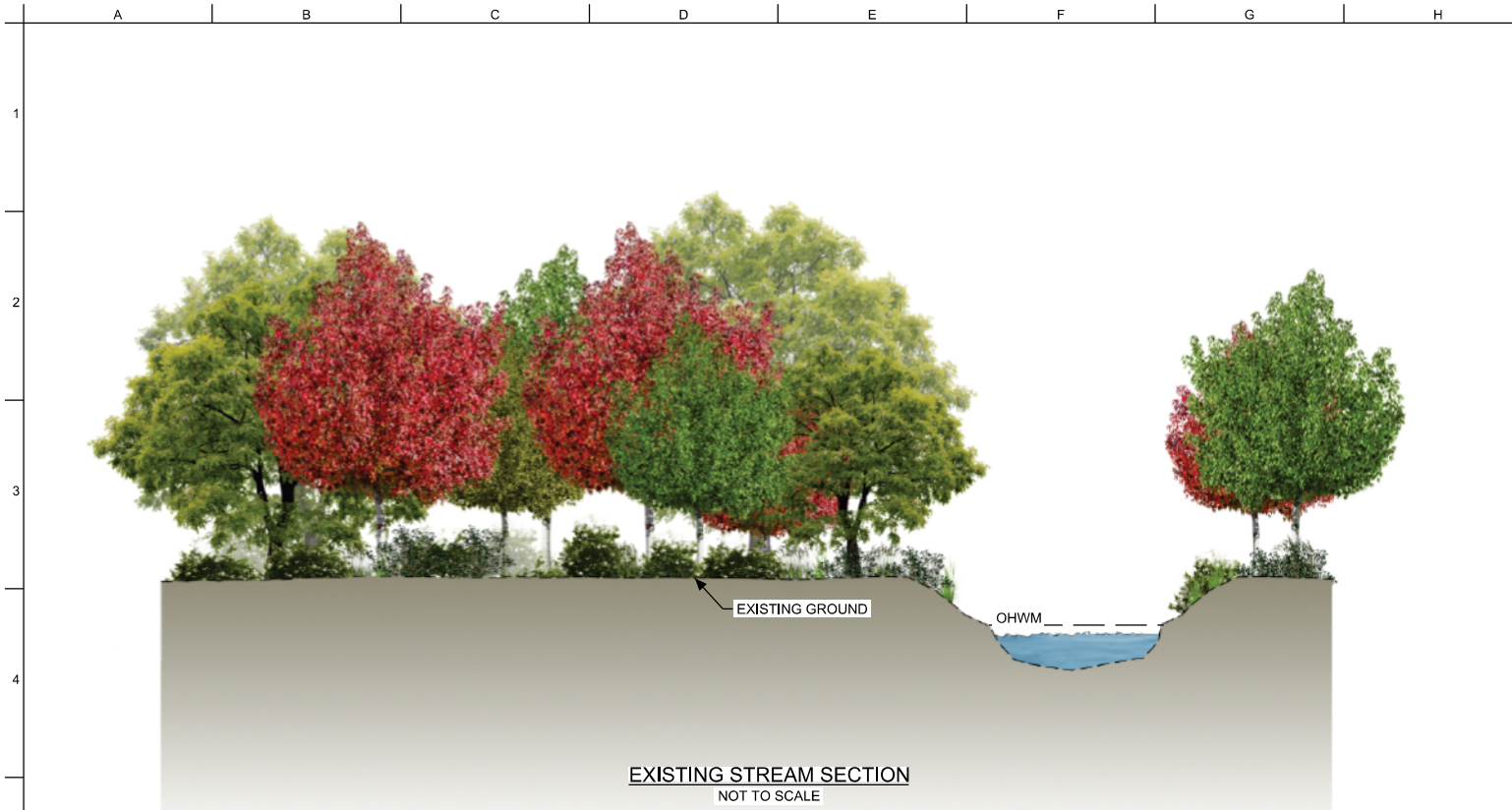
Drawing Status

FINAL REV.1

Job No
234180



Drawing No

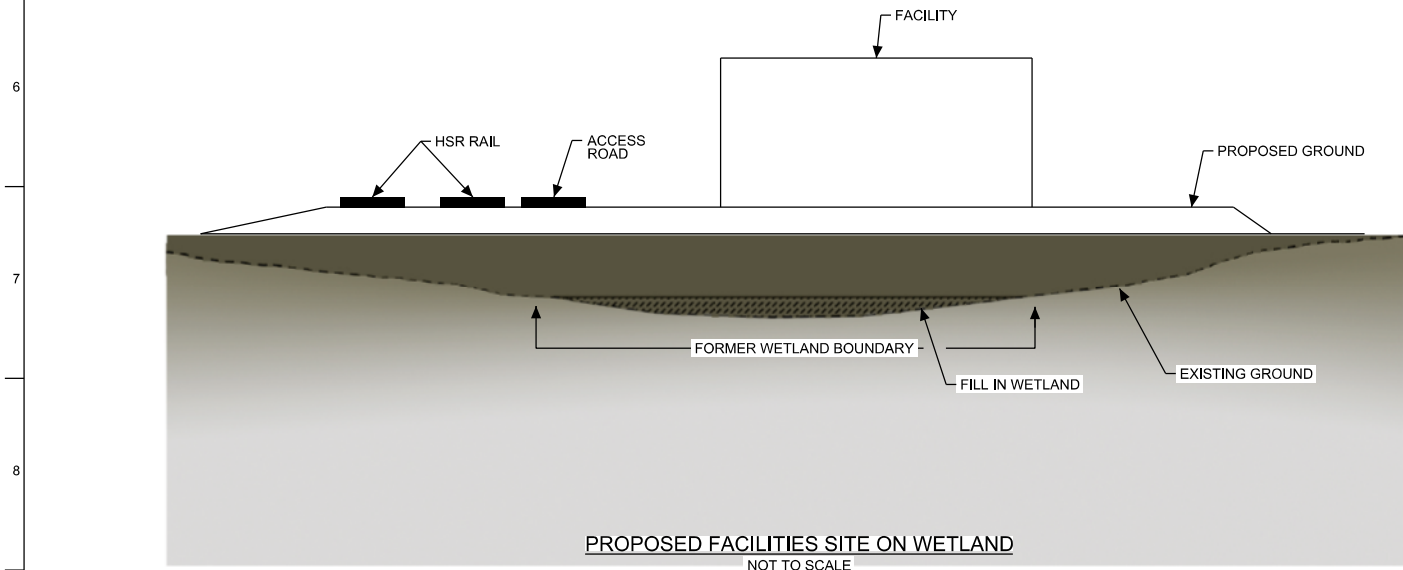
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DALLAS TO HOUSTON HIGH-SPEED RAIL
 APPLICANT: TCRR
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DRAWN BY J. ALMAGUER					Drawing Status FINAL REV.1		
CHECKED BY D. GISE					Job No	Drawing No	Rev
IN CHARGE R. ZARATE					234180		02
DATE OCT. 2019							



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DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

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Drawing Title

**DETAIL 15
FACILITIES SITE
ON WETLAND**

Scale
NOT TO SCALE

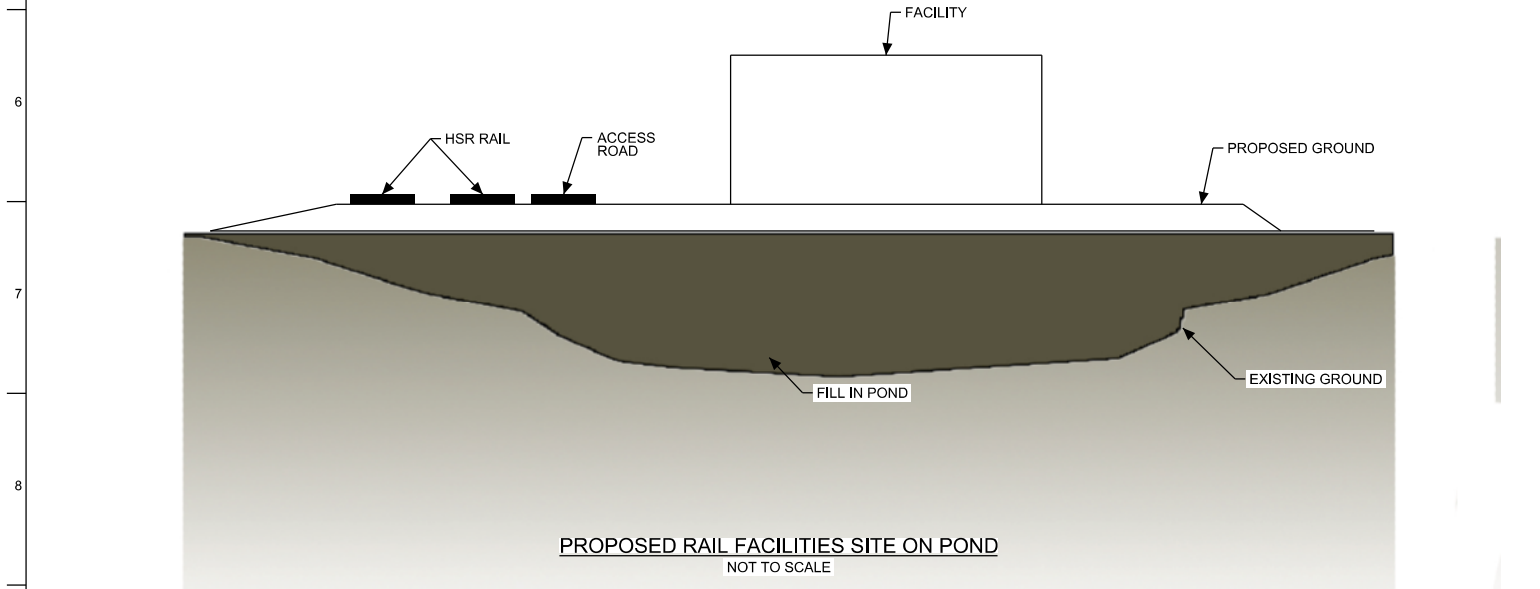
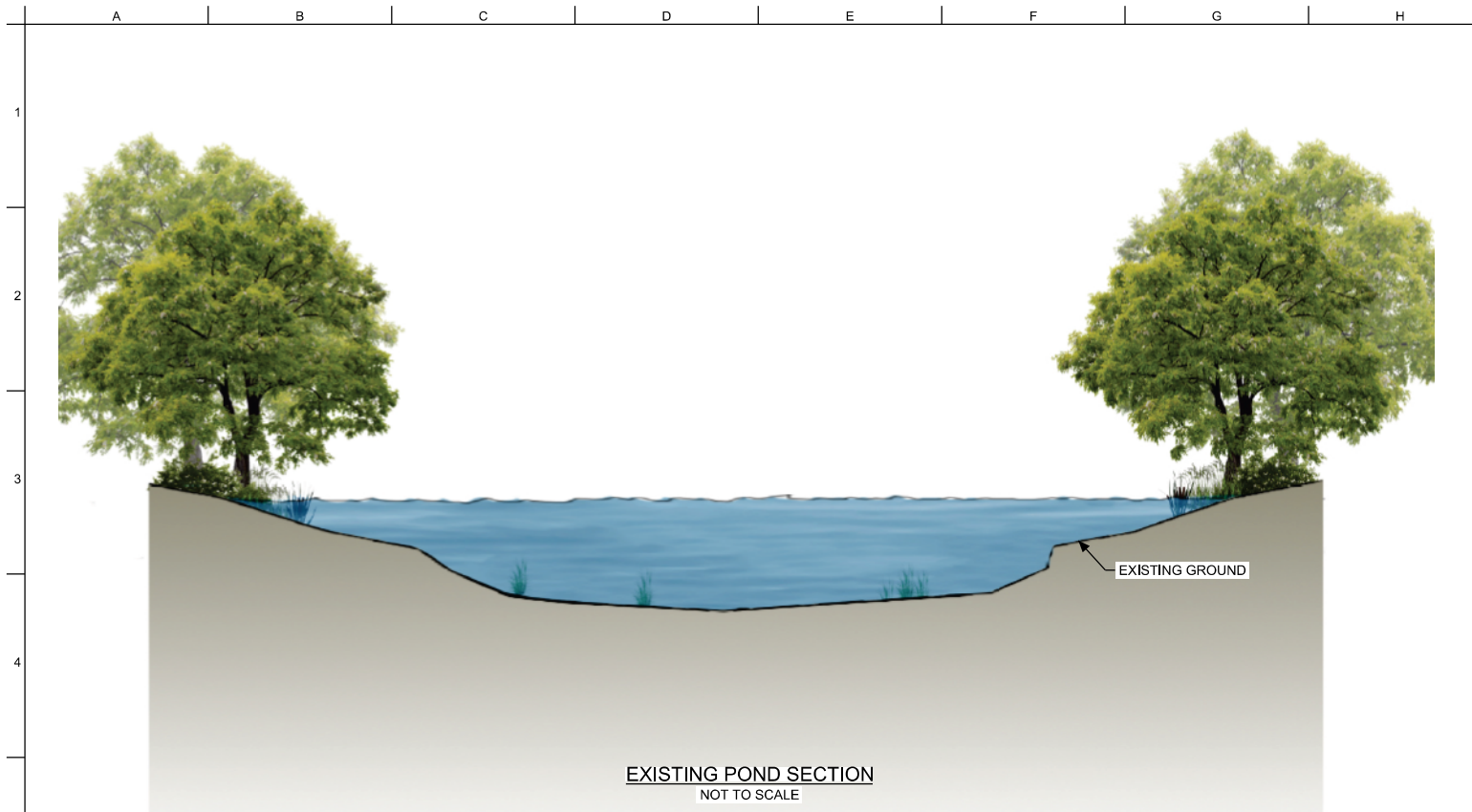
Drawing Status

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Drawing No

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Drawing Title

DETAIL 16
FACILITIES SITE
ON POND

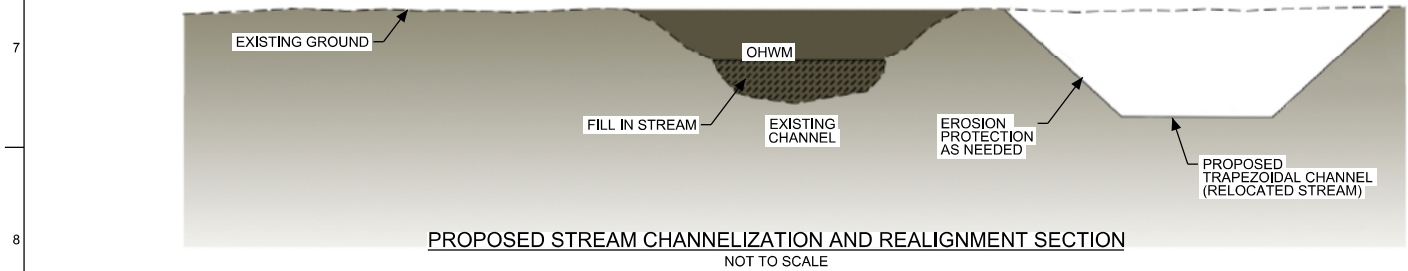
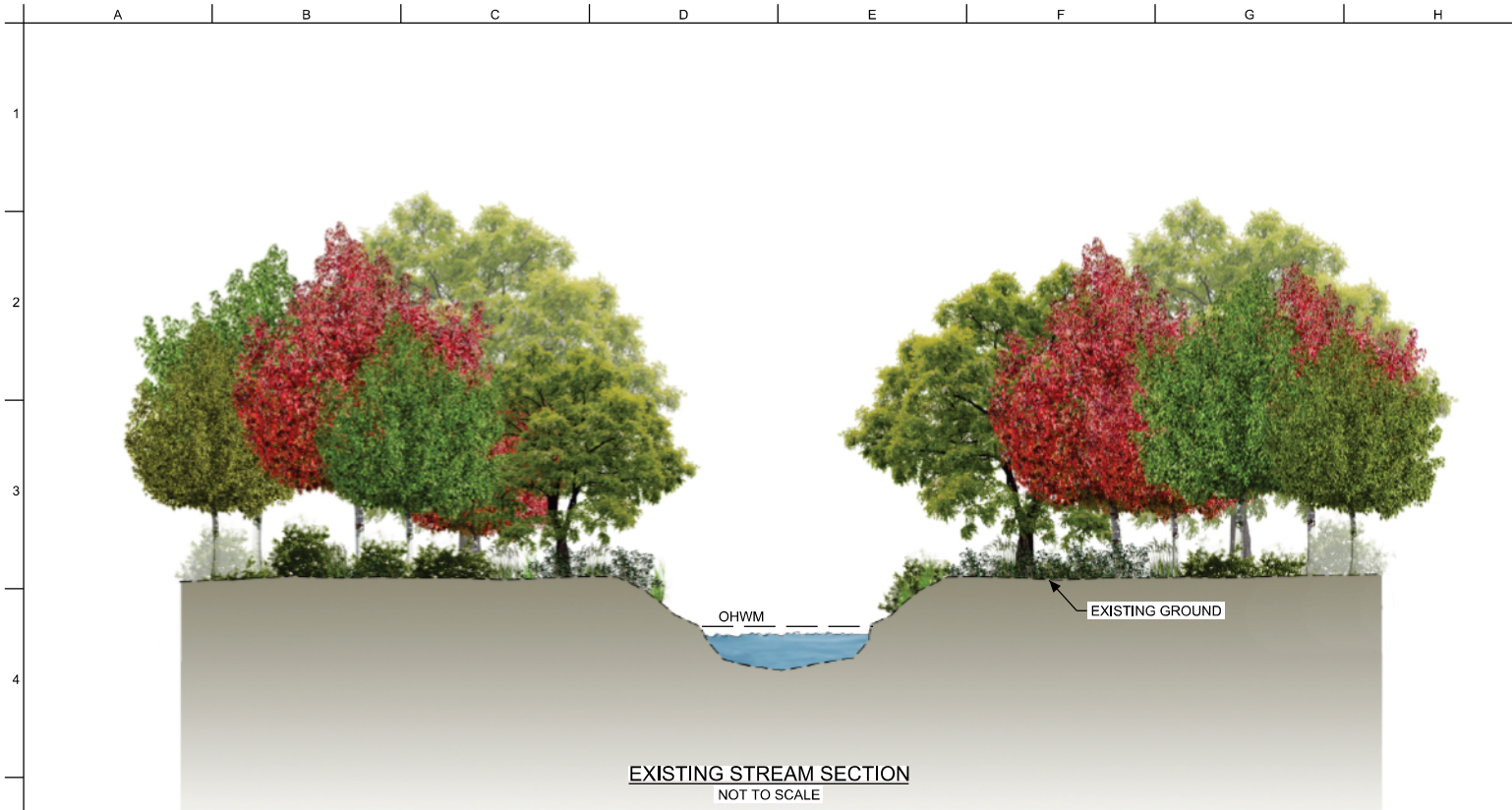
Scale
NOT TO SCALE

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FINAL REV.1

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DALLAS TO HOUSTON HIGH-SPEED RAIL
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Drawing Title

**DETAIL 17
STREAM CHANNELIZATION
AND REALIGNMENT**

Scale

NOT TO SCALE

Drawing Status

FINAL REV.1

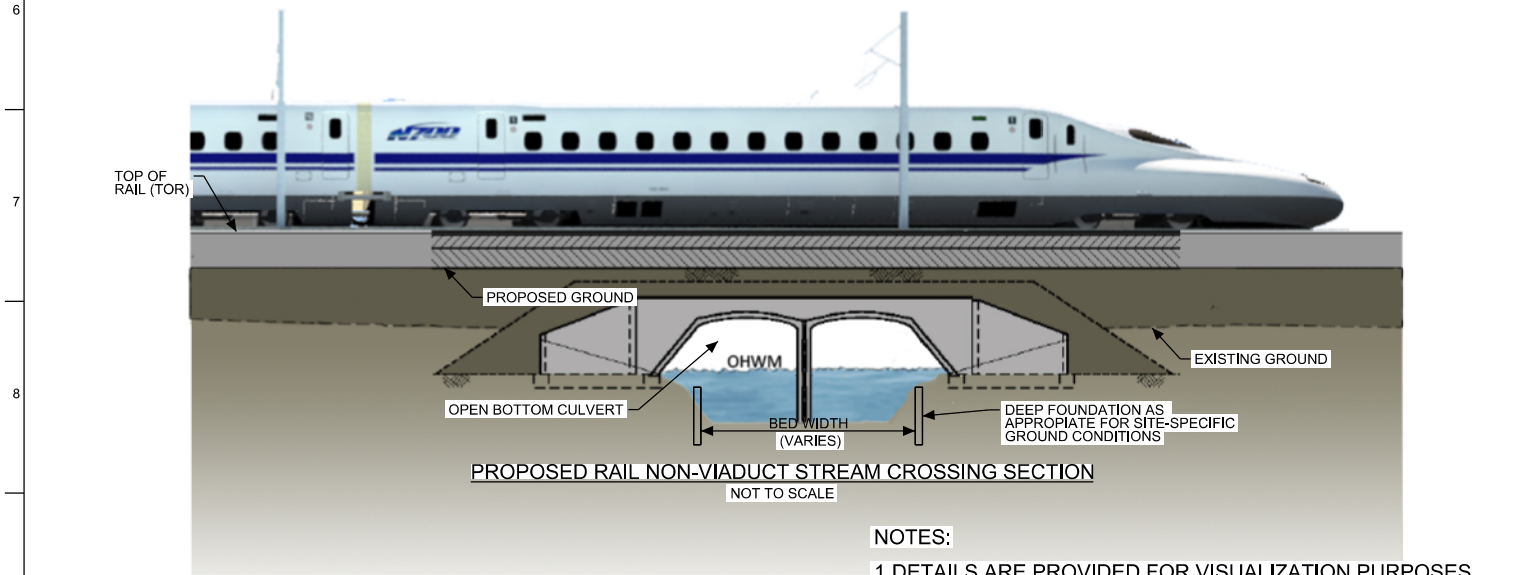
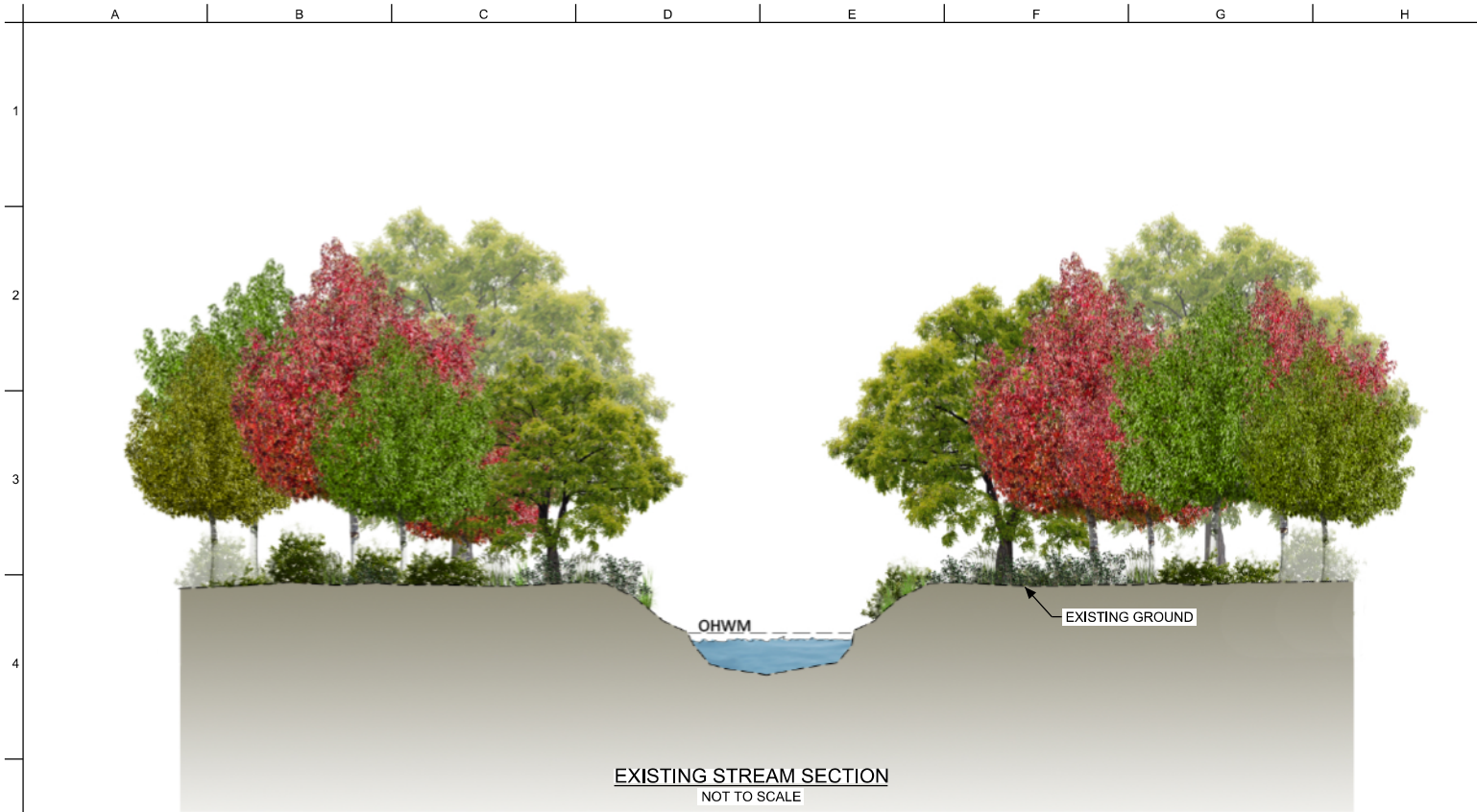
Job No

234180

Drawing No

Rev

02



DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY
R. ZARATE

DRAWN BY
J. ALMAGUER

CHECKED BY
D. GISE

IN CHARGE
R. ZARATE

DATE
OCT. 2019

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Client



**TEXAS
CENTRAL**

1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

**DETAIL 18
RAIL NON-VIADUCT
WITH OPEN
BOTTOM CULVERT
STREAM CROSSING**

Scale
NOT TO SCALE

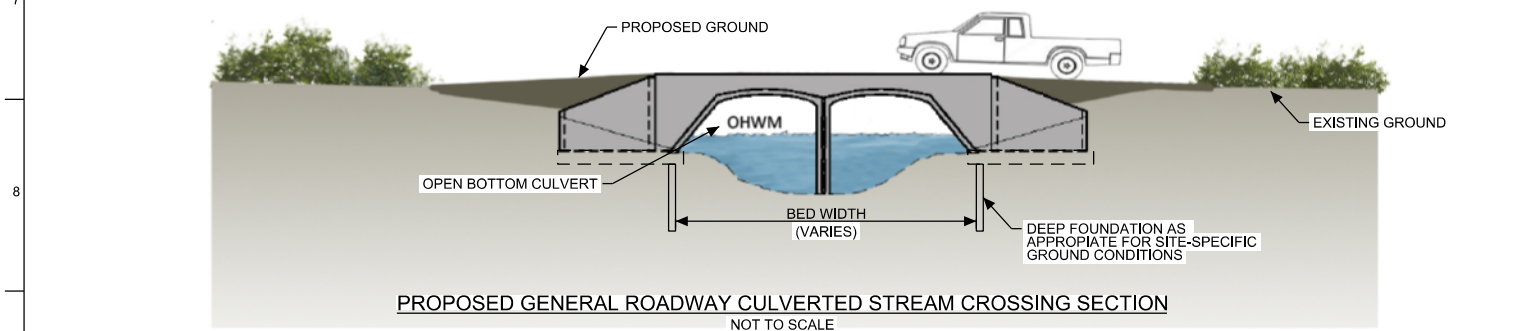
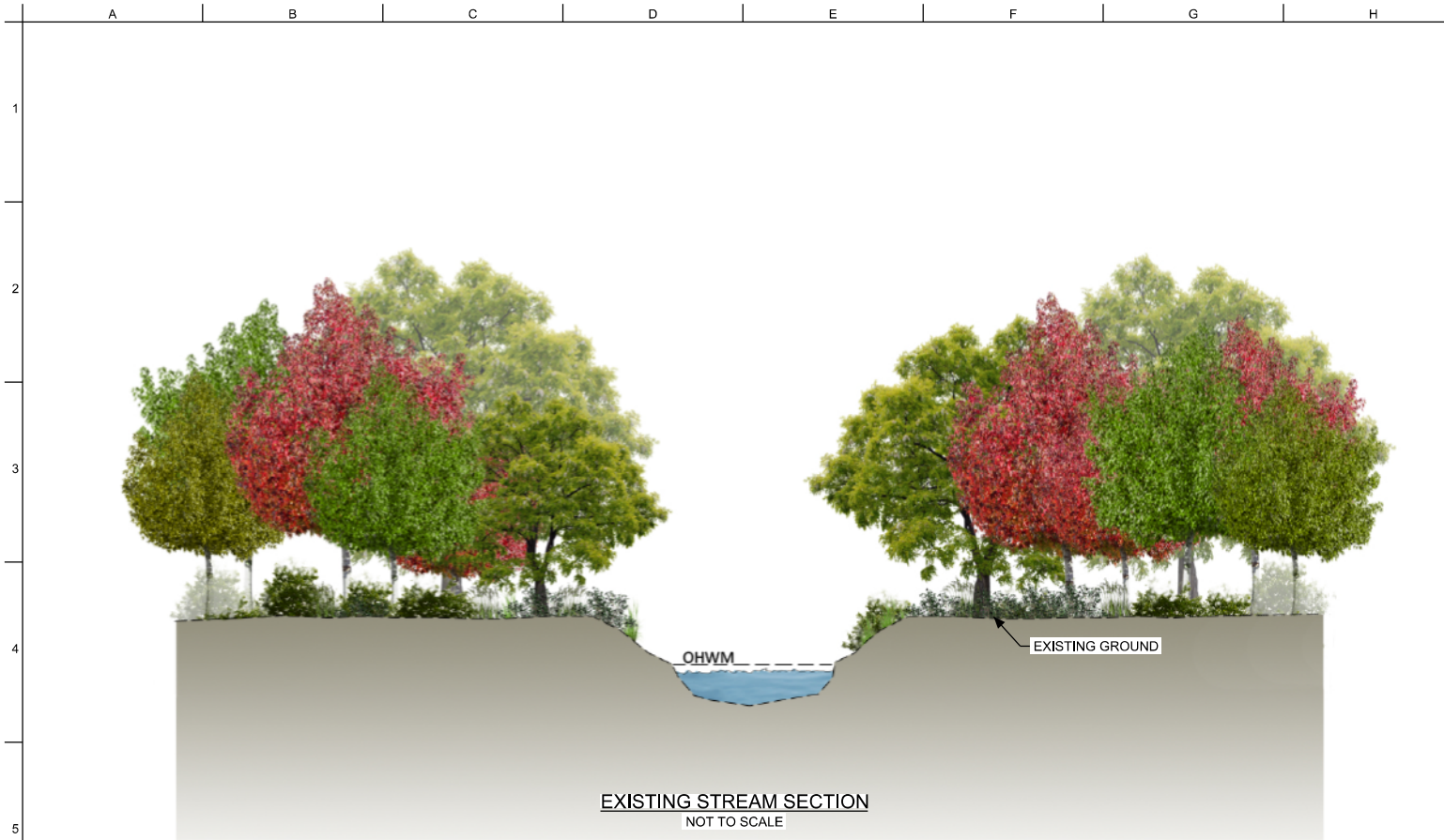
Drawing Status

FINAL REV.1

Job No
234180

Drawing No

Rev
02



NOTES:

- 1.DETAILED ARE PROVIDED FOR VISUALIZATION PURPOSES ONLY AND ARE NOT MEANT FOR CONSTRUCTION.
- 2.ALL STREAMS WILL BE PROPERLY CULVERTED TO MAINTAIN DOWNSTREAM FLOWS.
- 3.CULVERT STRUCTURE DESIGN LIFE TO BE MINIMUM 75 YEARS.
- 4.FINAL CULVERT ARRAY & NUMBERS VARY BY LOCATION.

DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY
R. ZARATE
DRAWN BY
J. ALMAGUER
CHECKED BY
D. GISE
IN CHARGE
R. ZARATE
DATE
OCT. 2019

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**TEXAS
CENTRAL**

1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

**DETAIL 19
GENERAL ROADWAY
WITH OPEN
BOTTOM CULVERT
STREAM CROSSING**

Scale
NOT TO SCALE

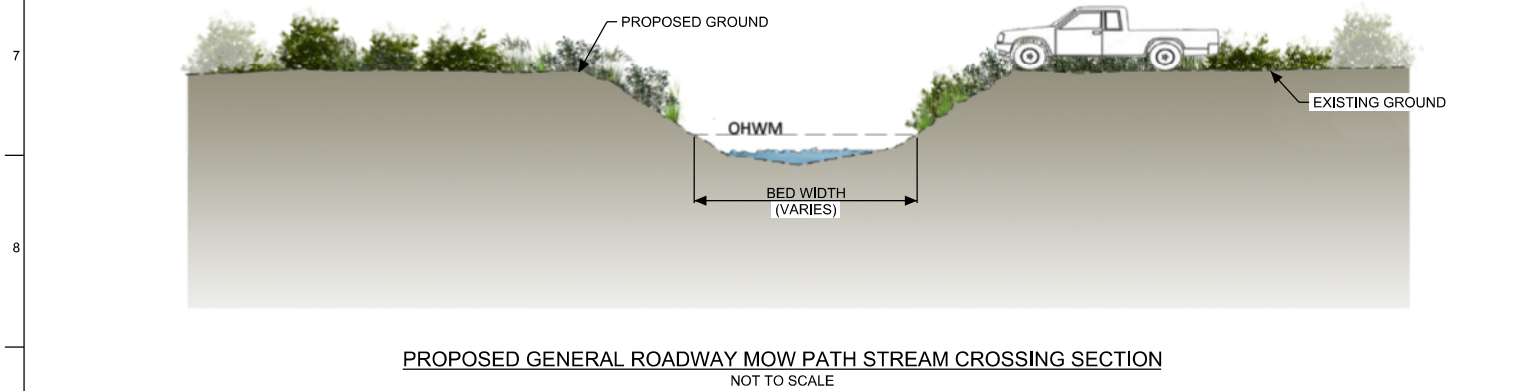
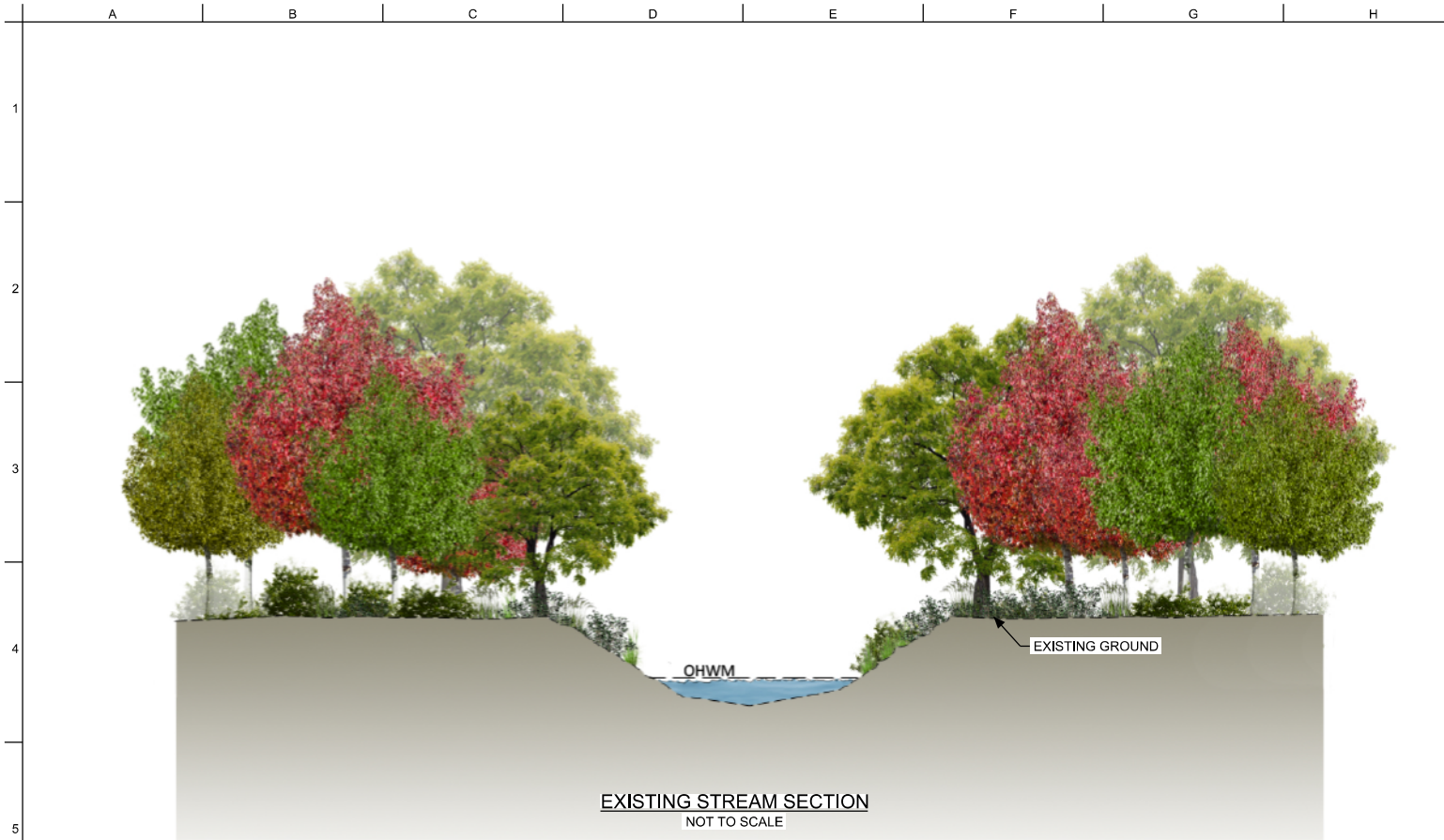
Drawing Status

FINAL REV.1

Job No
234180


Drawing No

Rev
02



- NOTES:
- 1.DETAILED ARE PROVIDED FOR VISUALIZATION PURPOSES ONLY AND ARE NOT MEANT FOR CONSTRUCTION.
 - 2.MOW PATHS ARE NOT INTENDED FOR USE DURING FLOODING.

DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY R. ZARATE	<div>ARUP</div> <div>Arup Texas, Inc. 10370 Richmond Ave., Suite 475 Houston, Texas 77042 USA Tel (713) 783 2787 Fax (713) 343 1487 www.arup.com Texas Registered Engineering Firm F-1990</div>	<div>FREES NICHOLS</div> <div>2711 North Haskell Ave., Suite 3300 Dallas, Texas 75204 Tel (214) 217 2200 Fax (214) 217 2201 www.freese.com Texas Registered Engineering Firms F-2144</div>	<div>Client</div> <div> TEXAS CENTRAL</div> <div>1409 South Lamar Street, Suite 1022, Dallas, Texas 75215</div>	<div>Drawing Title</div> <div>DETAIL 20 RAIL NON-VIADUCT MOW PATH STREAM CROSSING</div>	Scale NOT TO SCALE		
DRAWN BY J. ALMAGUER					Drawing Status FINAL REV.1		
CHECKED BY D. GISE					Job No	Drawing No	Rev
IN CHARGE R. ZARATE					234180		02
DATE OCT. 2019							



NOTES:

- 1.DETAILS ARE PROVIDED FOR VISUALIZATION PURPOSES ONLY AND ARE NOT MEANT FOR CONSTRUCTION.
- 2.REFER TO PLAN VIEW TO DETERMINE SPECIFIC TYPE OF WETLAND CROSSING.
- 3.MOW PATHS ARE NOT INTENDED FOR USE DURING FLOODING.

DALLAS TO HOUSTON HIGH-SPEED RAIL
APPLICANT: TCRR
SWG-2014-00412 & SWF-2011-00483

DESIGNED BY
R. ZARATE
DRAWN BY
J. ALMAGUER
CHECKED BY
D. GISE
IN CHARGE
R. ZARATE
DATE
OCT. 2019

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Client



**TEXAS
CENTRAL**

1409 South Lamar Street, Suite 1022, Dallas, Texas 75215

Drawing Title

**DETAIL 21
MOW PATH
WETLAND CROSSING**

Scale
NOT TO SCALE

Drawing Status

FINAL REV.1

Job No
234180

Drawing No

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02