

**Scope of Work for Communication Tower Installation at Smithfield Station.**

**Project:** TEX Rail Commuter Rail Line

**Subject:** Communication Tower at Smithfield Station

**Description of Work:**

The TEX Rail Radio Subsystem is to provide voice communication between the Rail Control Centers to the trains and maintenance personal (within a 1 mile of the right of way) along the TEX Rail corridor. Portion of the Right of Way (ROW) is shared with Trinity Railway Express (TRE), another portion is shared with Fort Worth & Western Railroad (FWWR), and two portions of the ROW are under exclusive use of TEX Rail.

Communication tower install consist of a 60' tilt-down type tower installed on a 10' helical drill in foundation. This tower is to be installed on TEX Rail right-of-way at Smithfield Station. in conformance with all TEX Rail contract specifications, standards & safety requirements.

**Objective:**

The TEX Rail Radio Subsystem shall provide coverage for 98% of the alignment for 99% of the time. This is to be achieved by three 160MHz base stations located along the alignment with one of the base station locations at Smithfield Station. The other two locations are CP Grapevine West and Northside station. Each of the 3 towers are standalone towers, this is due to the coverage design, the specifications it must meet for installation, its shared usage with other class 1 railroads.

**Tasks:**

Installation consists of first installing 10' tower foundation that is drilled by augur motor attachment to a required torque value. The use of this type of foundation eliminates the need for open excavation and provides minimal impact to native soil.

Next, the 60' tilt-down type tower is installed onto foundation. The tower base has a hinge-type pivot that allows the tower to be mounted while laying horizontally on the ground then raised by telescoping fork-lift or back-hoe after base is attached to foundation. Use of tilt-down style towers allows for safe and efficient antenna installation and maintenance by using ratchet system to lower tilt portion of antenna while working.

Last, a trench is excavated approximately 30" in depth from tower location to house – approximately 30'. A 2" flexible, liquid tight conduit is installed into trench and backfilled.

Northside Station – The communication tower’s proposed location is approximately at STA 30008+00. It shall be installed in a location that is at least 30’ minimum to the east of the Communication Facility building.

Site #	Site Name	Latitude	Longitude	Degree	Minute	Seconds	Degree	Minute	Seconds	Ground Elev. (ft)	Tower type
1	North Side Station	32.795378	97.337989	32	47	43.4	-97	20	16.8	559	60-foot, tilting
2	Smithfield Station	32.865278	97.210694	32	51	55.0	-97	12	38.5	645	60-foot, tilting
3	Grapevine West	32.933398	97.080472	32	55	58.9	-97	5	2.3	636	60-foot, tilting

## 1. PURPOSE

The purpose of this document is to provide the Fort Worth Transit Authority (FWTA) with an understanding of the system design, components, and integration approach being proposed for the 160 MHz Radio Subsystem. The ultimate goal is to provide a radio system which completely meets the specifications and intent for reliable voice radio service on and near the TEXRail right-of-way.

## 2. REFERENCE MATERIAL

Section 16870 Radio Subsystem (and the specifications/standards cited therein)

Section 16863 Control Center Integrated Voice Communication Subsystem (and the specifications/standards cited therein)

RF coverage analysis document: Appendix G - TEXRail 160 MHz Analysis v3 0 20170918.pdf

## 3. SYSTEM DESIGN

### 3.1. RF COVERAGE ANALYSIS

An RF coverage analysis was performed using EDX SignalPro to determine what hardware and configuration are needed to achieve a delivered audio quality (DAQ) of 3.4 on the entire right-of-way (ROW) and one mile in each direction from the ROW.<sup>1</sup> The analysis indicated that the coverage goal could be met by building radio base stations at: 1) North Side Station, 2) Smithfield station, and 3) Control Point (CP) Grapevine West. More detail is presented in the coverage analysis document "TEXRail 160 MHz Analysis v3 0 20170918.pdf", submitted in Appendix G.

### 3.2. FREQUENCY PLANNING

The frequencies needed to provision the base stations will be issued by the AAR frequency coordinator, Transportation Technology Center Inc. (TTCI). The channel plan will be evaluated by TTCI using their Planet prediction tool, and independently verified by Xorail using EDX SignalPro. The radios can be operated on carrier squelch for the sake of interoperability – though coded squelch should also be considered.

While an over-the-air repeater was originally envisioned to repeat a voice traffic on the entire right-of-way (ROW), such a repeater and its cavity duplexer system would not be quickly retunable to operate on TRE channels on an emergency basis. As an alternative, two 160 MHz band voice channels will be requested from the frequency coordinator. Channel #1 would be used at North Side Station, and re-used at Grapevine West; channel #2 would be used at Smithfield.

### 3.3. SYSTEM OPERATION

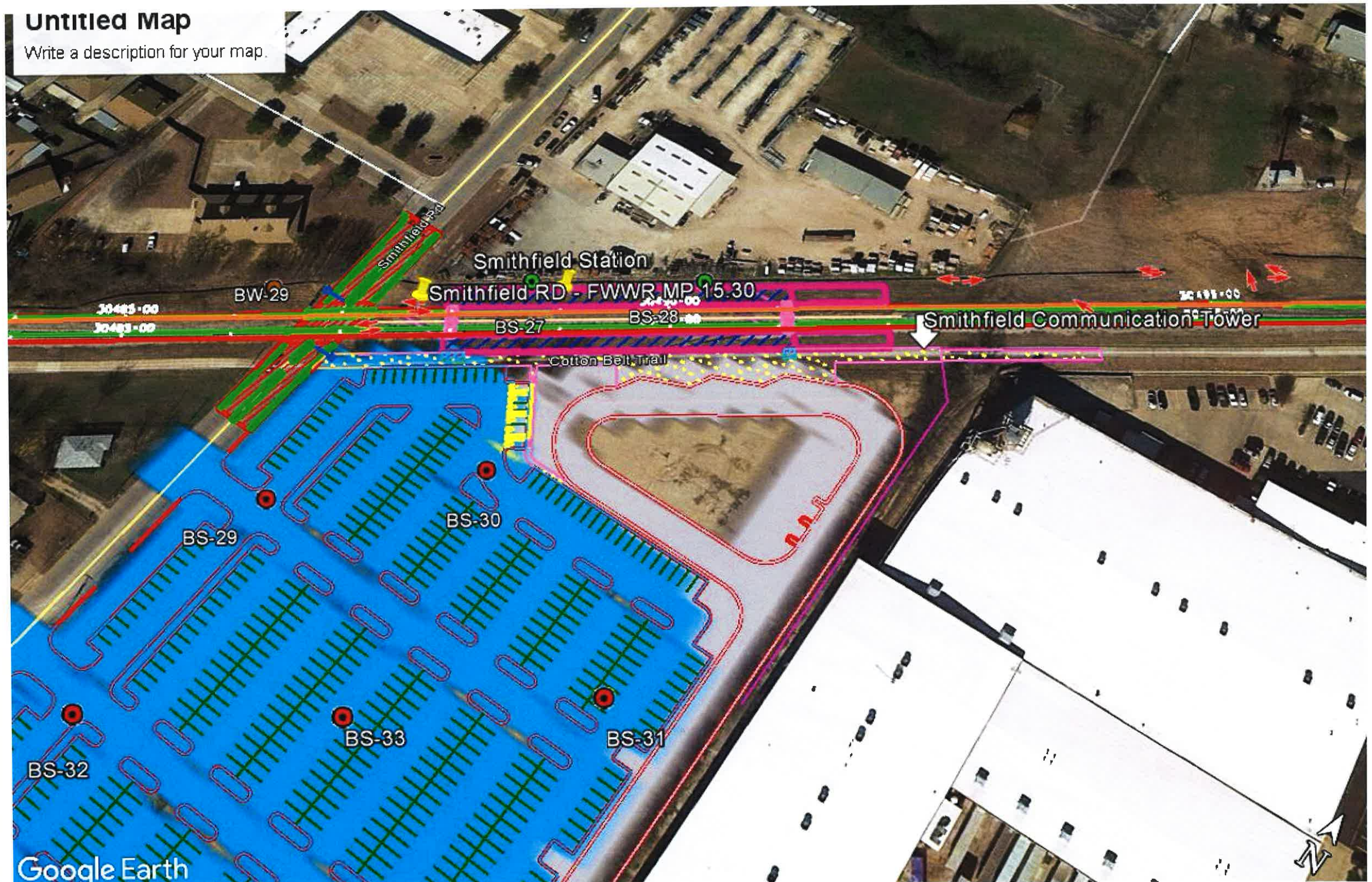
The radio subsystem would operate on 12.5 kHz-wide channels, using *analog* frequency modulation (FM) for the sake of interoperability with other railroads operating on the TEXRail right-of-way. To send audio to a train on the ROW, the dispatcher would typically transmit simultaneously (i.e. *multicast*) on all three base stations, causing each base station to transmit on its own assigned frequency. The locomotive (or vehicle) radio would hear the call anywhere on or near the ROW.

*Transmitting from the train to the dispatcher can be more complicated.* On a two-channel frequency plan (described in the paragraph above), the train engineer would have to manually switch the radio to

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<sup>1</sup> Radio coverage past the right-of-way is subject to approval by the AAR frequency coordinator.



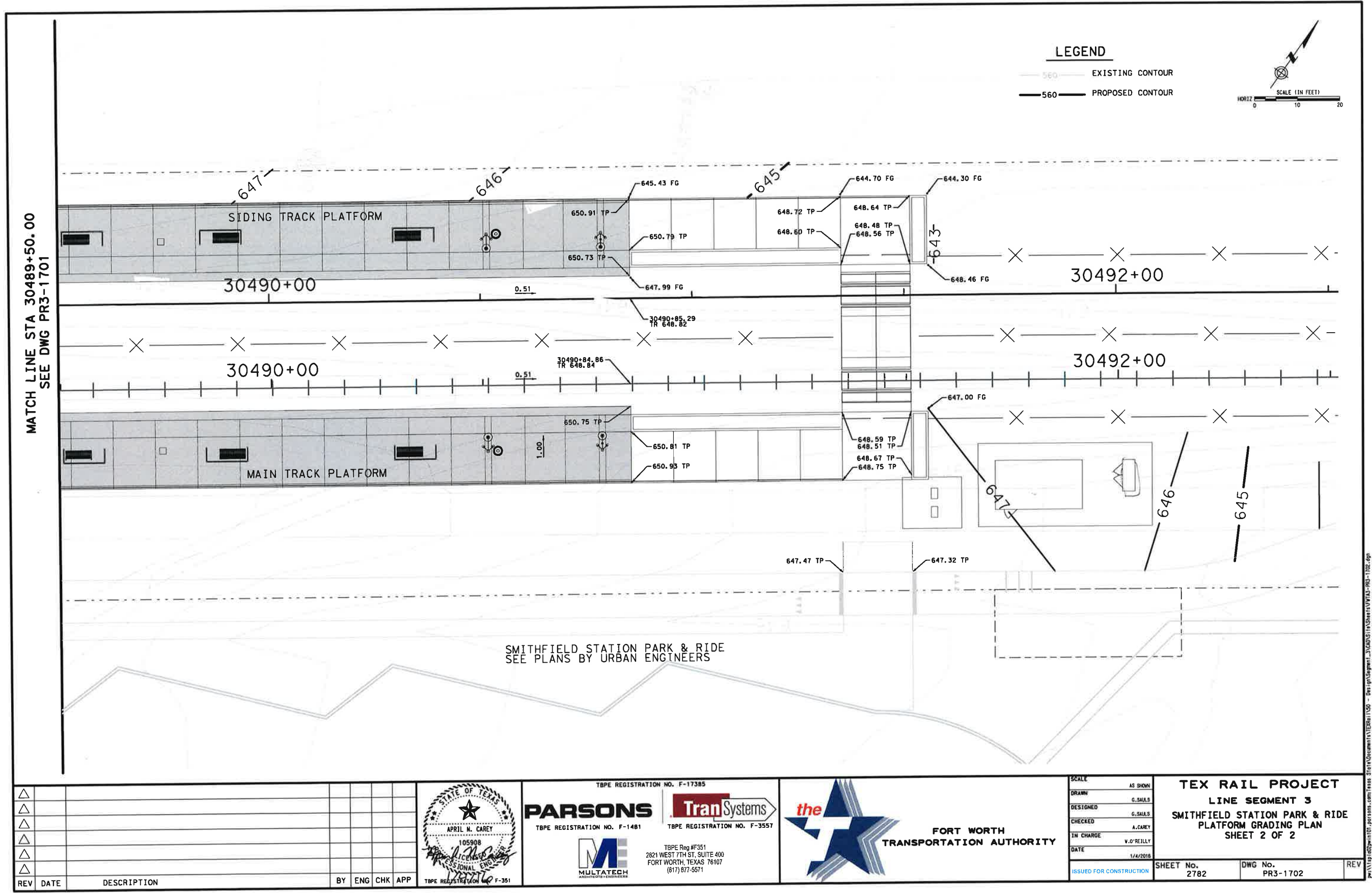




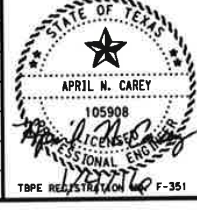
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REV	DATE	DESCRIPTION	BY	ENG	CHK	APP



PARSONS

TBPE REGISTRATION NO. F-1481

MULTATECH

TranSystems

TBPE REGISTRATION NO. F-3557


TBPE Reg #F351  
2821 WEST 7TH ST, SUITE 400  
FORT WORTH, TEXAS 76107  
(817) 817-5571



SCALE	AS SHOWN
DRAWN	G. SALLS
DESIGNED	G. SALLS
CHECKED	A. CAREY
IN CHARGE	V. O'REILLY
DATE	1/4/2016
ISSUED FOR CONSTRUCTION	

TEX RAIL PROJECT		
LINE SEGMENT 3		
SMITHFIELD STATION PARK & RIDE		
PLATFORM GRADING PLAN		
SHEET 2 OF 2		
SHEET No.	DWG No.	REV
2782	PR3-1702	



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