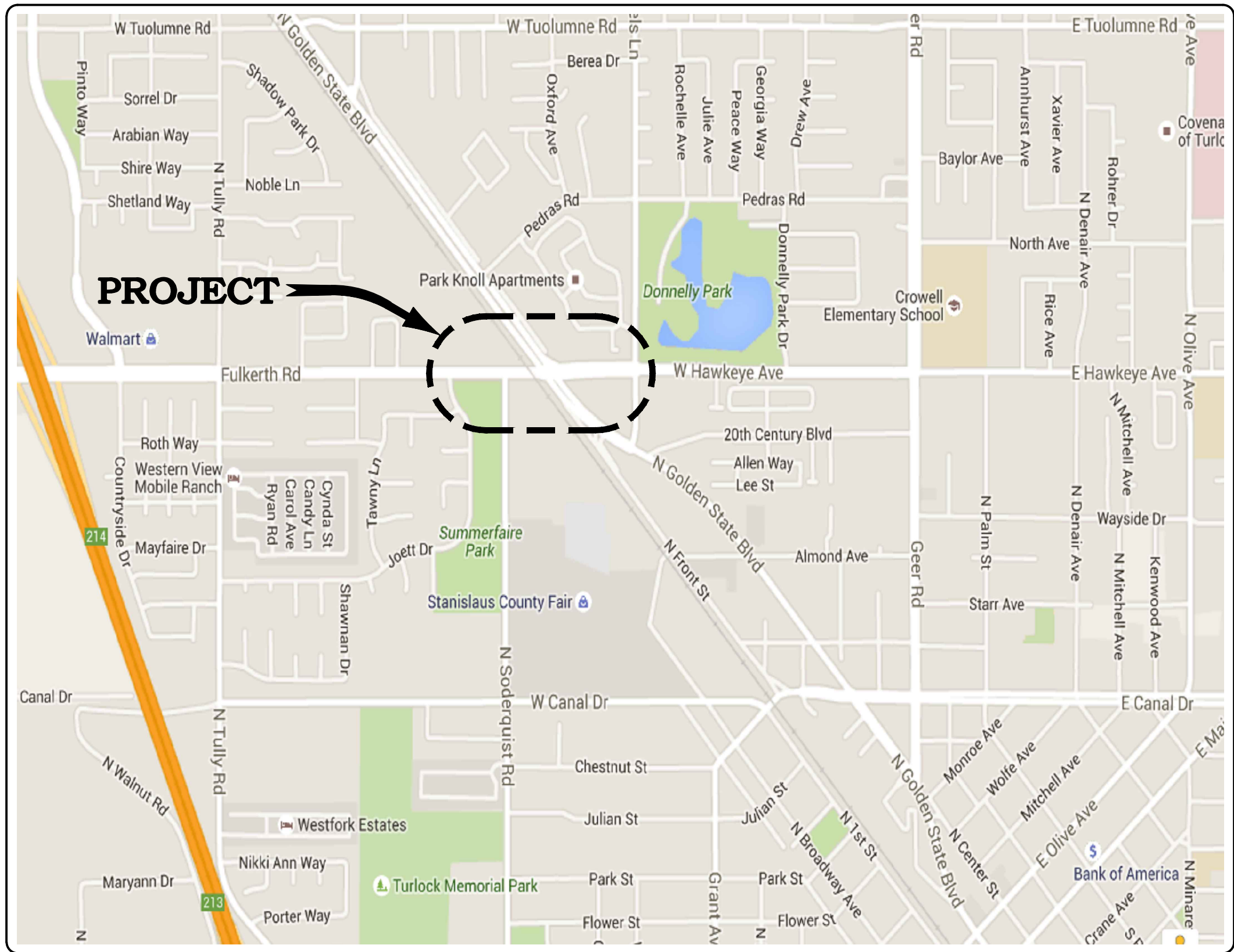


LEGEND

	BENCHMARK
	EX. MONUMENT WELL
	EX. MONUMENTS
	EX. SET MONUMENT
	EX. CONCRETE ELEVATION
	EX. FLOWLINE OF CURB ELEVATION
	EX. BACK OF SIDEWALK ELEVATION
	EX. PAVEMENT ELEVATION
	EX. GROUND ELEVATION
	PROPERTY LINE
	CENTERLINE
	EX. FENCE
	EX. 8" SS
	EX. 18" SD
	EX. 12" W
	EX. SANITARY SEWER MANHOLE
	EX. STORM DRAIN MANHOLE
	EX. WATER VALVE
	EX. WATER WELL
	EX. NON-POTABLE WATER VALVE
	EX. MANHOLE
	EX. TELEPHONE MANHOLE
	EX. PRESSURE MANHOLE
	EX. SANITARY SEWER CLEAN OUT
	EX. FIRE HYDRANT
	EX. GAS VALVE
	EX. CATCH BASIN
	EX. DRAIN INLET
	EX. TRAFFIC SIGNAL
	EX. TRAFFIC SIGNAL HAND WELL
	EX. TRAFFIC SIGNAL LOOP DETECTOR
	EX. BOLLARD
	EX. LIGHT
	EX. SIGN
	EX. POWER POLE
	EX. TELEPHONE POLE
	EX. JOINT UTILITY POLE
	EX. GUY POLE
	EX. UTILITY SERVICE POLE
	EX. TREE
	EX. CABLE BOX
	EX. ELECTRICAL BOX
	EX. FIRE ALARM BOX
	EX. GAS BOX
	EX. IRRIGATION BOX
	EX. STREET LIGHT BOX
	EX. COMMUNICATION BOX
	EX. TRAFFIC BOX
	EX. IRRIGATION CONTROL VALVE BOX
	EX. TELEPHONE BOX
	EX. UTILITY BOX
	EX. WATER BOX
	PROP. 10" SS
	PROP. 18" SD
	PROP. 12" W
	PROP. 12" RW
	PROP. SEPARATION MANHOLE
	PROP. STORM DRAIN MANHOLE
	PROP. CATCH BASIN
	PROP. DROP INLET
	PROP. SANITARY SEWER CLEAN OUT
	PROP. SANITARY SEWER MANHOLE
	PROP. POTABLE WATER VALVE
	PROP. NON-POTABLE WATER VALVE
	PROP. FIRE HYDRANT
	PROP. WATER BLOW-OFF ASSEMBLY
	PROP. HOT MIX ASPHALT
	PROP. CONCRETE
	PROP. TRAFFIC CHRISTY BOX

ABBREVIATIONS

C	CONCRETE
P	PAVEMENT
R	RADIUS
L	LENGTH
S	SLOPE
W	POTABLE WATER
OC	ON CENTER
BC	BEGINNING OF CURVE
EC	END OF CURVE
AC	ASPHALT CONCRETE
DI	DROP INLET
AV	AIR VENT
IV	IRRIGATION VALVE
AB	AGGREGATE BASE
SF	SQUARE FEET
CY	CUBIC YARD
RW	RIGHT-OF-WAY
PL	PROPERTY LINE
CL	CENTER LINE
FL	FLOWLINE
EP	EDGE OF PAVEMENT
TC	TOP OF CURB
EX	EXISTING
GB	GRADE BREAK
HP	HIGH POINT
LP	LOW POINT
AP	ANGLE POINT
UP	UTILITY POLE
PP	ELECTRICITY POLE
TP	TELEPHONE POLE
JP	JOINT UTILITY POLE
SP	SERVICE POLE
GP	GUY POLE
LF	LINEAR FOOT
CB	CATCH BASIN
SS	SANITARY SEWER
SD	STORM DRAIN
APN	ASSESSORS PARCEL NUMBER
BSW	BACK OF SIDEWALK
INV	INVERT
HMA	HOT MIX ASPHALT
NPW	NON-POTABLE WATER
TYP	TYPICAL
PCC	POINT OF COMPOUND CURVE
PRC	POINT OF REVERSE CURVE
IDB	IRRIGATION DISTRIBUTION BOX
ISP	IRRIGATION STAND PIPE
PROP	PROPOSED
RHMA	RUBBERIZED HOT MIX ASPHALT
SSMH	SANITARY SEWER MANHOLE
SSCO	SANITARY SEWER CLEAN OUT
SDMH	STORM DRAIN MANHOLE



VICINITY MAP

SHEET INDEX

SHEET	DESCRIPTION
1	SHEET INDEX, LEGEND & VICINITY MAP
2	TOPOGRAPHY SURVEY
3	DEMOLITION PLAN
4	SITE PLAN
5	UTILITY COMPOSITE PLAN
6	GRADING AND DRAINAGE PLAN
7	GRADING AND DRAINAGE PLAN (ENLARGED ISLAND DETAILS)
8	HORIZONTAL CONTROL PLAN
9	HORIZONTAL CONTROL PLAN (ENLARGED ISLAND DETAILS)
10	TRAFFIC SIGNAL PLAN (40 SCALE)
11	TRAFFIC SIGNAL PLAN (20 SCALE)
12	TRAFFIC SIGNAL DETAILS
13	TRAFFIC SIGNAL SPECIFICATION SHEET
14	TRAFFIC SIGNAL SPECIFICATION SHEET
15	TRAFFIC SIGNAL SPECIFICATION SHEET
16	STRIPING AND SIGNAGE PLAN
17	CONSTRUCTION DETAILS
18	CONSTRUCTION DETAILS
19	CONSTRUCTION DETAILS
20	CONSTRUCTION DETAILS

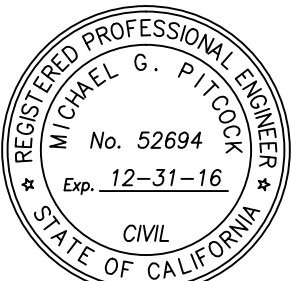
CONTACTS

CITY OF TURLOCK, DEVELOPMENT SERVICES DEPARTMENT (209) 668-5520 ENGINEERING DIVISION
CITY OF TURLOCK, MUNICIPAL SERVICES DEPARTMENT (209) 668-5590 FOR SEWER, STORM AND WATER LINES
TURLOCK IRRIGATION DISTRICT (ELECTRICAL) (209) 883-8419 ED JEFFERS
TURLOCK IRRIGATION DISTRICT (IRRIGATION) (209) 883-8367 TODD TROGLIN
CHARTER COMMUNICATIONS (209) 633-3311 ABEL DAVILA
PACIFIC GAS & ELECTRIC (GAS) (209) 576-6662 KURT SOUSA
AT&T (209) 578-7139 SUKHWANT VIRK
FIRE DEPARTMENT (NON-EMERGENCY) (209) 668-5580
POLICE DEPARTMENT (NON-EMERGENCY) (209) 668-1200
AMBULANCE (209) 632-2271
TURLOCK SCAVENGER (209) 668-7274



NOTE:
ALL REFERENCES AND WRITTEN
DIMENSIONS SHALL SUPERCEDE
ALL SCALED DISTANCES AND
SHALL BE VERIFIED IN THE
FIELD. ANY DISCREPANCY SHALL
BE BROUGHT TO THE ATTENTION
OF THE ENGINEER PRIOR TO
THE COMMENCEMENT OF WORK.

MICHAEL G. PITCOCK, P.E.
DIRECTOR OF DEVELOPMENT
SERVICES/CITY ENGINEER
12/12/16
PLANS APPROVAL DATE



NATHAN B. BRAY, P.E.
PRINCIPAL CIVIL ENGINEER
DATE: 12/12/16



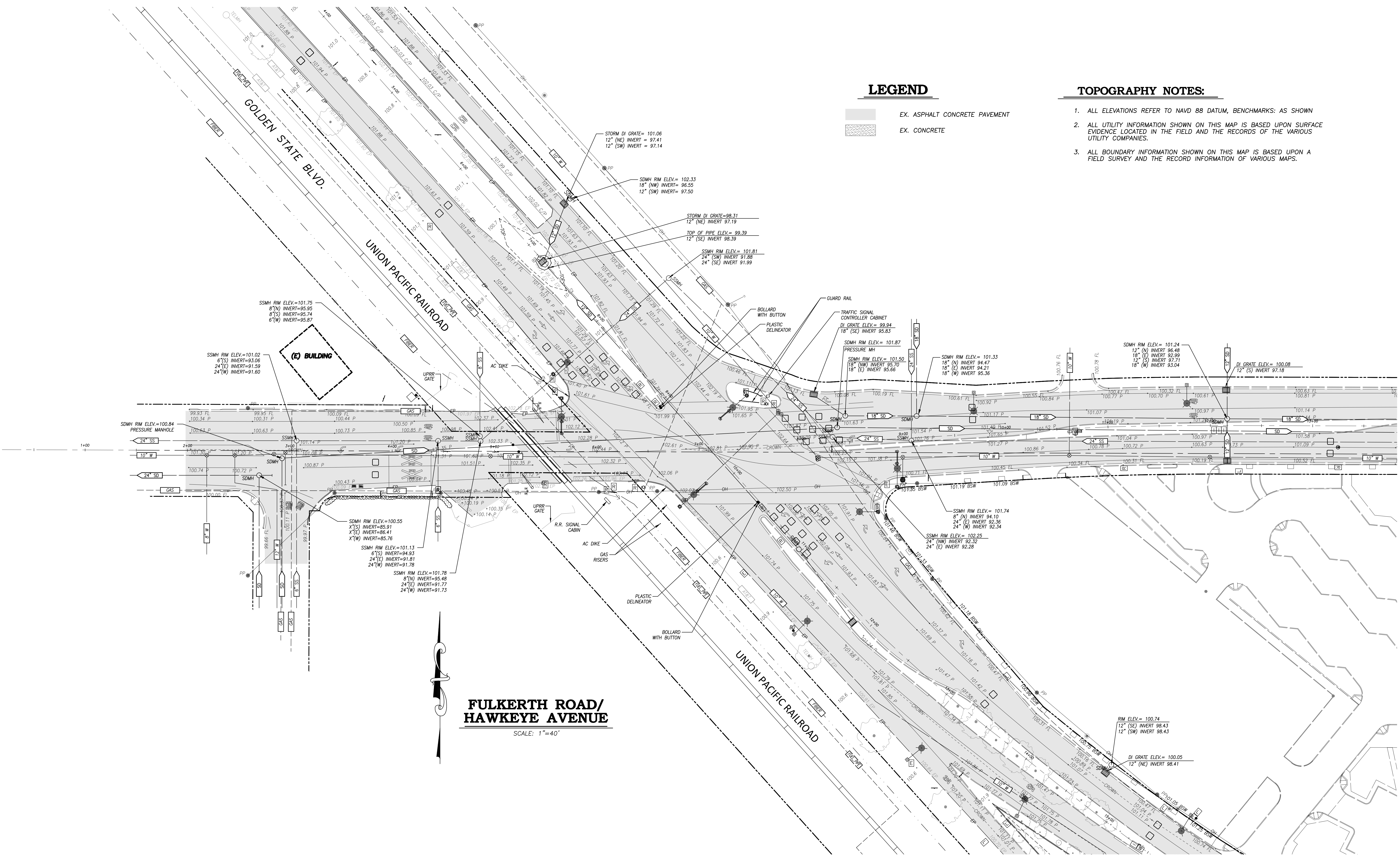
CITY OF TURLOCK
DEVELOPMENT SERVICES
ENGINEERING DIVISION
156 S. BROADWAY, STE 150
(209) 668-5520

SHEET INDEX, LEGEND & VICINITY MAP
CAPITAL PROJECT NO. 14-28
INTERSECTION IMPROVEMENTS AT
GOLDEN STATE BLVD. AND FULKERTH ROAD

VERIFY SCALE
BAR IS 1" ON
ORIGINAL DRAWING
0 1/4" 3/4" 1"
1/2"
IF NOT ONE INCH ON
THIS SHEET, ADJUST
SCALES ACCORDINGLY

DRAWN BY: AZ
REV. BY: --
CH. BY: SRF
DATE: DECEMBER, 2016
SCALE: NONE
14-28 BASE.dwg

SHEET
1
OF 20



LEGEND

- EX. ASPHALT CONCRETE PAVEMENT
- EX. CONCRETE

TOPOGRAPHY NOTES:

- ALL ELEVATIONS REFER TO NAVD 88 DATUM, BENCHMARKS: AS SHOWN
- ALL UTILITY INFORMATION SHOWN ON THIS MAP IS BASED UPON SURFACE EVIDENCE LOCATED IN THE FIELD AND THE RECORDS OF THE VARIOUS UTILITY COMPANIES.
- ALL BOUNDARY INFORMATION SHOWN ON THIS MAP IS BASED UPON A FIELD SURVEY AND THE RECORD INFORMATION OF VARIOUS MAPS.

**FULKERTH ROAD/
HAWKEYE AVENUE**

SCALE: 1"=40'

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Michael G. Pitcock
MICHAEL G. PITCOCK, P.E.
DIRECTOR OF DEVELOPMENT
SERVICES/CITY ENGINEER
12/12/16
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
No. 52694
Exp. 12-31-16
CIVIL
STATE OF CALIFORNIA

Nathan B. Bray
NATHAN B. BRAY, P.E.
PRINCIPAL CIVIL ENGINEER
DATE: 12/12/16

CITY OF TURLOCK
INC. 1908

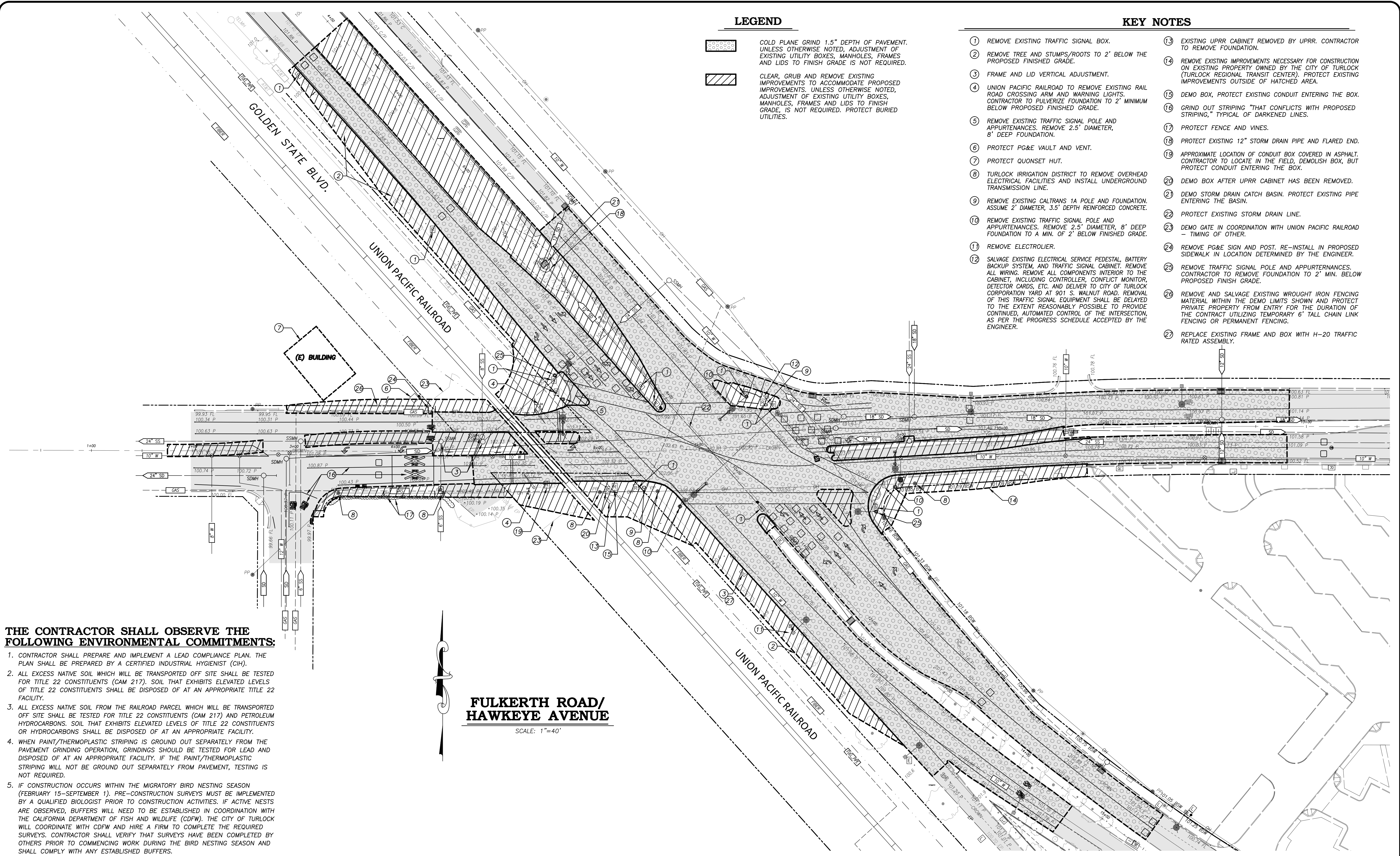
**CITY OF TURLOCK
DEVELOPMENT SERVICES
ENGINEERING DIVISION**
156 S. BROADWAY, STE 150
(209) 668-5520

TOPOGRAPHY SURVEY
FULKERTH ROAD/HAWKEYE AVENUE ~ BEGIN TO STA. 13+00
CAPITAL PROJECT NO. 14-28
**INTERSECTION IMPROVEMENTS AT
GOLDEN STATE BLVD. AND FULKERTH ROAD**

VERIFY SCALE
BAR IS 1" ON
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DRAWN BY: AZ
REV. BY: --
CH. BY: SRF
DATE: DECEMBER, 2016
SCALE: 1"=40'
14-28 TOP0.dwg

SHEET
2
OF **20**



LEGEND

- COLD PLANE GRIND 1.5" DEPTH OF PAVEMENT. UNLESS OTHERWISE NOTED, ADJUSTMENT OF EXISTING UTILITY BOXES, MANHOLES, FRAMES AND LIDS TO FINISH GRADE IS NOT REQUIRED.
- CLEAR, GRUB AND REMOVE EXISTING IMPROVEMENTS TO ACCOMMODATE PROPOSED IMPROVEMENTS. UNLESS OTHERWISE NOTED, ADJUSTMENT OF EXISTING UTILITY BOXES, MANHOLES, FRAMES AND LIDS TO FINISH GRADE, IS NOT REQUIRED. PROTECT BURIED UTILITIES.

KEY NOTES

- 1 REMOVE EXISTING TRAFFIC SIGNAL BOX.
- 2 REMOVE TREE AND STUMPS/ROOTS TO 2' BELOW THE PROPOSED FINISHED GRADE.
- 3 FRAME AND LID VERTICAL ADJUSTMENT.
- 4 UNION PACIFIC RAILROAD TO REMOVE EXISTING RAIL ROAD CROSSING ARM AND WARNING LIGHTS. CONTRACTOR TO PULVERIZE FOUNDATION TO 2' MINIMUM BELOW PROPOSED FINISHED GRADE.
- 5 REMOVE EXISTING TRAFFIC SIGNAL POLE AND APPURTENANCES. REMOVE 2.5' DIAMETER, 8' DEEP FOUNDATION.
- 6 PROTECT PG&E VAULT AND VENT.
- 7 PROTECT QUONSET HUT.
- 8 TURLOCK IRRIGATION DISTRICT TO REMOVE OVERHEAD ELECTRICAL FACILITIES AND INSTALL UNDERGROUND TRANSMISSION LINE.
- 9 REMOVE EXISTING CALTRANS 1A POLE AND FOUNDATION. ASSUME 2' DIAMETER, 3.5' DEPTH REINFORCED CONCRETE.
- 10 REMOVE EXISTING TRAFFIC SIGNAL POLE AND APPURTENANCES. REMOVE 2.5' DIAMETER, 8' DEEP FOUNDATION TO A MIN. OF 2' BELOW FINISHED GRADE.
- 11 REMOVE ELECTROLIER.
- 12 SALVAGE EXISTING ELECTRICAL SERVICE PEDESTAL, BATTERY BACKUP SYSTEM, AND TRAFFIC SIGNAL CABINET. REMOVE ALL WIRING. REMOVE ALL COMPONENTS INTERIOR TO THE CABINET, INCLUDING CONTROLLER, CONFLICT MONITOR, DETECTOR CARDS, ETC. AND DELIVER TO CITY OF TURLOCK CORPORATION YARD AT 901 S. WALNUT ROAD. REMOVAL OF THIS TRAFFIC SIGNAL EQUIPMENT SHALL BE DELAYED TO THE EXTENT REASONABLY POSSIBLE TO PROVIDE CONTINUED, AUTOMATED CONTROL OF THE INTERSECTION, AS PER THE PROGRESS SCHEDULE ACCEPTED BY THE ENGINEER.
- 13 EXISTING UPRR CABINET REMOVED BY UPRR. CONTRACTOR TO REMOVE FOUNDATION.
- 14 REMOVE EXISTING IMPROVEMENTS NECESSARY FOR CONSTRUCTION ON EXISTING PROPERTY OWNED BY THE CITY OF TURLOCK (TURLOCK REGIONAL TRANSIT CENTER). PROTECT EXISTING IMPROVEMENTS OUTSIDE OF HATCHED AREA.
- 15 DEMO BOX, PROTECT EXISTING CONDUIT ENTERING THE BOX.
- 16 GRIND OUT STRIPING "THAT CONFLICTS WITH PROPOSED STRIPING," TYPICAL OF DARKENED LINES.
- 17 PROTECT FENCE AND VINES.
- 18 PROTECT EXISTING 12" STORM DRAIN PIPE AND FLARED END.
- 19 APPROXIMATE LOCATION OF CONDUIT BOX COVERED IN ASPHALT. CONTRACTOR TO LOCATE IN THE FIELD, DEMOLISH BOX, BUT PROTECT CONDUIT ENTERING THE BOX.
- 20 DEMO BOX AFTER UPRR CABINET HAS BEEN REMOVED.
- 21 DEMO STORM DRAIN CATCH BASIN. PROTECT EXISTING PIPE ENTERING THE BASIN.
- 22 PROTECT EXISTING STORM DRAIN LINE.
- 23 DEMO GATE IN COORDINATION WITH UNION PACIFIC RAILROAD - TIMING OF OTHER.
- 24 REMOVE PG&E SIGN AND POST. RE-INSTALL IN PROPOSED SIDEWALK IN LOCATION DETERMINED BY THE ENGINEER.
- 25 REMOVE TRAFFIC SIGNAL POLE AND APPURTENANCES. CONTRACTOR TO REMOVE FOUNDATION TO 2' MIN. BELOW PROPOSED FINISH GRADE.
- 26 REMOVE AND SALVAGE EXISTING WROUGHT IRON FENCING MATERIAL WITHIN THE DEMO LIMITS SHOWN AND PROTECT PRIVATE PROPERTY FROM ENTRY FOR THE DURATION OF THE CONTRACT UTILIZING TEMPORARY 6' TALL CHAIN LINK FENCING OR PERMANENT FENCING.
- 27 REPLACE EXISTING FRAME AND BOX WITH H-20 TRAFFIC RATED ASSEMBLY.

THE CONTRACTOR SHALL OBSERVE THE FOLLOWING ENVIRONMENTAL COMMITMENTS:

1. CONTRACTOR SHALL PREPARE AND IMPLEMENT A LEAD COMPLIANCE PLAN. THE PLAN SHALL BE PREPARED BY A CERTIFIED INDUSTRIAL HYGIENIST (CIH).
2. ALL EXCESS NATIVE SOIL WHICH WILL BE TRANSPORTED OFF SITE SHALL BE TESTED FOR TITLE 22 CONSTITUENTS (CAM 217). SOIL THAT EXHIBITS ELEVATED LEVELS OF TITLE 22 CONSTITUENTS SHALL BE DISPOSED OF AT AN APPROPRIATE TITLE 22 FACILITY.
3. ALL EXCESS NATIVE SOIL FROM THE RAILROAD PARCEL WHICH WILL BE TRANSPORTED OFF SITE SHALL BE TESTED FOR TITLE 22 CONSTITUENTS (CAM 217) AND PETROLEUM HYDROCARBONS. SOIL THAT EXHIBITS ELEVATED LEVELS OF TITLE 22 CONSTITUENTS OR HYDROCARBONS SHALL BE DISPOSED OF AT AN APPROPRIATE FACILITY.
4. WHEN PAINT/THERMOPLASTIC STRIPING IS GROUND OUT SEPARATELY FROM THE PAVEMENT GRINDING OPERATION, GRINDINGS SHOULD BE TESTED FOR LEAD AND DISPOSED OF AT AN APPROPRIATE FACILITY. IF THE PAINT/THERMOPLASTIC STRIPING WILL NOT BE GROUND OUT SEPARATELY FROM PAVEMENT, TESTING IS NOT REQUIRED.
5. IF CONSTRUCTION OCCURS WITHIN THE MIGRATORY BIRD NESTING SEASON (FEBRUARY 15-SEPTEMBER 1), PRE-CONSTRUCTION SURVEYS MUST BE IMPLEMENTED BY A QUALIFIED BIOLOGIST PRIOR TO CONSTRUCTION ACTIVITIES. IF ACTIVE NESTS ARE OBSERVED, BUFFERS WILL NEED TO BE ESTABLISHED IN COORDINATION WITH THE CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE (CDFW). THE CITY OF TURLOCK WILL COORDINATE WITH CDFW AND HIRE A FIRM TO COMPLETE THE REQUIRED SURVEYS. CONTRACTOR SHALL VERIFY THAT SURVEYS HAVE BEEN COMPLETED BY OTHERS PRIOR TO COMMENCING WORK DURING THE BIRD NESTING SEASON AND SHALL COMPLY WITH ANY ESTABLISHED BUFFERS.

FULKERTH ROAD/
HAWKEYE AVENUE

SCALE: 1"=40'

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NOTE:
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MICHAEL G. PITCOCK, P.E.
DIRECTOR OF DEVELOPMENT SERVICES/CITY ENGINEER
12/12/16
PLANS APPROVAL DATE

NATHAN B. BRAY, P.E.
PRINCIPAL CIVIL ENGINEER
DATE: 12/12/16

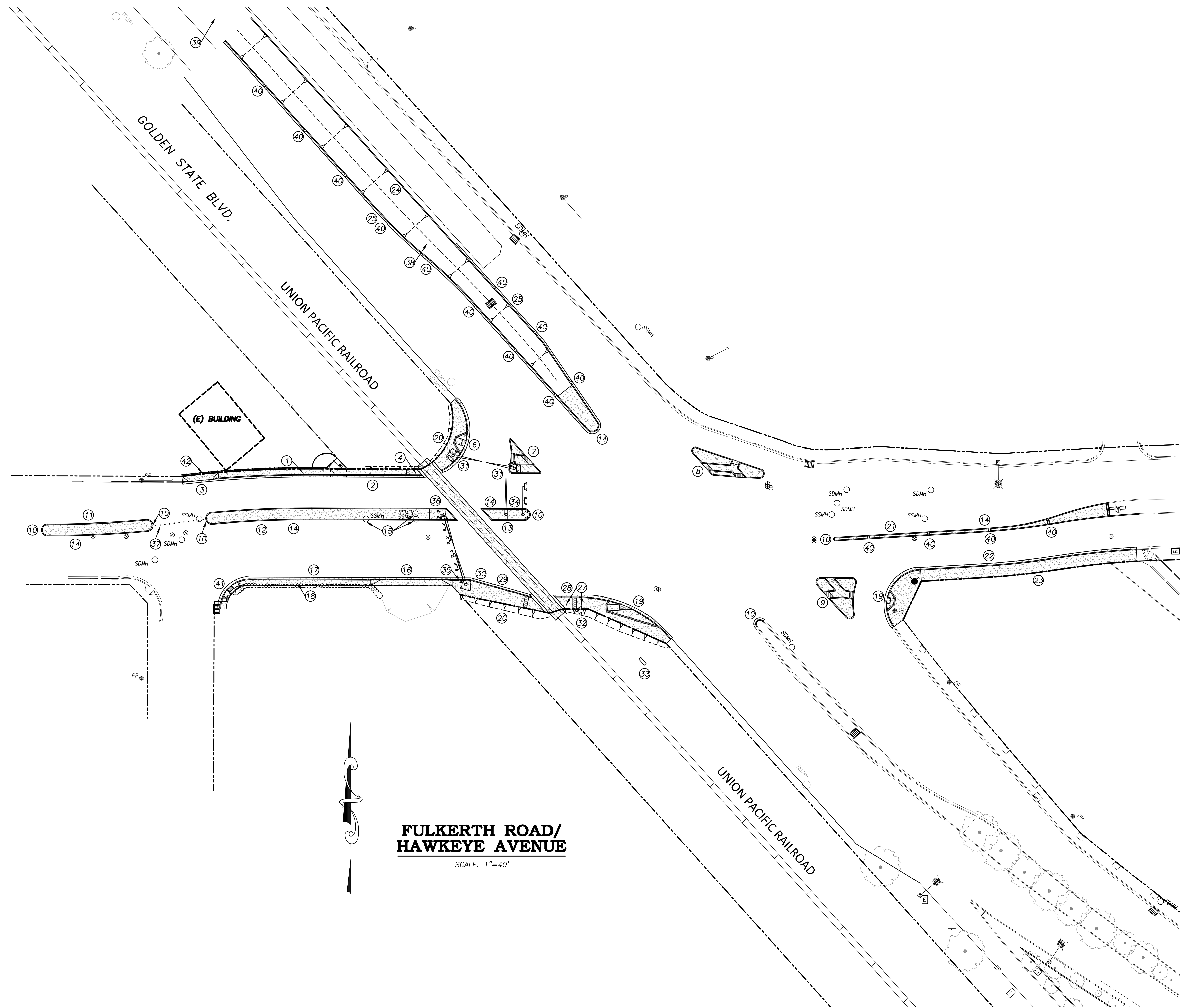
CITY OF TURLOCK
DEVELOPMENT SERVICES
ENGINEERING DIVISION
156 S. BROADWAY, STE 150
(209) 668-5520

DEMOLITION PLAN
FULKERTH ROAD/HAWKEYE AVENUE ~ BEGIN TO STA. 13+00
CAPITAL PROJECT NO. 14-28
INTERSECTION IMPROVEMENTS AT
GOLDEN STATE BLVD. AND FULKERTH ROAD

VERIFY SCALE
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0 1/4" 3/4" 1"
1/2"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

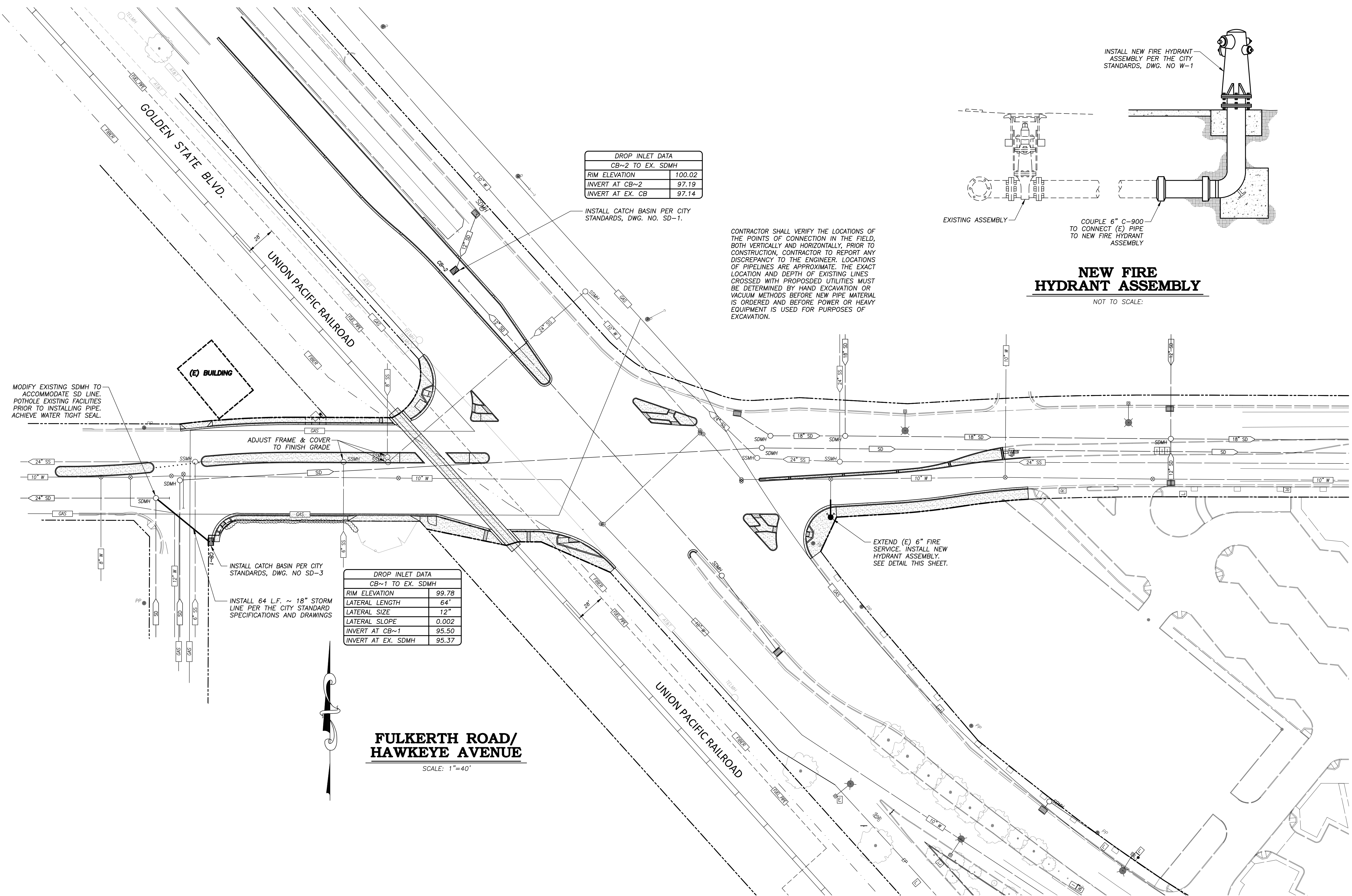
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REV. BY: --
CH. BY: SRF
DATE: DECEMBER, 2016
SCALE: 1"=40'
14-28 TOP0.dwg

SHEET
3
OF 20



KEY NOTES

- 1 INSTALL 726 SF ~ SIDEWALK PER CITY STANDARDS, DWG. NO. C-2 AND C-3.
- 2 INSTALL 168 LF ~ 6" CURB AND GUTTER PER CITY STANDARDS, DWG. NO. C-1.
- 3 INSTALL DRIVEWAY APPROACH PER CITY STANDARDS, DWG. NO. C-5.
- 4 INSTALL 36 SF ~ SIDEWALK PER CITY STANDARDS, DWG. NO. C-2 AND C-3.
- 6 INSTALL CURB RAMP PER CITY STANDARDS, DWG. NO. C-11.
- 7 INSTALL 6" CONCRETE MEDIAN ISLAND WITH PEDESTRIAN PASS THRU. INSTALL 105 LF ~ 6" VERTICAL CURB PER CITY STANDARDS, DWG. NO. C-1, DETAIL "VERTICAL CURB."
- 8 INSTALL 6" CONCRETE MEDIAN ISLAND WITH PEDESTRIAN PASS THRU. INSTALL 186 LF ~ 6" VERTICAL CURB PER CITY STANDARDS, DWG. NO. C-1, DETAIL "VERTICAL CURB."
- 9 INSTALL 6" CONCRETE MEDIAN ISLAND WITH PEDESTRIAN PASS THRU. INSTALL 159 LF ~ 6" VERTICAL CURB PER CITY STANDARDS, DWG. C-1, DETAIL "VERTICAL CURB."
- 10 INSTALL STANDARD MEDIAN NOSE PER CITY STANDARDS, DWG. NO. ST-17.
- 11 INSTALL 196 L.F. ~ 6" VERTICAL CURB PER CITY STANDARDS, DWG. NO. C-1, DETAIL "VERTICAL CURB."
- 12 INSTALL 428 LF ~ 6" VERTICAL CURB PER CITY STANDARDS, DWG. NO. C-1, DETAIL "VERTICAL CURB."
- 13 INSTALL 92 LF ~ 6" VERTICAL CURB PER CITY STANDARDS, DWG. NO. C-1, DETAIL "VERTICAL CURB."
- 14 4" THICK CONCRETE MEDIAN WITH EXPOSED AGGREGATE FINISH.
- 15 ADJUST TO FINISH GRADE.
- 16 INSTALL DRIVEWAY APPROACH PER CITY STANDARDS, DWG. NO. C-7.
- 17 INSTALL 100 LF ~ 6" CURB AND GUTTER PER CITY STANDARDS, DWG. NO. C-1.
- 18 INSTALL 457 SF ~ SIDEWALK PER CITY STANDARDS, DWG. NO. C-2 AND C-3.
- 19 INSTALL CURB RAMP PER CITY STANDARDS, DWG. NO. C-11.
- 20 NATIVE MATERIAL COMPACTED TO 85% TO MATCH EXISTING AT 3:1 SLOPE.
- 21 INSTALL 486 LF ~ 6" VERTICAL CURB PER CITY STANDARDS, DWG. NO. C-1 DETAIL "VERTICAL CURB."
- 22 INSTALL 180 LF ~ 6" CURB AND GUTTER PER CITY STANDARDS, DWG. NO. C-1.
- 23 INSTALL 1,676 SF ~ SIDEWALK PER CITY STANDARDS, DWG. NO. C-2 AND C-3.
- 24 INSTALL 253 LF ~ 6" VERTICAL CURB PER CITY STANDARDS, DWG. NO. C-1, DETAIL "VERTICAL CURB."
- 25 INSTALL 645 LF ~ CURB AND GUTTER PER CITY STANDARDS, DWG. NO. C-1.
- 27 INSTALL 186 SF ~ SIDEWALK PER CITY STANDARDS, DWG. NO. C-2 AND C-3.
- 28 INSTALL 21 LF ~ 6" CURB AND GUTTER PER CITY STANDARDS, DWG. NO. C-1.
- 29 INSTALL 67 LF ~ 6" CURB AND GUTTER PER CITY STANDARDS, DWG. NO. C-1.
- 30 INSTALL 718 SF ~ SIDEWALK PER CITY STANDARDS, DWG. NO. C-2 AND C-3.
- 31 UNION PACIFIC RAILROAD STANDARD, NO. 9 WARNING ASSEMBLY. INSTALLED BY UNION PACIFIC RAILROAD.
- 32 UNION PACIFIC RAILROAD STANDARD, NO. 8 WARNING ASSEMBLY. INSTALLED BY UNION PACIFIC RAILROAD.
- 33 UNION PACIFIC RAILROAD CABINET. INSTALLED BY UNION PACIFIC RAILROAD.
- 34 UNION PACIFIC RAILROAD STANDARD, NO. 9-A WARNING ASSEMBLY. INSTALLED BY UNION PACIFIC RAILROAD.
- 35 UNION PACIFIC RAILROAD STANDARD, NO. 9-A WARNING ASSEMBLY. WITH SIDE LIGHTS FACING FAIRGROUNDS DRIVEWAY. INSTALLED BY UNION PACIFIC RAILROAD.
- 36 UNION PACIFIC RAILROAD STANDARD, NO. 9 WITH COMBINATION FLASHING LIGHT ASSEMBLY. INSTALLED BY UNION PACIFIC RAILROAD.
- 37 REMOVABLE BOLLARDS, TYPICAL OF 11. INSTALL PER CITY STANDARDS, DWG. NO. ST-23, THOUGH WITH SLEEVE FLUSH WITH FINISHED PAVEMENT.
- 38 STORM DRAIN INFILTRATION SWALE. COMPACT NATIVE, CLEAN MATERIAL TO 90% RELATIVE COMPACTION.
- 39 EXISTING MEDIAN.
- 40 CURB OPENING. SEE DETAIL ON GRADING AND DRAINAGE PLAN.
- 41 INSTALL CURB PER THE CITY STANDARDS, DWG. NO. C-12.
- 42 INSTALL 136 LF~WROUGHT IRON FENCING IN LIKE KIND OF MATERIALS, COLOR, DESIGN AND CONSTRUCTION METHODS AS THE EXISTING FENCING. INSTALL ONE SLIDE GATE THE FULL LENGTH OF THE PROPOSED DRIVEWAY APPROACH AND ONE 12' WIDE SWING GATE WITH WELDED LOCK BOX.



DROP INLET DATA	
CB~2 TO EX. SDMH	
RIM ELEVATION	100.02
INVERT AT CB~2	97.19
INVERT AT EX. CB	97.14

INSTALL CATCH BASIN PER CITY STANDARDS, DWG. NO. SD-1.

CONTRACTOR SHALL VERIFY THE LOCATIONS OF THE POINTS OF CONNECTION IN THE FIELD, BOTH VERTICALLY AND HORIZONTALLY, PRIOR TO CONSTRUCTION. CONTRACTOR TO REPORT ANY DISCREPANCY TO THE ENGINEER. LOCATIONS OF PIPELINES ARE APPROXIMATE. THE EXACT LOCATION AND DEPTH OF EXISTING LINES CROSSED WITH PROPOSED UTILITIES MUST BE DETERMINED BY HAND EXCAVATION OR VACUUM METHODS BEFORE NEW PIPE MATERIAL IS ORDERED AND BEFORE POWER OR HEAVY EQUIPMENT IS USED FOR PURPOSES OF EXCAVATION.

NEW FIRE HYDRANT ASSEMBLY

NOT TO SCALE:

MODIFY EXISTING SDMH TO ACCOMMODATE SD LINE. POT HOLE EXISTING FACILITIES PRIOR TO INSTALLING PIPE. ACHIEVE WATER TIGHT SEAL.

ADJUST FRAME & COVER TO FINISH GRADE

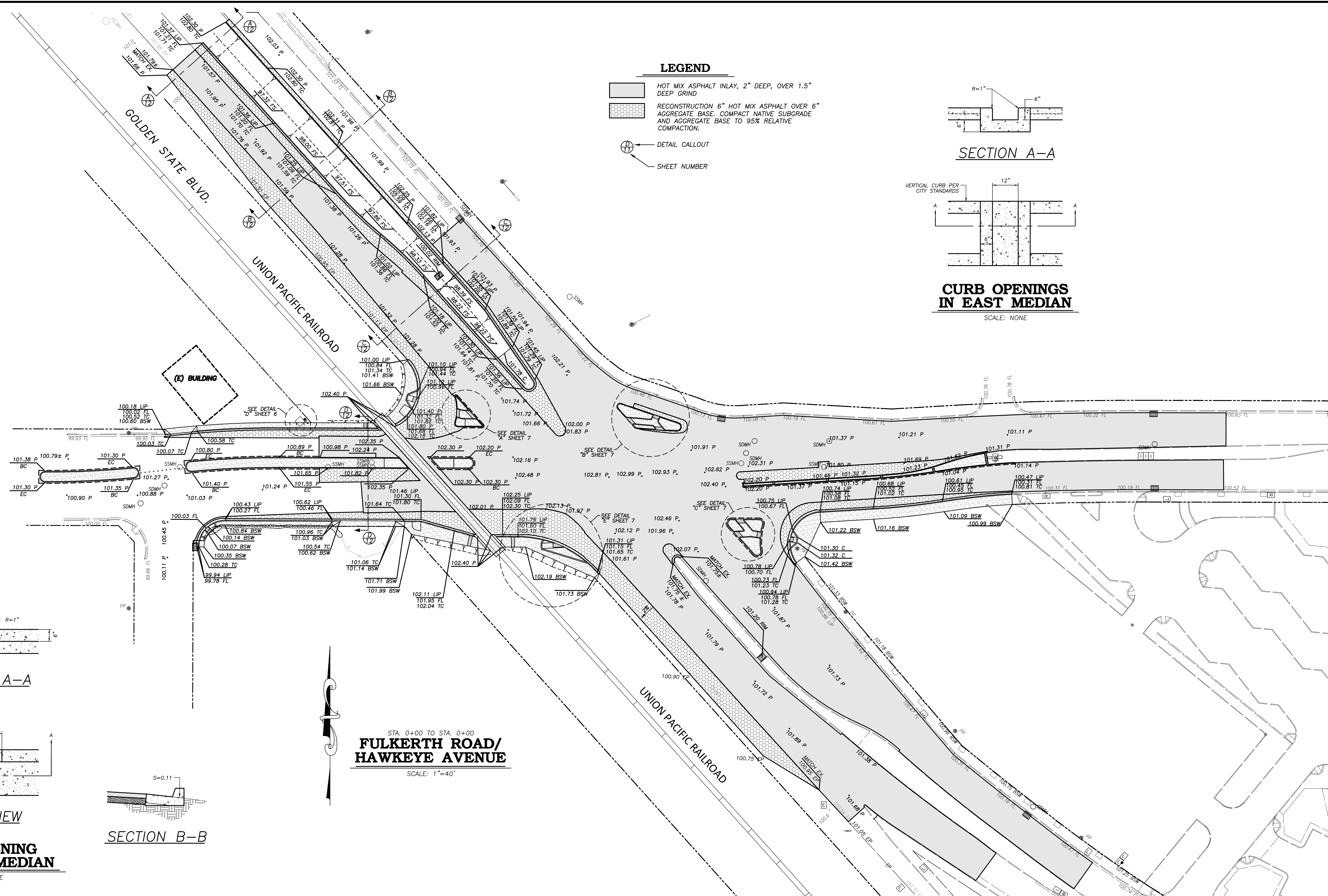
INSTALL CATCH BASIN PER CITY STANDARDS, DWG. NO SD-3
INSTALL 64 L.F. ~ 18" STORM LINE PER THE CITY STANDARD SPECIFICATIONS AND DRAWINGS

DROP INLET DATA	
CB~1 TO EX. SDMH	
RIM ELEVATION	99.78
LATERAL LENGTH	64'
LATERAL SIZE	12"
LATERAL SLOPE	0.002
INVERT AT CB~1	95.50
INVERT AT EX. SDMH	95.37

EXTEND (E) 6" FIRE SERVICE. INSTALL NEW HYDRANT ASSEMBLY. SEE DETAIL THIS SHEET.

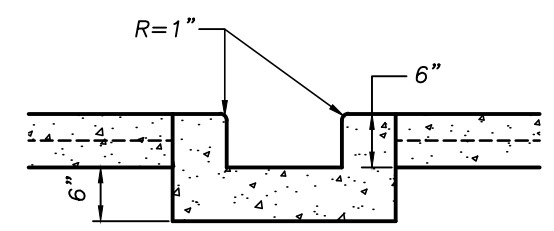
**FULKERTH ROAD/
HAWKEYE AVENUE**

SCALE: 1"=40'

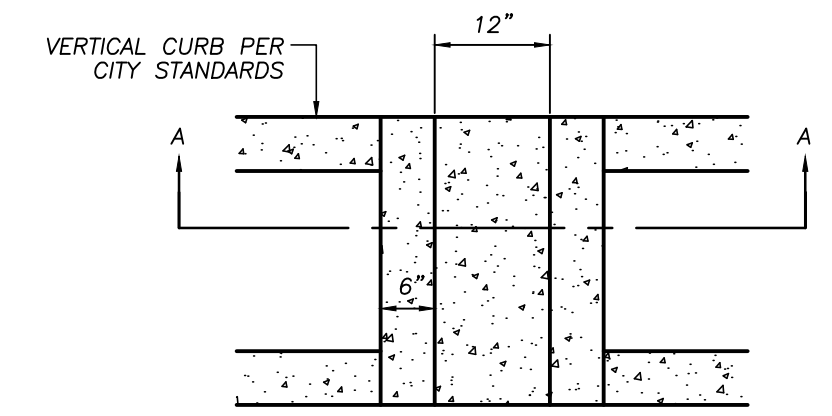


LEGEND

- HOT MIX ASPHALT INLAY, 2" DEEP, OVER 1.5" DEEP GRIND
- RECONSTRUCTION 6" HOT MIX ASPHALT OVER 6" AGGREGATE BASE, COMPACT NATIVE SUBGRADE AND AGGREGATE BASE TO 95% RELATIVE COMPACTION.
- DETAIL CALLOUT
- SHEET NUMBER



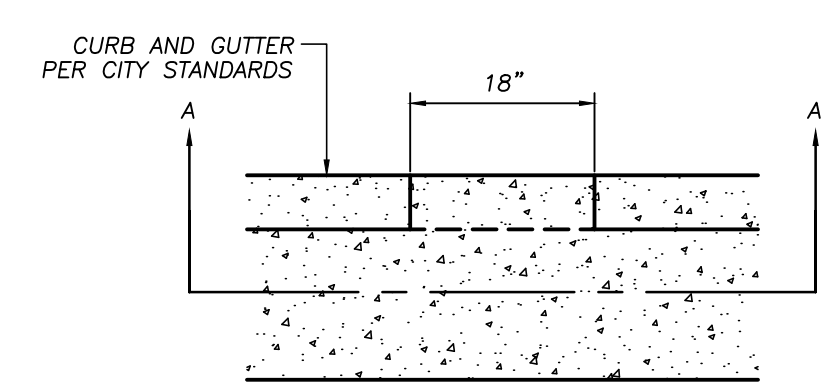
SECTION A-A



CURB OPENINGS IN EAST MEDIAN

SCALE: NONE

SECTION A-A

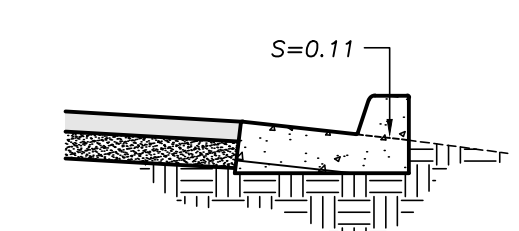


PLAN VIEW

CURB OPENING AT NORTH MEDIAN

SCALE: NONE

SECTION B-B

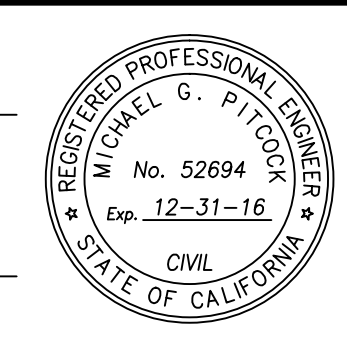


STA. 0+00 TO STA. 0+00
**FULKERTH ROAD/
HAWKEYE AVENUE**
SCALE: 1"=40'

USA NORTH 811
Call 811 Before You Dig
WWW.USANORTH811.ORG

NOTE:
ALL REFERENCES AND WRITTEN DIMENSIONS SHALL SUPERCEDE ALL SCALED DISTANCES AND SHALL BE VERIFIED IN THE FIELD. ANY DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

Michael G. Pitcock, P.E.
MICHAEL G. PITCOCK, P.E.
DIRECTOR OF DEVELOPMENT SERVICES/CITY ENGINEER
12/12/16
PLANS APPROVAL DATE



Nathan B. Bray, P.E.
NATHAN B. BRAY, P.E.
PRINCIPAL CIVIL ENGINEER
DATE: 12/12/16



**CITY OF TURLOCK
DEVELOPMENT SERVICES
ENGINEERING DIVISION
156 S. BROADWAY, STE 150
(209) 668-5520**

**GRADING AND DRAINAGE PLAN
FULKERTH ROAD/HAWKEYE AVENUE ~ BEGIN TO STA. 13+00
CAPITAL PROJECT NO. 14-28
INTERSECTION IMPROVEMENTS AT
GOLDEN STATE BLVD. AND FULKERTH ROAD**

VERIFY SCALE
BAR IS 1" ON ORIGINAL DRAWING
0 1/4" 3/4" 1"
1/2"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWN BY: AZ
REV. BY: --
CH. BY: SRF
DATE: DECEMBER, 2016
SCALE: 1"=40'
14-28 BASE.dwg

SHEET
6
OF **20**



SCALE: 1"=10'



SCALE: 1"=10'



SCALE: 1"=10'

PG&E VAULT

PLAN VIEW



PG&E VAULT DETAIL

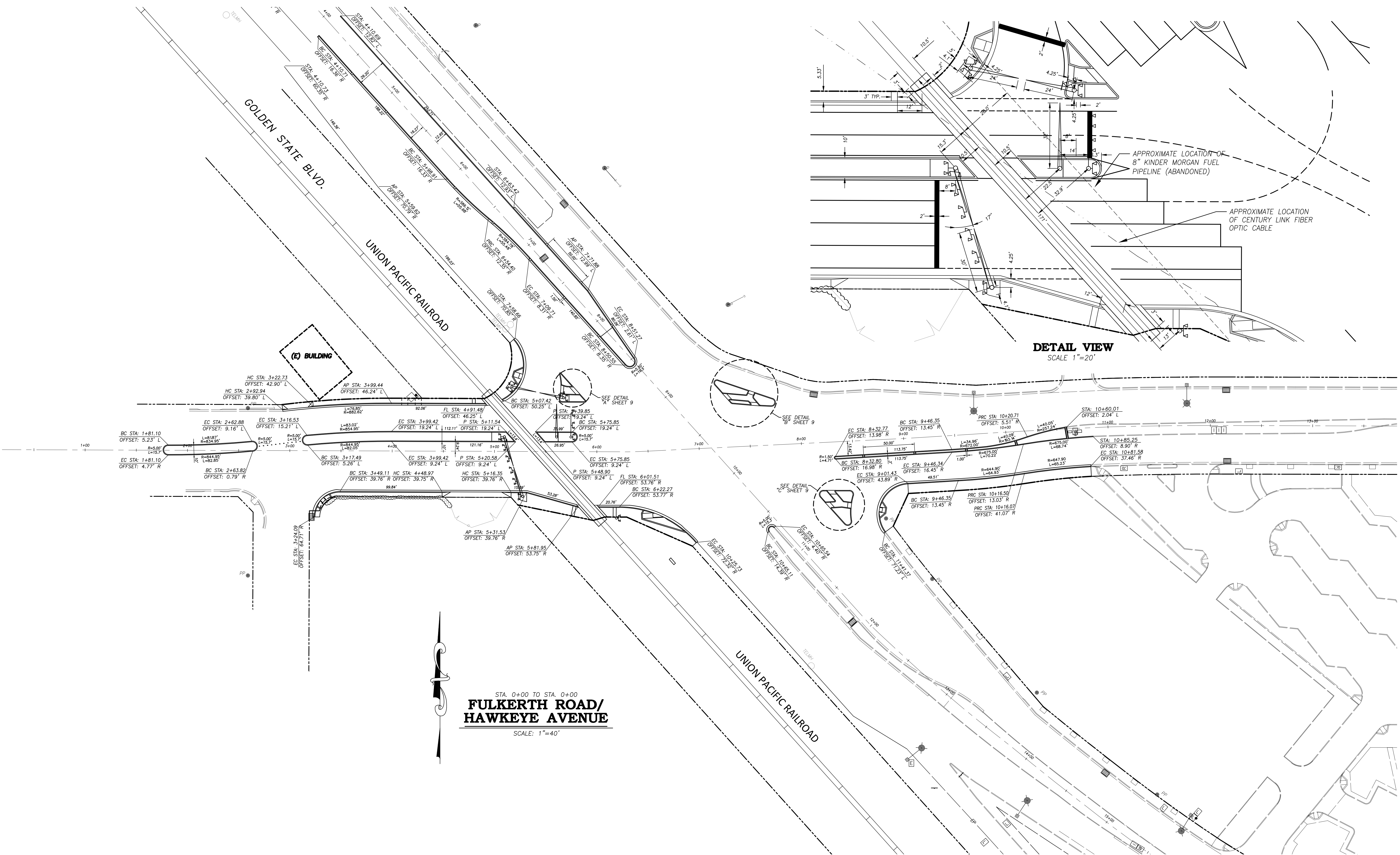
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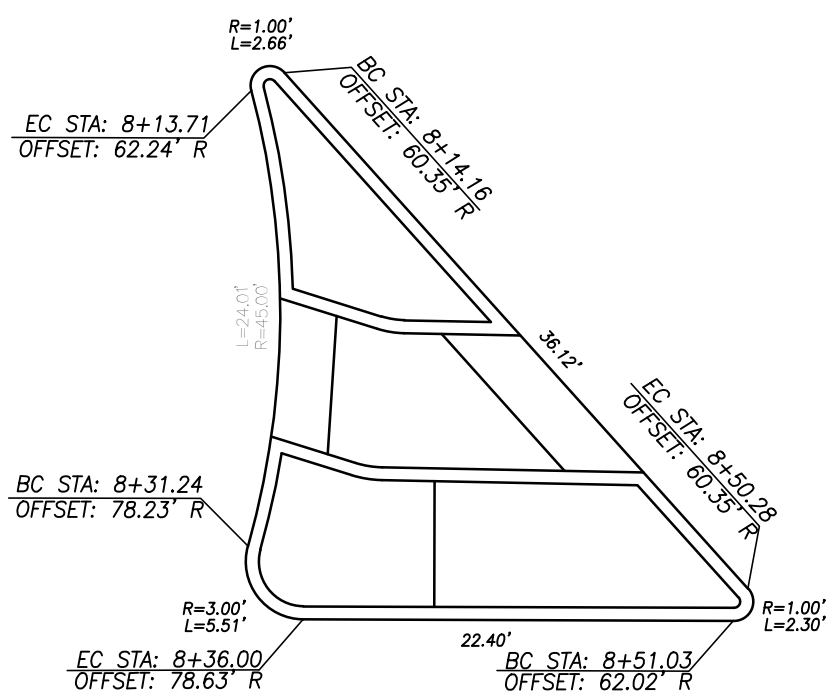


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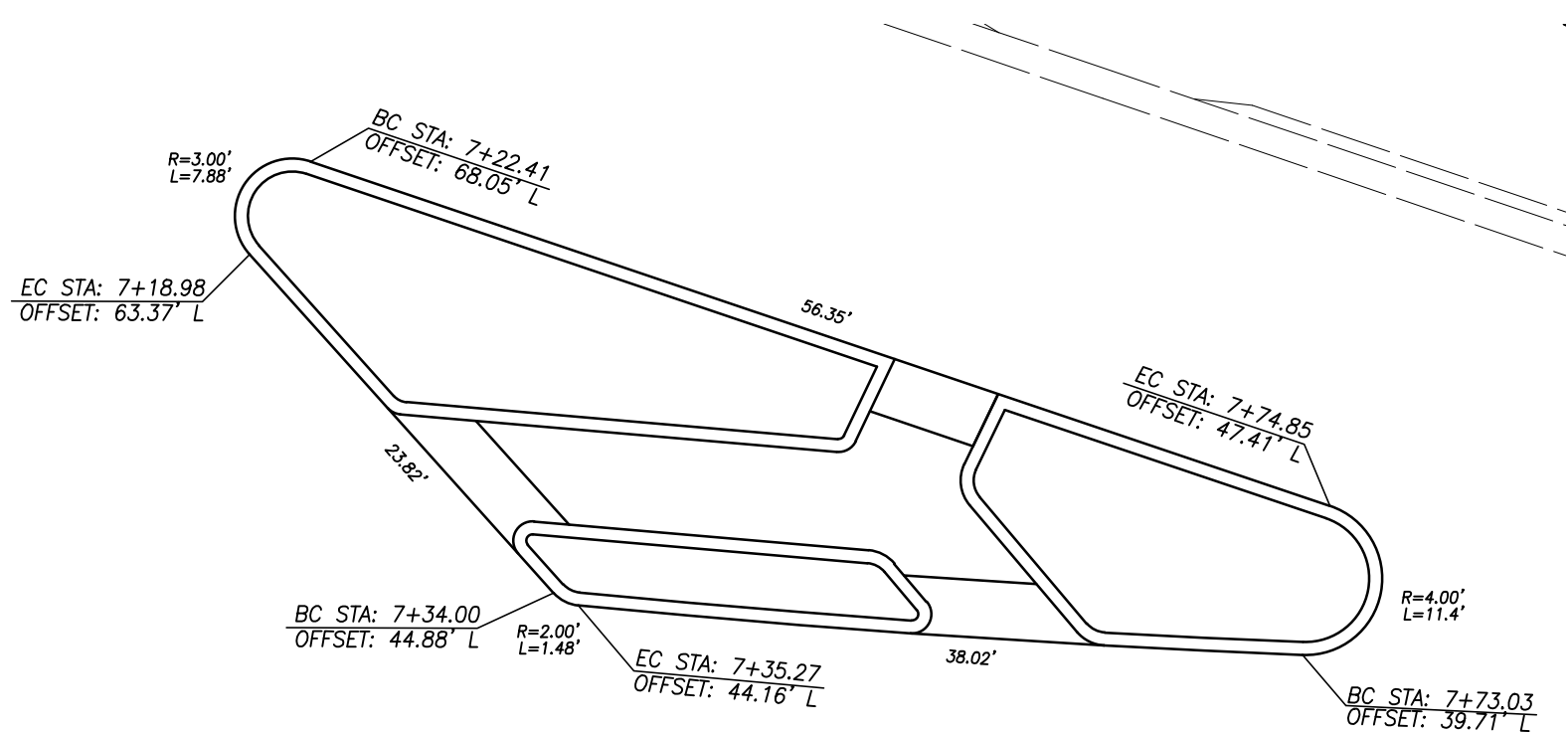
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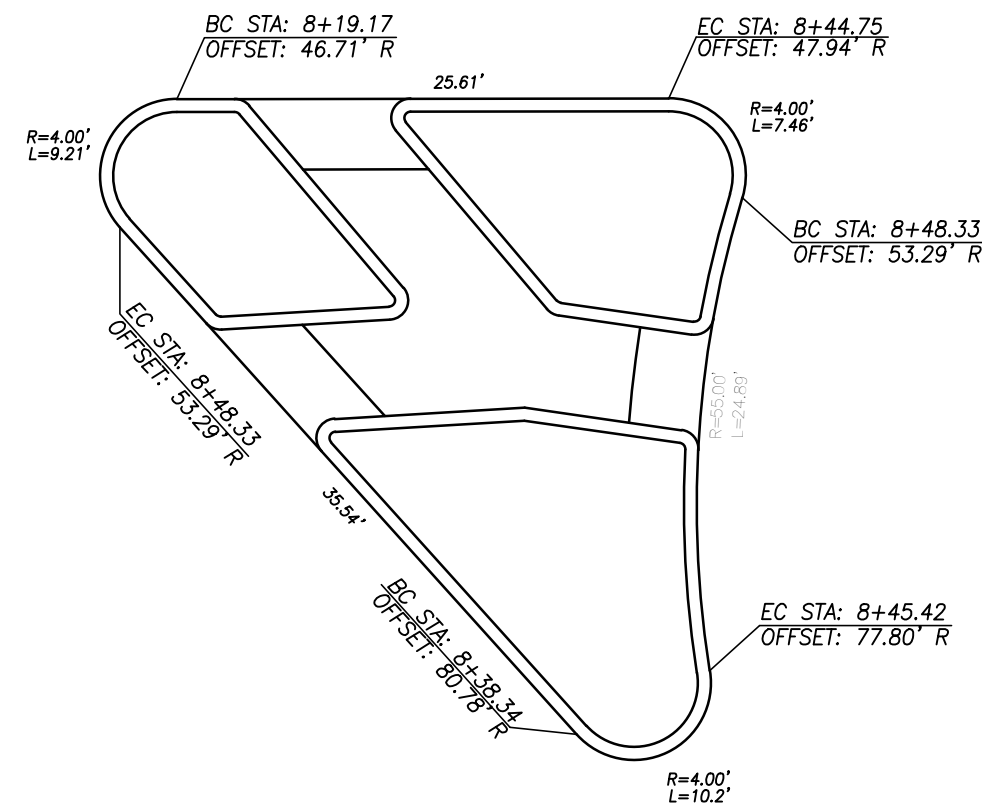
ISLAND DETAIL "A"

SCALE: 1"=10'



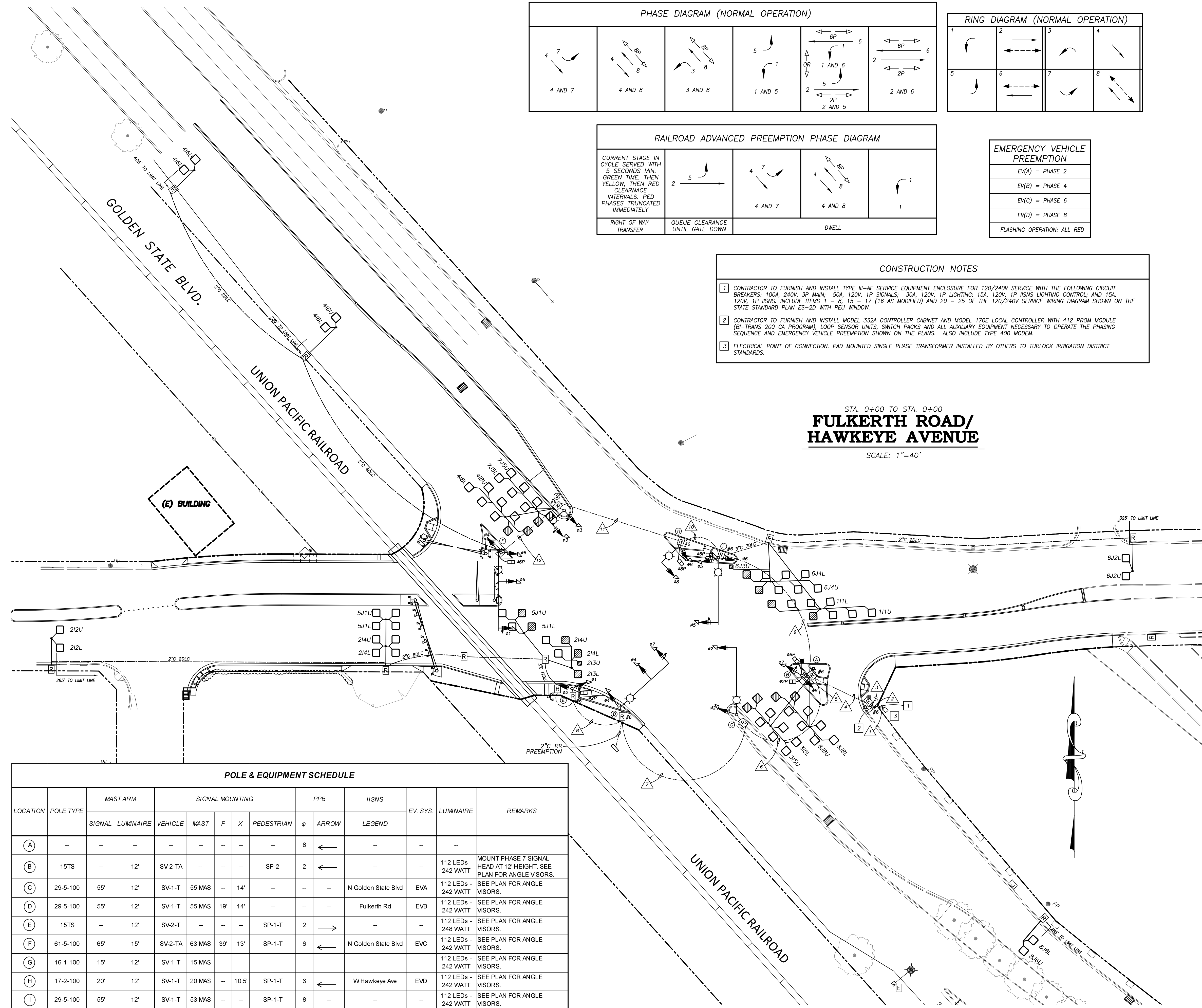
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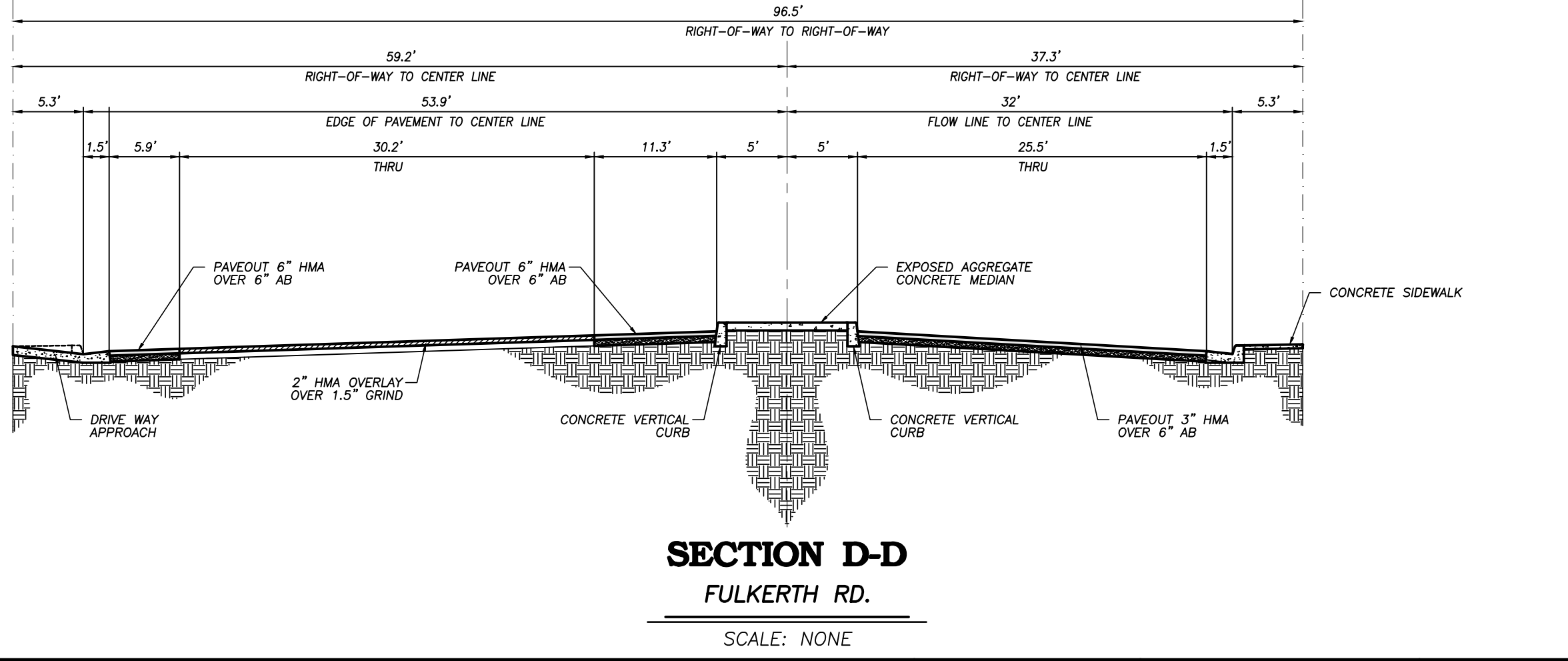
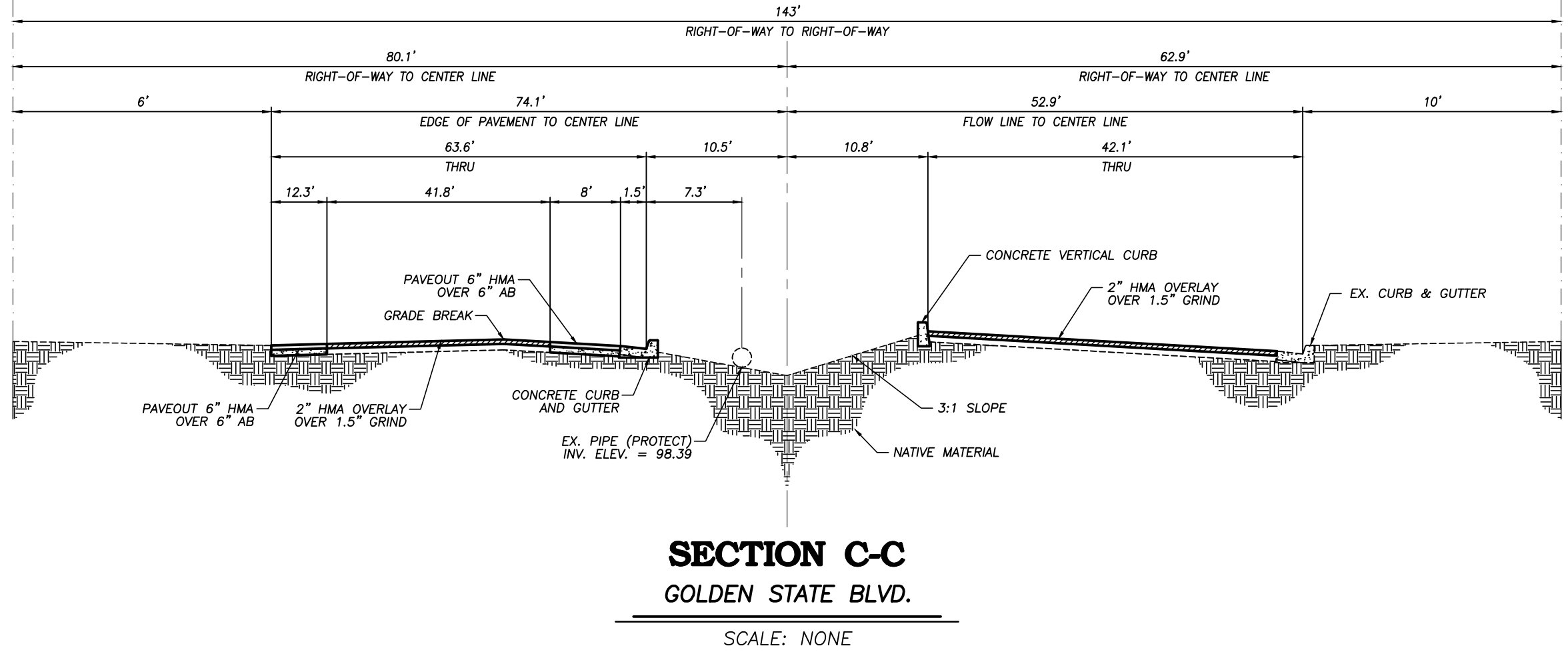
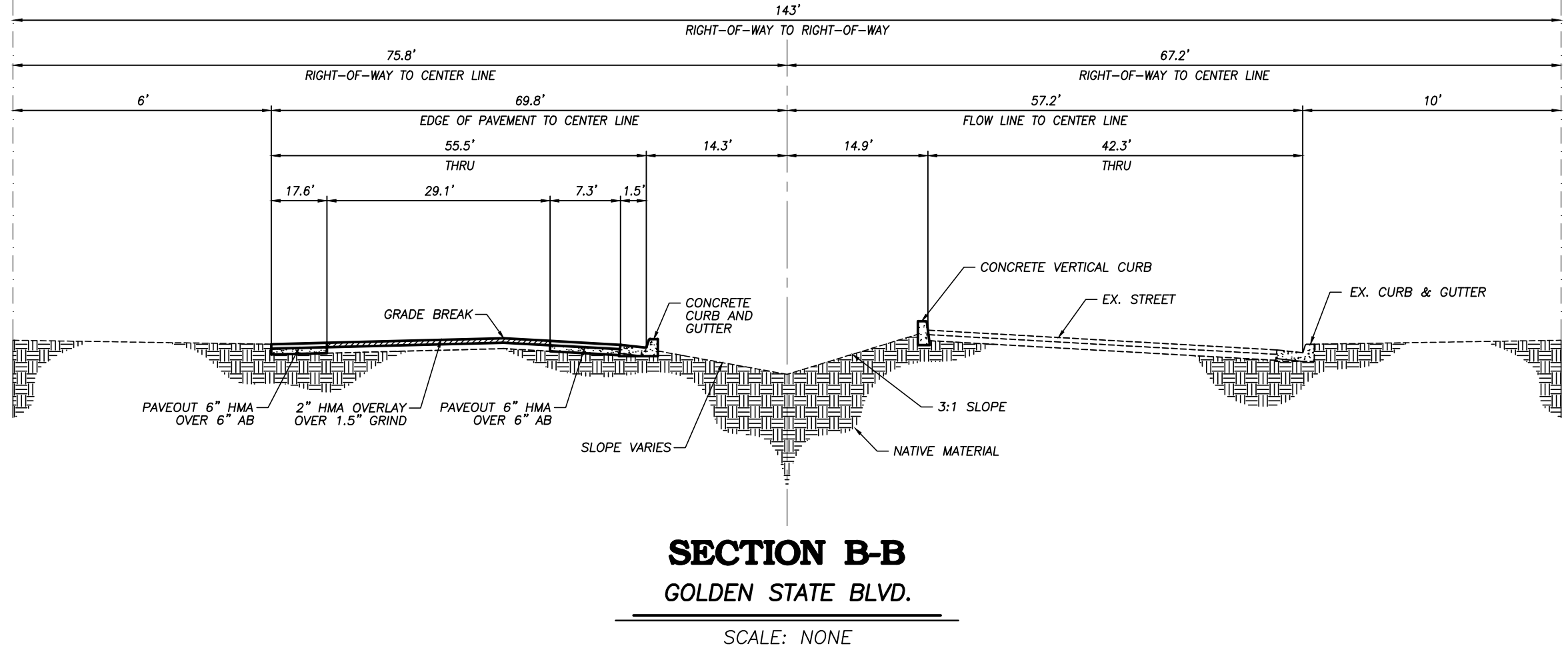
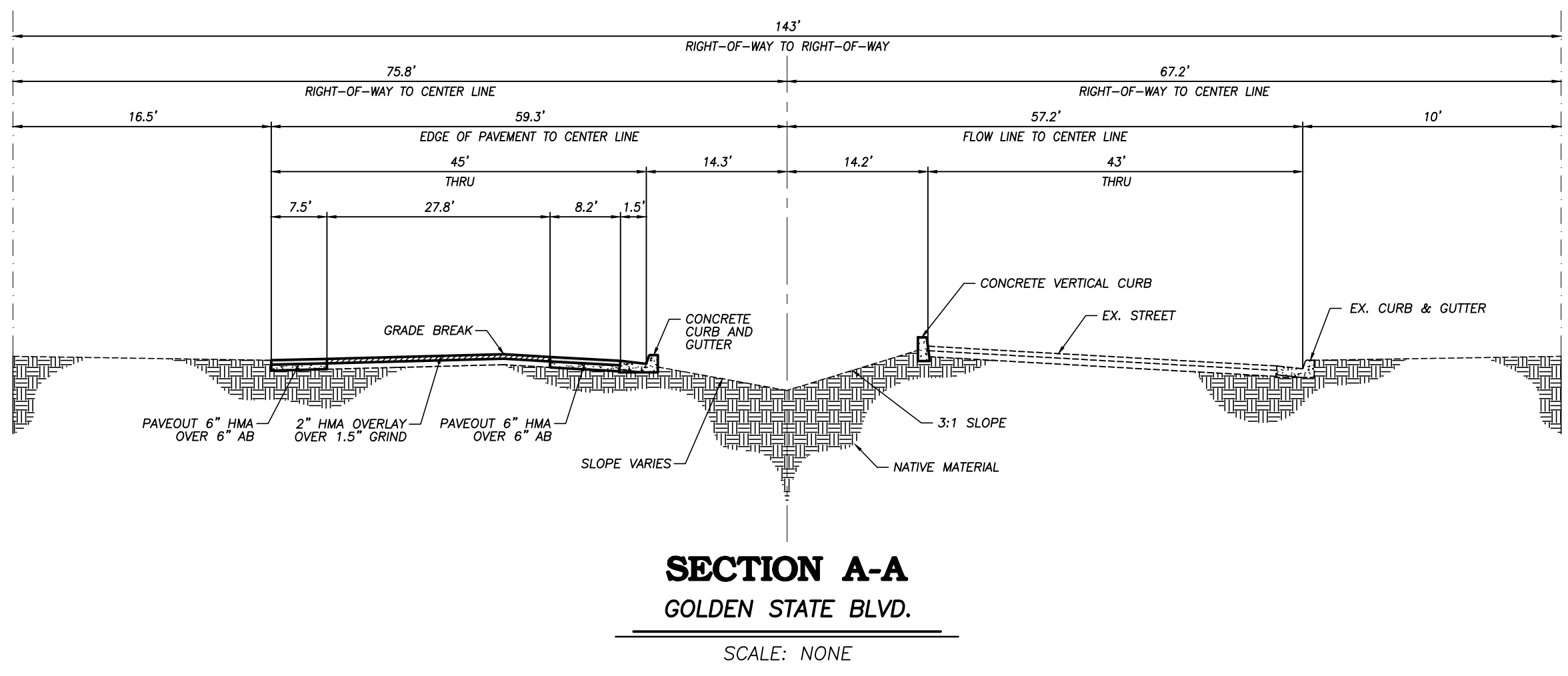
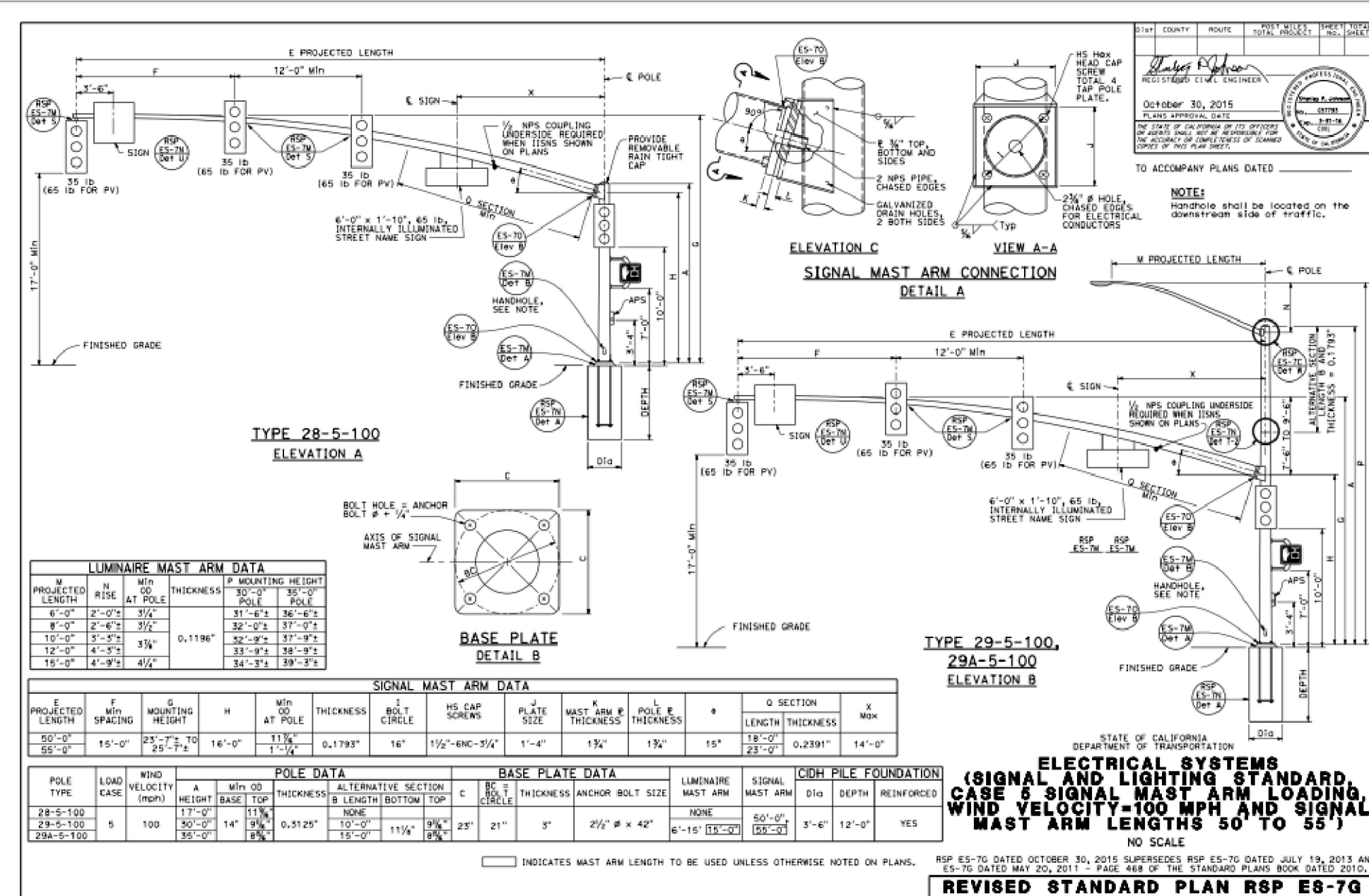
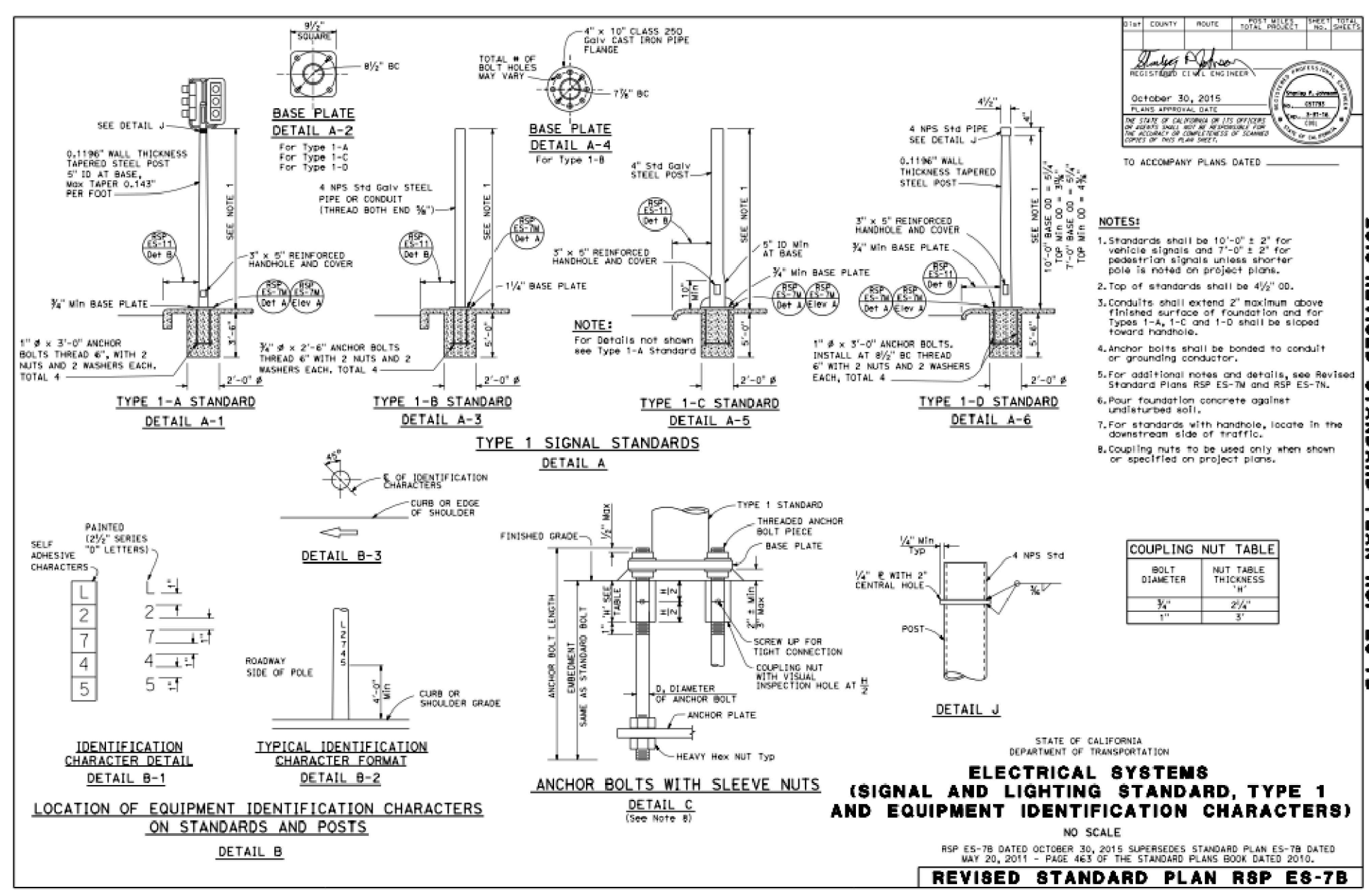
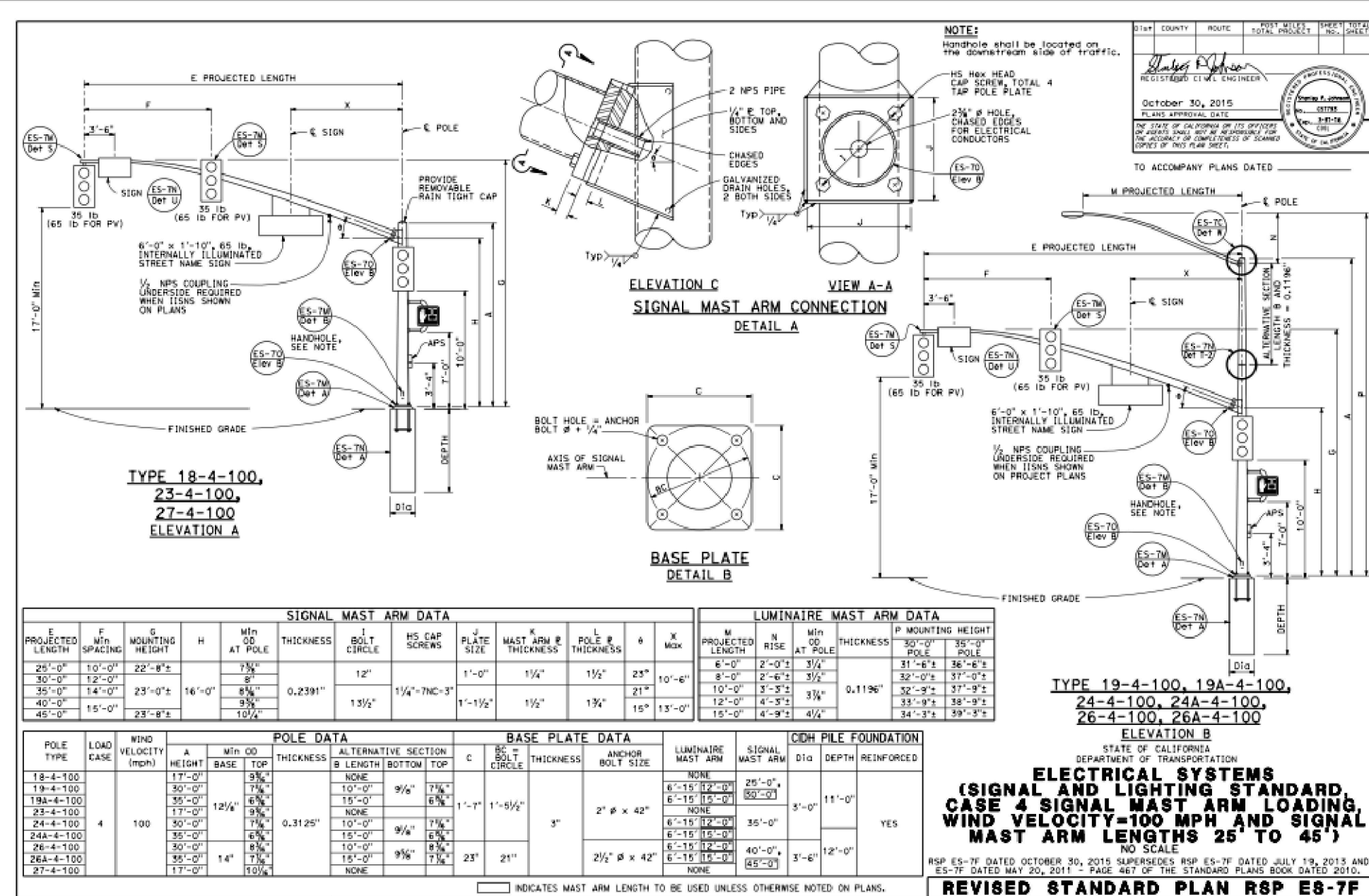
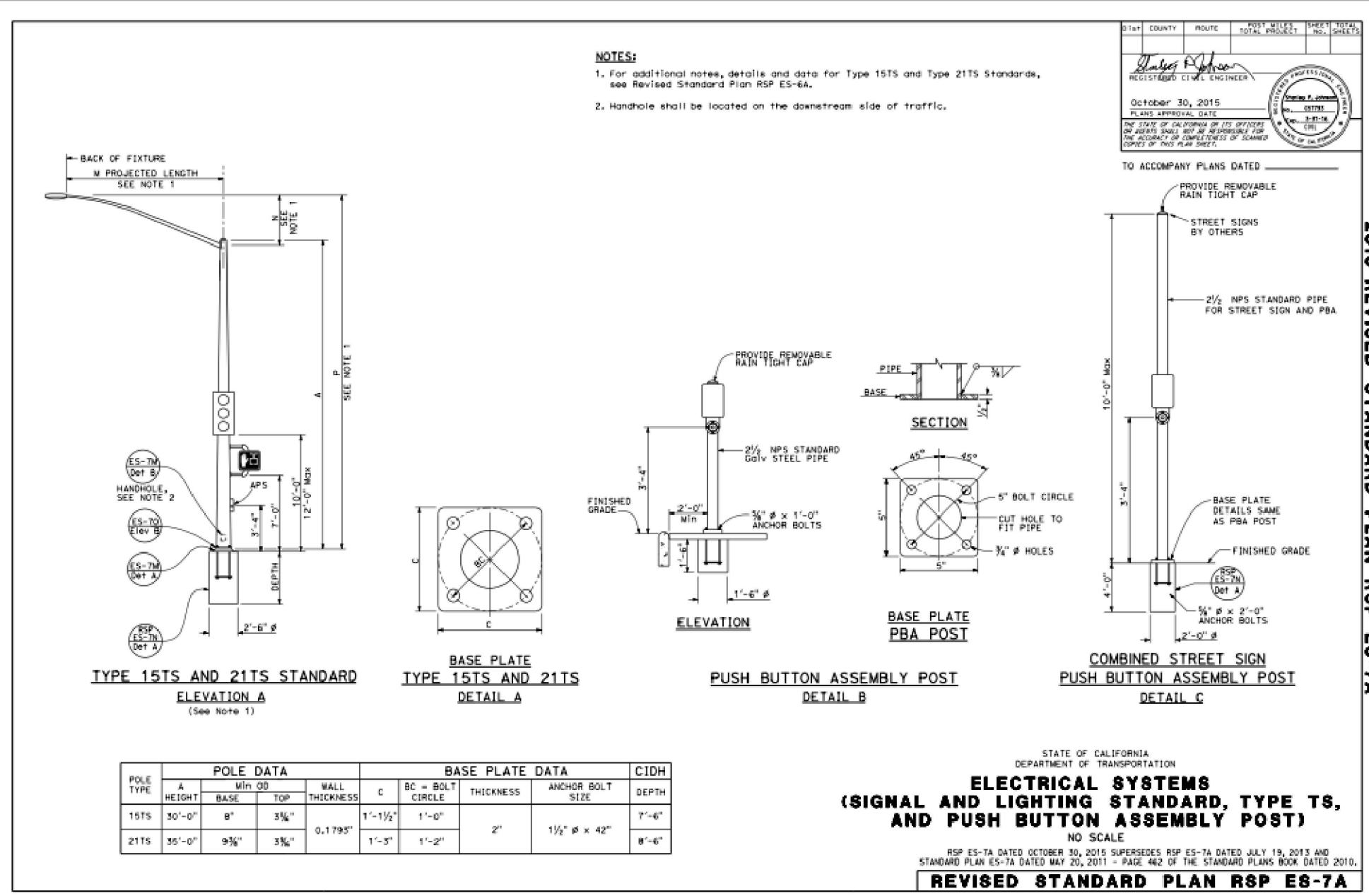
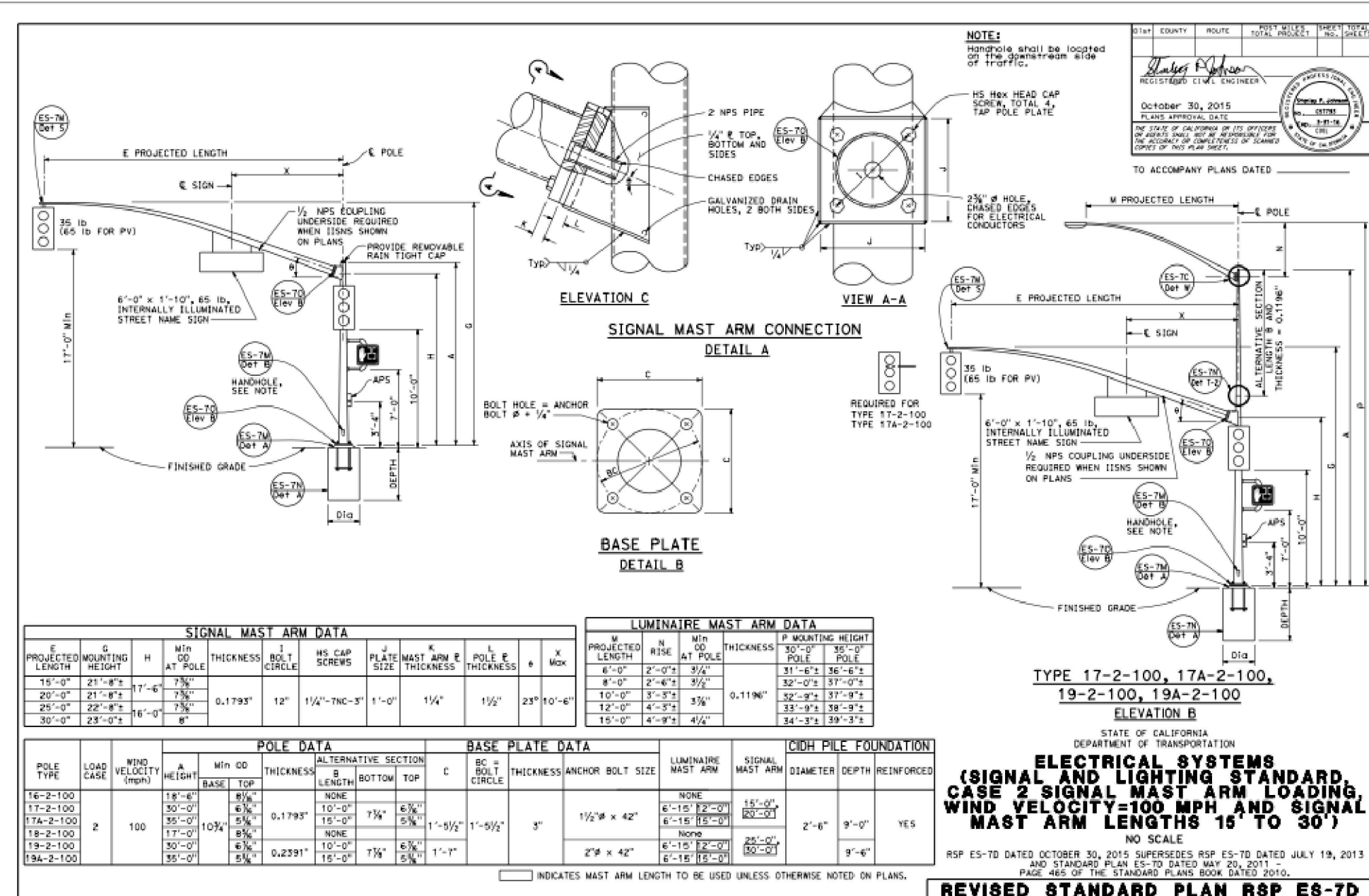
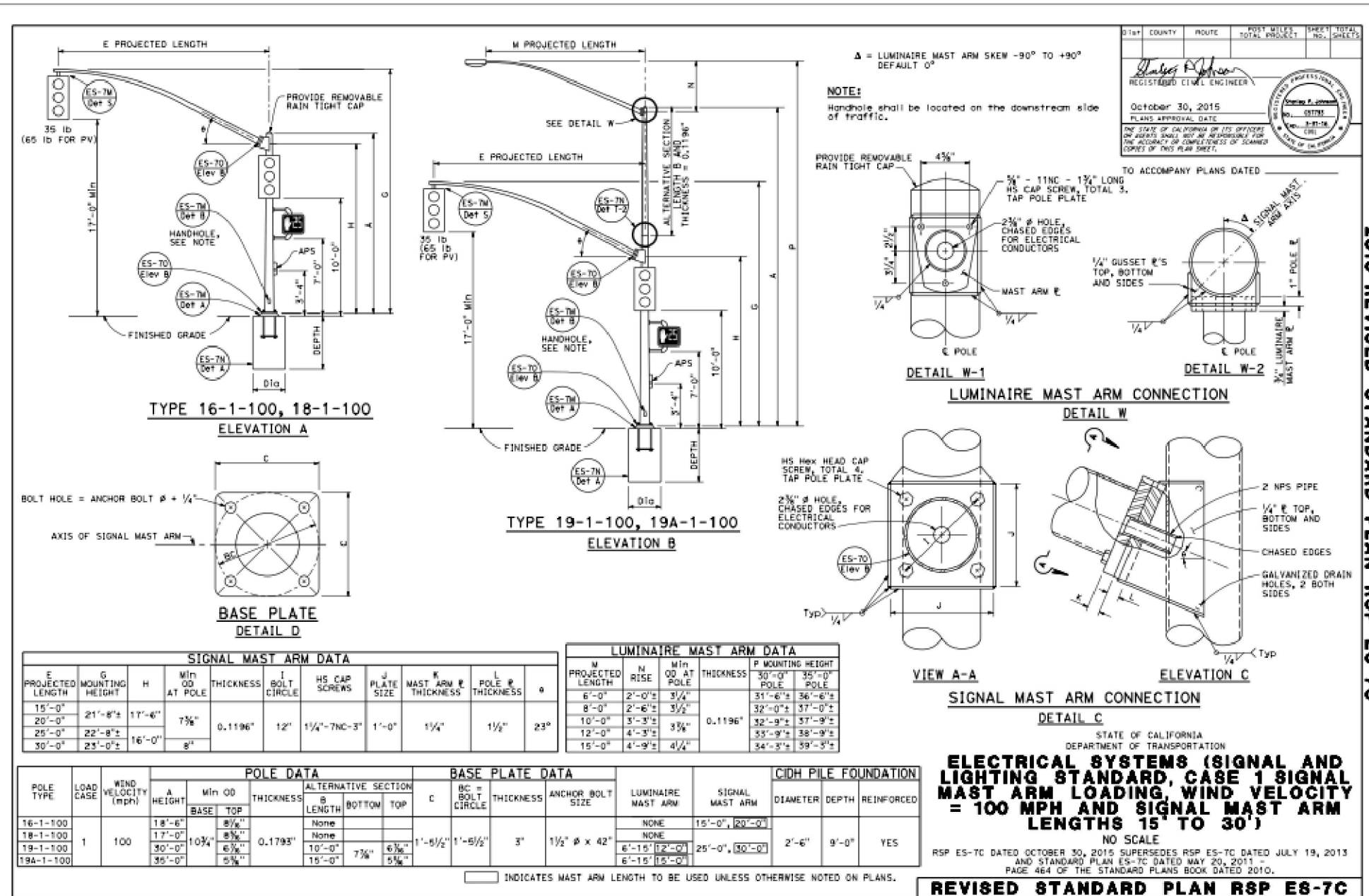
SCALE: 1"=10'



ISLAND DETAIL "C"

SCALE: 1"=10'





SECTION 11 SIGNALS, LIGHTING & ELECTRICAL SYSTEMS

TRAFFIC SIGNAL, LIGHTING, AND SIGN ILLUMINATION SHALL CONFORM TO THE PROVISIONS IN SECTION 86, "SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS", OF THE 2010 CALIFORNIA STANDARD PLANS AND SPECIFICATIONS, EXCEPT AS AMENDED BY THIS PROJECT'S SPECIFICATIONS.

TRAFFIC SIGNAL INSTALLATION AND REMOVAL OF EXISTING ELECTRICAL EQUIPMENT, STREET LIGHT POLES AND STANDARDS WORK SHALL BE PERFORMED AT THE FOLLOWING LOCATIONS: INTERSECTION OF GOLDEN STATE BLVD. AND FULKERTH RD.

11.01 COST BREAK--DOWN

COST BREAKDOWNS SHALL CONFORM TO THE PROVISIONS IN SECTION 86-1.03, "SCHEDULE OF VALUES", OF THE STANDARD SPECIFICATIONS AND THESE SPECIAL PROVISIONS.

THE COST BREAKDOWN SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL WITHIN 15 DAYS AFTER THE CONTRACT HAS BEEN APPROVED. BEFORE ANY PARTIAL PAYMENT FOR THE ITEMS OF ELECTRICAL WORK WILL BE MADE, THE ENGINEER SHALL APPROVE THE COST BREAKDOWN, IN WRITING.

11.02 STANDARDS, STEEL PEDESTALS AND POSTS

WHERE THE PLANS REFER TO THE SIDE TENON DETAIL AT THE END OF THE SIGNAL MAST ARM, THE APPLICABLE TIP TENON DETAIL MAY BE SUBSTITUTED.

THE SIGN MOUNTING HARDWARE SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON THE PLANS. HANDHOLES FOR SIGNAL STANDARDS SHALL BE LOCATED 90° CLOCKWISE FROM THE TRAFFIC SIGNAL MAST ARM.

TYPE 1 STANDARDS SHALL BE ASSEMBLED AND SET WITH THE HANDHOLE ON THE DOWNSTREAM SIDE OF THE POLE IN RELATION TO TRAFFIC, OR AS SHOWN ON THE PLANS.

11.03 CONDUIT

CONDUIT TO BE INSTALLED UNDERGROUND SHALL BE TYPE 3 UNLESS OTHERWISE SPECIFIED. DETECTOR TERMINATION CONDUITS SHALL BE TYPE 3.

THE CONDUIT IN A FOUNDATION AND BETWEEN A FOUNDATION AND THE NEAREST PULL BOX SHALL BE TYPE 1.

WHEN TYPE 3 CONDUIT IS PLACED IN A TRENCH (NOT IN PAVEMENT OR UNDER PORTLAND CEMENT CONCRETE SIDEWALK), AFTER THE BEDDING MATERIAL IS PLACED AND THE CONDUIT IS INSTALLED, THE TRENCH SHALL BE BACKFILLED WITH COMMERCIAL QUALITY CONCRETE, CONTAINING NOT LESS THAN 420 LB OF PORTLAND CEMENT PER CUBIC YARD, TO NOT LESS THAN 4 INCHES ABOVE THE CONDUIT BEFORE ADDITIONAL BACKFILL MATERIAL IS PLACED.

CONDUIT RUNS SHOWN ON THE PLANS TO BE LOCATED BEHIND CURBS, MAY BE INSTALLED IN THE STREET, WITHIN 3 FEET OF AND PARALLEL WITH THE FACE OF THE CURB, BY THE "TRENCHING IN PAVEMENT METHOD" IN CONFORMANCE WITH THE PROVISIONS IN SECTION 86-2.05C, "INSTALLATION," OF THE STANDARD SPECIFICATIONS. PULL BOXES SHALL BE LOCATED BEHIND THE CURB OR AT THE LOCATIONS SHOWN ON THE PLANS.

AFTER CONDUCTORS HAVE BEEN INSTALLED, THE ENDS OF CONDUITS TERMINATING IN PULL BOXES, SERVICE EQUIPMENT ENCLOSURES, AND CONTROLLER CABINETS SHALL BE SEALED WITH AN APPROVED TYPE OF SEALING COMPOUND.

AT OTHER LOCATIONS WHERE CONDUIT IS REQUIRED TO BE INSTALLED UNDER PAVEMENT AND IF A DELAY TO VEHICLES WILL NOT EXCEED 5 MINUTES, CONDUIT MAY BE INSTALLED BY THE "TRENCHING IN PAVEMENT METHOD." ALL CONDUITS INSTALLED IN THE STREET AREAS SHALL BE INSTALLED AT A MINIMUM 24 INCH DEPTH FROM THE SURFACE OF THE FINISHED STREET TO THE TOP OF THE CONDUIT.

11.04 PULL BOXES

GROUT SHALL BE PLACED IN THE BOTTOM OF PULL BOXES.

11.05 CONDUCTORS AND WIRING

SPLICES SHALL BE INSULATED BY METHOD "B" OR, AT THE CONTRACTOR'S OPTION, SPLICES OF CONDUCTORS SHALL BE INSULATED WITH HEAT-SHRINK TUBING OF THE APPROPRIATE SIZE AFTER THOROUGHLY PAINTING THE SPLICED CONDUCTORS WITH ELECTRICAL INSULATING COATING.

TESTING

THE CONTRACTOR SHALL PERFORM A HIGH-VOLTAGE SERIES LIGHTING TEST CONSISTING OF THE OPEN CIRCUIT VOLTAGE OF THE CONNECTED CONSTANT CURRENT TRANSFORMER BETWEEN CONDUCTORS AND GROUND.

THE HIGH-VOLTAGE TEST SHALL NOT BE PERFORMED ON EXISTING CIRCUITS OR EQUIPMENT. NON-TESTING OF EXISTING CIRCUITS AND EQUIPMENT SHALL NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY FOR MALFUNCTIONING OF EXISTING LIGHTING CIRCUITS DUE TO THE CONTRACTOR MAKING SPLICES IN OR CONNECTING TO THE CIRCUITS AND SUCH MALFUNCTIONS SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE.

11.06 ELECTRICAL SERVICE

CONTINUOUS WELDING OF EXTERIOR SEAMS IN SERVICE EQUIPMENT ENCLOSURES IS NOT REQUIRED.

TYPE III SERVICE EQUIPMENT ENCLOSURES SHALL BE THE ALUMINUM TYPE.

CIRCUIT BREAKERS SHALL BE THE CABLE-IN/CABLE-OUT TYPE, MOUNTED ON NON-ENERGIZED CLIPS. ALL CIRCUIT BREAKERS SHALL BE MOUNTED VERTICALLY WITH THE UP POSITION OF THE HANDLE BEING THE "ON" POSITION.

SERVICE SHALL BE PROVIDED WITH UP TO 2 MAIN CIRCUIT BREAKERS, WHICH SHALL DISCONNECT UNGROUNDED SERVICE ENTRANCE CONDUCTORS. WHERE THE "MAIN" CIRCUIT BREAKER CONSISTS OF 2 CIRCUIT BREAKERS AS SHOWN ON THE PLANS OR REQUIRED IN THE SPECIAL PROVISIONS, EACH OF THE CIRCUIT BREAKERS SHALL HAVE A MINIMUM INTERRUPTING CAPACITY OF 10,000 AMPS, RMS.

CIRCUIT BREAKERS USED AS SERVICE DISCONNECT EQUIPMENT SHALL HAVE A MINIMUM INTERRUPTING CAPACITY OF 42,000 AMPS, RMS, FOR 120/240 V(AC) SERVICES AND 30,000 AMPS, RMS, FOR 480 V(AC) SERVICES.

CITY SHALL ARRANGE FOR SINGLE PHASE ELECTRICAL SERVICE THROUGH THE TURLOCK IRRIGATION DISTRICT AS SHOWN ON THE PLANS. CITY SHALL PAY ALL T.I.D. FEES DIRECTLY. CONTRACTOR SHALL BE RESPONSIBLE TO INSTALL A CONCRETE PAD FOR A SINGLE PHASE TRANSFORMER, A SINGLE PHASE TRANSFORMER, CONDUIT, AND CONDUCTOR FROM THE TRANSFORMER TO THE SERVICE PANEL PER T.I.D. STANDARDS.

11.07 MODEL 170 CONTROLLER ASSEMBLY

THE MODEL 170 CONTROLLER ASSEMBLIES SHALL INCLUDE TYPE 170E LOCAL CONTROLLER UNIT WITH A 400 MODEM, COMPLETELY WIRED CONTROLLER CABINET AND INDUCTIVE LOOP SENSOR UNITS, WITH ANCHOR BOLTS, WILL BE CONTRACTOR FURNISHED. THE CONTROLLER SHALL BE FURNISHED WITH BI-TRANS 200CA PROGRAM INSTALLED.

THE TYPE 332A CABINET SHALL HAVE A CONTROLLER CABINET DRAWER INCLUDED TO HOLD PLANS, MAINTENANCE LOGS AND TIMING SHEETS. THE CONTROLLER SHALL ALSO INCLUDE A CABINET LIGHT AS REQUIRED WITHIN THE CALTRANS STANDARD SPECIFICATIONS.

THE TESTING OF THE CONTROLLER AND CABINET SHALL BE PERFORMED BY A TESTING LABORATORY AND CERTIFIED TO MEET THE SPECIFICATIONS AND REQUIREMENTS OF THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION. THE TESTING COSTS AND TRANSPORTATION OF THE CONTROLLER AND CABINET TO THE TESTING LABORATORY SHALL BE AT THE CONTRACTOR'S EXPENSE AND SHALL BE INCLUDED IN THE LUMP SUM PRICE PAID FOR THE TRAFFIC SIGNAL AS SET FORTH IN THE PROPOSAL.

THE CONTRACTOR SHALL MAKE ARRANGEMENTS TO HAVE A SIGNAL TECHNICIAN, QUALIFIED TO WORK ON THE CONTROLLER UNIT AND EMPLOYED BY THE CONTROLLER UNIT MANUFACTURER OR HIS REPRESENTATIVE, PRESENT AT THE TIME THE EQUIPMENT IS TURNED ON.

THE TYPE 332 TRAFFIC SIGNAL CABINETS SHALL BE PRE-WIRED WITH "GREEN SENSOR" HARNESS FOR "OPTICOM" PREEMPTION.

11.08 NUMBERING ELECTRICAL EQUIPMENT

THE CONTRACTOR WILL DO THE PLACEMENT OF TID NUMBERS ON ELECTRICAL EQUIPMENT. THE TURLOCK IRRIGATION DISTRICT WILL SUPPLY THE NUMBERS FOR THE CONTRACTOR'S INSTALLATION.

11.09 VEHICLE SIGNAL FACES AND SIGNAL HEADS

ALL RED, AMBER AND GREEN LIGHTS (BALL OR ARROW) SHALL BE 12 INCH IN SIZE AND SHALL UTILIZE LIGHT EMITTING DIODE SIGNAL MODULES. EACH LIGHT EMITTING DIODE SIGNAL MODULE SHALL CONSIST OF AN ASSEMBLY THAT UTILIZES LIGHT EMITTING DIODES AS THE LIGHT SOURCE. EACH LIGHT EMITTING DIODE SIGNAL MODULE SHALL BE DESIGNED TO BE INSTALLED IN THE DOOR FRAME OF A STANDARD TRAFFIC SIGNAL HOUSING. THE CONTRACTOR SHALL FURNISH ALL LED LAMPS.

11.10 PEDESTRIAN SIGNALS

PEDESTRIAN SIGNALS SHALL BE TYPE A BLACK IN COLOR. INTERNATIONAL SYMBOL INDICATIONS SHALL BE PROVIDED. THE PEDESTRIAN SIGNAL INDICATIONS SHALL HAVE LED'S SIGNAL MODULES THAT MEET CALTRANS SPECIFICATIONS "COUNTDOWN TYPE" WITH "FULL FIGURE DISPLAY".

THE FOLLOWING TYPE OF SCREEN SHALL BE PROVIDED:
A 1 1/2-INCH DEEP EGGRATE-TYPE SCREEN EITHER OF 0.020-INCH MAXIMUM THICKNESS 3003 H14 ALUMINUM ALLOY OR OF 0.030-INCH NOMINAL THICKNESS POLYCARBONATE. THE ASSEMBLY SHALL BE MOUNTED IN A FRAME CONSTRUCTED OF 0.040-INCH MINIMUM THICKNESS ALUMINUM ALLOY OR POLYCARBONATE BLACK IN COLOR.

THE EGGRATE-TYPE SCREEN SHALL BE INSTALLED PARALLEL TO THE FACE OF THE MESSAGE PLATE AND SHALL BE HELD IN PLACE BY THE USE OF STAINLESS STEEL SCREWS.

THE HOOD DESCRIBED IN SECTION 86-4.05C, "VISORS", OF THE STATE STANDARD SPECIFICATIONS IS NOT REQUIRED.

THE SCREEN AND FRAME SHALL BE ANODIZED FLAT BLACK OR MAY BE FINISHED WITH FLAT BLACK ENAMEL AS SPECIFIED IN SECTION 91-4.01, "ENAMEL: TRAFFIC SIGNAL LUSTERLESS BLACK", CONTRACTOR'S EXPENSE.

ALTERNATE METHODS MAY BE SUBSTITUTED FOR THE ABOVE SCREENING PROVIDING THE RESULTS ARE EQUAL TO OR SUPERIOR TO THOSE OBTAINED WITH THE ABOVE-SPECIFIED SCREEN AS DETERMINED BY THE CITY ENGINEER.

11.11 PEDESTRIAN PUSHBUTTONS

PEDESTRIAN PUSHBUTTONS SHALL MEET MUTCD REQUIREMENTS FOR ACCESSIBLE PEDESTRIAN SIGNALS. CONTRACTOR SHALL PROVIDE THE APS WHERE THE MUTCD LANGUAGE IS SUCH THAT A FEATURE "SHALL" BE REQUIRED. THE PUSH BUTTON SIGN SHALL BE PORCELAIN ENAMELED METAL. THE PUSH BUTTON SHALL INCLUDE A R10-3e SIGN IMMEDIATELY ABOVE THE BUTTON.

POLE-SUPPORTED PEDESTRIAN TRAFFIC CONTROL BUTTONS SHALL BE IDENTIFIED WITH COLOR CODING CONSISTING OF A TEXTURED HORIZONTAL YELLOW BAND 2" IN WIDTH ENCIRCLING THE POLE, AND A 1" WIDE DARK BORDER BAND ABOVE AND BELOW THE YELLOW BAND. COLOR CODING SHOULD BE PLACED IMMEDIATELY ABOVE THE CONTROL BUTTON. CONTROL BUTTONS SHALL BE LOCATED NO HIGHER THAN 48" ABOVE THE SURFACE ADJACENT TO THE POLE.

11.12 EMERGENCY VEHICLE DETECTOR SYSTEM

TRAFFIC SIGNAL SHALL HAVE AN EMERGENCY VEHICLE DETECTOR SYSTEM THAT SHALL CONFORM TO THE DETAILS SHOWN ON THE PLANS AND THESE SPECIAL PROVISIONS.

GENERAL

EACH EMERGENCY VEHICLE DETECTOR SYSTEM SHALL CONSIST OF AN OPTICAL EMITTER ASSEMBLY OR ASSEMBLIES LOCATED ON THE APPROPRIATE VEHICLE AND AN OPTICAL DETECTOR/DISCRIMINATOR ASSEMBLY OR ASSEMBLIES LOCATED AT THE TRAFFIC SIGNAL.

EMITTER ASSEMBLIES ARE NOT REQUIRED FOR THIS PROJECT EXCEPT UNITS FOR TESTING PURPOSES TO DEMONSTRATE THAT THE SYSTEMS PERFORM AS SPECIFIED. TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE ENGINEER AS DESCRIBED BELOW UNDER "SYSTEM OPERATION" DURING THE SIGNAL TEST PERIOD. THE ENGINEER SHALL BE GIVEN A MINIMUM OF 2 WORKING DAYS NOTICE PRIOR TO PERFORMING THE TESTS.

EACH SYSTEM SHALL PERMIT DETECTION OF 2 CLASSES OF AUTHORIZED VEHICLES. CLASS I (MASS TRANSIT) VEHICLES SHALL BE DETECTED AT RANGES OF UP TO 900 FEET FROM THE OPTICAL DETECTOR. CLASS II (EMERGENCY) VEHICLES SHALL BE DETECTED AT RANGES UP TO 1800 FEET FROM THE OPTICAL DETECTOR.

CLASS I SIGNALS (THOSE EMITTED BY CLASS I VEHICLES) SHALL BE DISTINGUISHED FROM CLASS II SIGNALS (THOSE EMITTED BY CLASS II VEHICLES) ON THE BASIS OF THE MODULATION FREQUENCY OF THE LIGHT FROM THE RESPECTIVE EMITTER. THE MODULATION FREQUENCY FOR CLASS I SIGNAL EMITTERS SHALL BE 9.639 HZ ± 0.110 HZ. THE MODULATION FREQUENCY FOR CLASS II SIGNAL EMITTERS SHALL BE 14.035 HZ ± 0.250 HZ.

A SYSTEM SHALL ESTABLISH A PRIORITY OF CLASS II VEHICLE SIGNALS OVER CLASS I VEHICLE SIGNALS AND SHALL CONFORM TO THE REQUIREMENTS IN SECTION 25352 OF THE CALIFORNIA VEHICLE CODE.

OPTICAL DETECTION/DISCRIMINATOR ASSEMBLY

GENERAL

EACH OPTICAL DETECTION/DISCRIMINATOR ASSEMBLY SHALL CONSIST OF ONE OR MORE OPTICAL DETECTORS, CONNECTING CABLE AND A DISCRIMINATOR MODULE.

EACH ASSEMBLY, WHEN USED WITH STANDARD EMITTERS, SHALL HAVE A RANGE OF AT LEAST 990 FEET FOR CLASS I SIGNALS AND 1800 FEET FOR CLASS II SIGNALS. STANDARD EMITTERS FOR BOTH CLASSES OF SIGNALS SHALL BE AVAILABLE FROM THE MANUFACTURER OF THE SYSTEM. RANGE MEASUREMENTS SHALL BE TAKEN WITH ALL RANGE ADJUSTMENTS ON THE DISCRIMINATOR MODULE SET TO "MAXIMUM".

OPTICAL DETECTOR

EACH OPTICAL DETECTOR SHALL BE A WATERPROOF UNIT CAPABLE OF RECEIVING OPTICAL ENERGY FROM TWO SEPARATELY AMIABLE DIRECTIONS. THE HORIZONTAL ANGLE BETWEEN THE 2 DIRECTIONS SHALL BE VARIABLE FROM 180 DEGREES TO 5 DEGREES.

THE RECEPTION ANGLE FOR EACH PHOTOCCELL ASSEMBLY SHALL BE A MAXIMUM OF 8 DEGREES IN ALL DIRECTIONS ABOUT THE AIMING AXIS OF THE ASSEMBLY. MEASUREMENTS OF RECEPTION ANGLE WILL BE TAKEN AT A RANGE OF 990 FEET FOR A TYPE I EMITTER AND AT A RANGE OF 1800 FEET FOR A TYPE II EMITTER.

INTERNAL CIRCUITRY SHALL BE SOLID STATE AND THE ASSOCIATED DISCRIMINATOR MODULE SHALL PROVIDE ELECTRICAL POWER.

EACH OPTICAL DETECTOR SHALL BE CONTAINED IN A HOUSING, WHICH SHALL INCLUDE 2 ROTATABLE PHOTOCCELL ASSEMBLIES, AN ELECTRONIC ASSEMBLY AND A BASE. THE BASE SHALL HAVE AN OPENING TO PERMIT MOUNTING ON A MAST ARM OR A VERTICAL PIPE NIPPLE, OR SUSPENSION FROM A SPAN WIRE. THE MOUNTING OPENING SHALL HAVE FEMALE THREADS FOR ONE INCH CONDUIT. A CABLE ENTRANCE SHALL BE PROVIDED WHICH SHALL HAVE MALE THREADS AND GASKETING TO PERMIT A WATERPROOF CABLE CONNECTION. EACH DETECTOR SHALL HAVE MASS OF LESS THAN 2.4 LBS AND SHALL PRESENT A MAXIMUM WIND LOAD AREA OF 36 INCHES SQUARED. THE HOUSING SHALL BE PROVIDED WITH WEEP HOLES TO PERMIT DRAINAGE OF CONDENSED MOISTURE.

EACH OPTICAL DETECTOR SHALL BE INSTALLED, WIRED AND AIMED AS SPECIFIED BY THE MANUFACTURER.

CABLE

OPTICAL DETECTOR CABLE (EV-C) SHALL MEET THE REQUIREMENTS OF IPCEA-S-61-402/NEMA WC 5, SECTION 7.4, 600V (AC) CONTROL CABLE, 75 C, TYPE B, AND THE FOLLOWING:

- A. THE CABLE SHALL CONTAIN 3 CONDUCTORS, EACH OF WHICH SHALL BE NO. 20 (7 X 28) STRANDED, TINNED COPPER WITH LOW-DENSITY POLYETHYLENE INSULATION. MINIMUM AVERAGE INSULATION THICKNESS SHALL BE 0.63 MM. INSULATION OF INDIVIDUAL CONDUCTORS SHALL BE COLOR-CODED: 1-YELLOW, 1-BLUE, AND 1-ORANGE.
- B. THE SHIELD SHALL BE EITHER TINNED COPPER BRAID OR ALUMINIZED POLYESTER FILM WITH A NOMINAL 20 PERCENT OVERLAP. WHERE FILM IS USED, A NO. 20 (7 X 28) STRANDED, TINNED, BARE DRAIN WIRE SHALL BE PLACED BETWEEN THE INSULATED CONDUCTORS AND THE SHIELD AND IN CONTACT WITH THE CONDUCTIVE SURFACE OF THE SHIELD.
- C. THE JACKET SHALL BE BLACK POLYVINYL CHLORIDE WITH MINIMUM RATINGS OF 600 V (AC) AND 80 C AND A MINIMUM AVERAGE THICKNESS OF 1.1 MM. THE JACKET SHALL BE MARKED AS REQUIRED BY IPCEA/NEMA.
- D. THE FINISHED OUTSIDE DIAMETER OF THE CABLE SHALL NOT EXCEED 8.9 MM.
- E. THE CAPACITANCE, AS MEASURED BETWEEN ANY CONDUCTOR AND THE OTHER CONDUCTORS AND THE SHIELD, SHALL NOT EXCEED 157 PF PER METER AT 1000 HZ.
- F. THE CABLE RUN BETWEEN EACH DETECTOR AND THE CONTROLLER CABINET SHALL BE CONTINUOUS WITHOUT SPLICES OR SHALL BE SPLICED ONLY AS DIRECTED BY THE DETECTOR MANUFACTURER.

DISCRIMINATOR MODULE

EACH DISCRIMINATOR MODULE SHALL BE DESIGNED TO BE COMPATIBLE AND USABLE WITH A MODEL 170 CONTROLLER UNIT AND TO BE MOUNTED IN THE INPUT FILE OF A MODEL 332 OR MODEL 336 CONTROLLER CABINET, AND SHALL CONFORM TO THE REQUIREMENTS OF CHAPTER I OF THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, "TRAFFIC SIGNAL CONTROL EQUIPMENT SPECIFICATIONS",

EACH DISCRIMINATOR MODULE SHALL BE CAPABLE OF OPERATING TWO CHANNELS, EACH OF WHICH SHALL PROVIDE AN INDEPENDENT OUTPUT FOR EACH SEPARATE INPUT.

EACH DISCRIMINATOR MODULE, WHEN USED WITH ITS ASSOCIATED DETECTORS, SHALL PERFORM THE FOLLOWING:

- A. RECEIVE CLASS I SIGNALS AT A RANGE OF UP TO 900 FEET AND CLASS II SIGNALS AT A RANGE OF UP TO 1800 FEET.
- B. DECODE THE SIGNALS, ON THE BASIS OF FREQUENCY, AT 9.639 HZ ± 0.119 HZ FOR CLASS I SIGNALS AND 14.035 HZ ± 0.255 HZ FOR CLASS II SIGNALS.
- C. ESTABLISH THE VALIDITY OF RECEIVED SIGNALS ON THE BASIS OF FREQUENCY AND LENGTH OF TIME RECEIVED. A SIGNAL SHALL BE CONSIDERED VALID ONLY WHEN RECEIVED FOR MORE THAN 0.50-SECOND. NO COMBINATION OF CLASS I SIGNALS SHALL BE RECOGNIZED AS A CLASS II SIGNAL. REGARDLESS OF THE NUMBER OF SIGNALS BEING RECEIVED, UP TO A MAXIMUM OF 10 SIGNALS. ONCE A VALID SIGNAL HAS BEEN RECOGNIZED, THE EFFECT SHALL BE HELD BY THE MODULE IN THE EVENT OF TEMPORARY LOSS OF THE SIGNAL FOR A PERIOD ADJUSTABLE FROM 4.5 SECONDS TO 11 SECONDS IN AT LEAST 2 STEPS AT 5 SECONDS ± 0.5 SECOND AND 10 SECONDS ± 0.5 SECOND.
- D. PROVIDE AN OUTPUT FOR EACH CHANNEL THAT WILL RESULT IN A "LOW" OR GROUNDED CONDITION OF THE APPROPRIATE INPUT OF A MODEL 170 CONTROLLER UNIT. FOR CLASS I SIGNAL THE OUTPUT SHALL BE A 6.25 HZ ± 0.1 PERCENT, RECTANGULAR WAVEFORM WITH A 50 PERCENT DUTY CYCLE. FOR CLASS II SIGNALS THE OUTPUT SHALL BE STEADY.

EACH DISCRIMINATOR MODULE SHALL RECEIVE ELECTRIC POWER FROM THE CONTROLLER CABINET AT EITHER 24 V (DC) OR 120 V (AC).

EACH CHANNEL TOGETHER WITH THE CHANNEL'S ASSOCIATED DETECTORS SHALL DRAW NOT MORE THAN 100 MA AT 24 V (DC) OR MORE THAN 100 MA AT 120 V (AC). ELECTRIC POWER, ONE DETECTOR INPUT FOR EACH CHANNEL AND ONE OUTPUT FOR EACH CHANNEL SHALL TERMINATE AT THE PRINTED CIRCUIT BOARD EDGE CONNECTOR PINS LISTED BELOW:

BOARD EDGE CONNECTOR PIN ASSIGNMENT

A	DC GROUND		
B	+24V (DC)	P	(NC)
C	(NC)		
D	DETECTOR INPUT, CHANNEL A	R	(NC)
E	+24V (DC) TO DETECTORS	S	(NC)
F	CHANNEL A OUTPUT (C)	T	(NC)
		U	(NC)
H	CHANNEL A OUTPUT (E)	V	(NC)
J	DETECTOR INPUT, CHANNEL B	W	CHANNEL B OUTPUT (C)
K	DC GROUND TO DETECTORS	X	CHANNEL B OUTPUT (E)
L	CHASSIS GROUND	Y	(NC)
M	AC-	Z	(NC)
N	AC+		

- (C) COLLECTOR, SLOTTED FOR KEYING
- (E) EMITTER, SLOTTED FOR KEYING
- (NC) NOT CONNECTED, CANNOT BE USED BY MANUFACTURER FOR ANY PURPOSE.

TWO AUXILIARY INPUTS FOR EACH CHANNEL SHALL ENTER EACH MODULE THROUGH THE FRONT PANEL CONNECTOR. PIN ASSIGNMENT FOR THE CONNECTOR SHALL BE AS FOLLOWS:

- A. AUXILIARY DETECTOR 1 INPUT, CHANNEL A
- B. AUXILIARY DETECTOR 2 INPUT, CHANNEL A
- C. AUXILIARY DETECTOR 1 INPUT, CHANNEL B
- D. AUXILIARY DETECTOR 2 INPUT, CHANNEL B

EACH CHANNEL OUTPUT SHALL BE AN OPTICALLY ISOLATED NPN OPEN COLLECTOR TRANSISTOR CAPABLE OF SINKING 50 MA AT 30 V (AC) AND SHALL BE COMPATIBLE WITH THE MODEL 170 CONTROLLER UNIT INPUTS.

EACH DISCRIMINATOR MODULE SHALL BE PROVIDED WITH MEANS OF PREVENTING TRANSIENTS RECEIVED BY THE DETECTOR FROM AFFECTING THE MODEL 170 CONTROLLER ASSEMBLY.

EACH DISCRIMINATOR MODULE SHALL HAVE A SINGLE CONNECTOR BOARD AND SHALL OCCUPY ONE SLOT WIDTH OF THE INPUT FILE. THE FRONT PANEL OF EACH MODULE SHALL HAVE A HANDLE TO FACILITATE WITHDRAWAL AND THE FOLLOWING CONTROLS AND INDICATORS FOR EACH CHANNEL:

- A. THREE SEPARATE RANGE ADJUSTMENTS EACH FOR BOTH CLASS I AND CLASS II SIGNALS.
- B. A 3-POSITION, CENTER-OFF, MOMENTARY CONTACT SWITCH, ONE POSITION (DOWN) LABELED FOR TEST OPERATION OF CLASS I SIGNALS, AND ONE POSITION (UP) LABELED FOR TEST OPERATION OF CLASS II SIGNALS.
- C. A "SIGNAL" INDICATION AND A "CALL" INDICATION EACH FOR CLASS I AND FOR CLASS II SIGNALS. THE "SIGNAL" INDICATOR DENOTES THAT A SIGNAL ABOVE THE THRESHOLD LEVEL HAS BEEN RECEIVED. A "CALL" INDICATION DENOTES THAT A STEADY, VALIDLY CODED SIGNAL HAS BEEN RECEIVED. THESE 2 INDICATIONS MAY BE ACCOMPLISHED WITH A SINGLE INDICATION LAMP; "SIGNAL" BEING DENOTED BY A FLASHING INDICATION AND "CALL" WITH A STEADY INDICATION.

IN ADDITION, THE FRONT PANEL SHALL BE PROVIDED WITH A SINGLE CIRCULAR, BAYONET-CAPTURED, MULTI-PIN CONNECTOR FOR 2 AUXILIARY DETECTOR INPUTS FOR EACH CHANNEL. CONNECTOR SHALL BE A MECHANICAL CONFIGURATION CONFORMING TO THE REQUIREMENTS IN MILITARY SPECIFICATION MIL-C-26482 WITH 10-4 INSERT ARRANGEMENT, SUCH AS BURNDY TRIM TRIO BANTAMATE SERIES,

- A. WALL MOUNTING RECEPTACLE, G0B10-4PNE WITH SM20M-156 GOLD PLATED PINS.
- B. PLUG, G6L10-4SNE WITH SC20M-156 GOLD PLATED SOCKETS, CABLE CLAMP AND STRAIN RELIEF THAT SHALL PROVIDE FOR A RIGHT ANGLE TURN WITHIN 65 MM MAXIMUM FROM THE FRONT PANEL SURFACE OF THE DISCRIMINATOR MODULE.

CABINET WIRING

THE MODEL 332 CABINET HAS PROVISIONS FOR CONNECTIONS BETWEEN THE OPTICAL DETECTORS, THE DISCRIMINATOR MODULE AND THE MODEL 170 CONTROLLER UNIT.

WIRING FOR A MODEL 332 CABINET SHALL CONFORM TO THE FOLLOWING:

- A. SLOTS 12 AND 13 OF INPUT FILE "J" HAVE EACH BEEN WIRED TO ACCEPT A 2-CHANNEL MODULE.
- B. FIELD WIRING FOR THE PRIMARY DETECTORS, EXCEPT 24-V (DC) POWER, SHALL TERMINATE ON EITHER TERMINAL BOARD TB-9 IN THE CONTROLLER CABINET OR ON THE REAR OF INPUT FILE "J," DEPENDING ON CABINET CONFIGURATION. WHERE TB-9 IS USED, POSITION ASSIGNMENTS SHALL BE AS FOLLOWS:

POSITION	ASSIGNMENT
4	CHANNEL A DETECTOR INPUT, 1ST MODULE (SLOT J-12)
5	CHANNEL B DETECTOR INPUT, 1ST MODULE (SLOT J-12)
7	CHANNEL A DETECTOR INPUT, 2ND MODULE (SLOT J-13)
8	CHANNEL B DETECTOR INPUT, 2ND MODULE (SLOT J-13)

THE 24V (DC) CABINET POWER WILL BE AVAILABLE AT POSITION 1 OF TERMINAL BOARD TB-1 IN THE CONTROLLER CABINET.

FIELD WIRING FOR THE AUXILIARY DETECTORS SHALL TERMINATE ON TERMINAL BOARD TB-0 IN THE CONTROLLER CABINET. POSITION ASSIGNMENTS ARE AS FOLLOWS:

FOR MODULE 1 (J-12)	
POSITION	ASSIGNMENT
1	+24V (DC) FROM (J-12E)
2	DETECTOR GROUND FROM (J-12K)
3	CHANNEL A AUXILIARY DETECTOR INPUT 1
4	CHANNEL A AUXILIARY DETECTOR INPUT 2
5	CHANNEL B AUXILIARY DETECTOR INPUT 1
6	CHANNEL B AUXILIARY DETECTOR INPUT 2

FOR MODULE 2 (J-13)	
POSITION	ASSIGNMENT
7	+24V (DC) FROM (J-13E)
8	DETECTOR GROUND FROM (J-13K)
9	CHANNEL A AUXILIARY DETECTOR INPUT 1
10	CHANNEL A AUXILIARY DETECTOR INPUT 2
11	CHANNEL B AUXILIARY DETECTOR INPUT 1
12	CHANNEL B AUXILIARY DETECTOR INPUT 2

SYSTEM OPERATION

THE CONTRACTOR SHALL DEMONSTRATE THAT THE COMPONENTS OF EACH SYSTEM ARE COMPATIBLE AND WILL PERFORM SATISFACTORILY AS A SYSTEM. SATISFACTORY PERFORMANCE SHALL BE DETERMINED USING THE FOLLOWING TEST PROCEDURE DURING THE FUNCTIONAL TEST PERIOD:

- A. EACH SYSTEM TO BE USED FOR TESTING SHALL CONSIST OF AN OPTICAL EMITTER ASSEMBLY, AN OPTICAL DETECTOR, AN OPTICAL DETECTOR CABLE AND A DISCRIMINATOR MODULE.
- B. THE DISCRIMINATOR MODULES SHALL BE INSTALLED IN THE PROPER INPUT FILE SLOT OF THE MODEL 170 CONTROLLER ASSEMBLY.
- C. TWO TESTS SHALL BE CONDUCTED; ONE USING A CLASS I SIGNAL EMITTER AND A DISTANCE OF 900 FEET BETWEEN THE EMITTER AND THE DETECTOR, THE OTHER USING A CLASS II SIGNAL EMITTER AND A DISTANCE OF 1800 FEET BETWEEN THE EMITTER AND THE DETECTOR. RANGE ADJUSTMENTS ON THE MODULE SHALL BE SET TO "MAXIMUM" FOR EACH TEST.
- D. EACH TEST SHALL BE CONDUCTED FOR A PERIOD OF ONE HOUR, DURING WHICH, THE EMITTER SHALL BE OPERATED FOR 30 CYCLES, EACH CONSISTING OF A ONE-MINUTE "ON" INTERVAL AND A ONE-MINUTE "OFF" INTERVAL. DURING THE TOTAL TEST PERIOD THE EMITTER SIGNAL SHALL CAUSE THE PROPER RESPONSE FROM THE MODEL 170 CONTROLLER UNIT DURING EACH "ON" INTERVAL AND THERE SHALL BE NO IMPROPER OPERATION OF EITHER THE MODEL 170 CONTROLLER UNIT OR THE MONITOR DURING EACH "OFF" INTERVAL.

11.13 UNINTERRUPTED POWER SUPPLY:

THE CONTRACTOR SHALL INSTALL AN UNINTERRUPTED POWER SUPPLY UNIT CAPABLE OF SUPPLYING ELECTRICAL POWER FOR A FULLY EQUIPPED EIGHT PHASE TYPE 332 CABINET CONTROLLED WITH A TYPE 170E TRAFFIC SIGNAL CONTROLLER. STANDARD RUN TIME SHALL BE 3 HOURS WITH ALL LED SIGNAL INDICATIONS. THE COMPONENTS SHALL BE WIRED AND CONFORM TO NEMA, NEC AND UL STANDARDS. THE UNIT SHALL BE EQUAL TO A TESCO 22 BBS 1400XL-6 OR AN APPROVED EQUAL. THE UNIT SHALL BE ELECTRICAL SERVICE MOUNTED ENCLOSURE, THE CONTRACTOR SHALL ENSURE THAT THE MOUNTING OF THIS UNIT TO THE ELECTRICAL SERVICE CABINET WILL NOT LIMIT THE WARRANTY OF ANY EQUIPMENT SUPPLIED WITH THIS PROJECT.

11.14 LUMINAIRES

- LUMINAIRES SHALL EACH HAVE THE FOLLOWING FEATURES:
- COBRA HEAD STYLE HOUSING MADE OF LOW COPPER DIE CAST ALUMINUM ALLOY WITH A GRAY POLYESTER POWDER COAT PAINT FINISH RATED, IP54 PER ANSI C136.37.
 - HOUSING FITS ON A 1.66"/1.9"/2-3/8" O.D. BY 5-1/2" MIN. LONG TENON.
 - HUMIDITY PROOF HOUSING IN ACCORDANCE WITH ASTM D2247.
 - ONLY PASSIVE COOLING (HEAT SINK) SHALL BE BUILT IN THE HOUSING.
 - HINGED REMOVABLE DOOR TO PROVIDE ACCESS TO ELECTRONIC COMPONENTS AND AND TERMINAL BLOCK SECURED TO PREVENT ACCIDENTAL DROPPING. INCLUDE ANSI LABEL WITH WATTAGE AND SOURCE.
 - 7 BANKS OF 16 WHITE LEDS ASSEMBLED IN COMPLIANCE WITH IEC613040-5-4 AND ANSI/ESD S20.20. CRI=70.
 - SYSTEM WATTAGE NO MORE THAN 241 WATTS INCLUDING LED MODULE AND DRIVER
 - ZERO UPLIGHTING PER IESNA TM-15
 - EACH LUMINAIRE SHALL PRODUCE 25,500 – 28,200 LUMENS.
 - LIGHT ENGINES SHALL BE IP66 RATED.
 - LIGHTING DISTRIBUTION SHALL BE TYPE V FOR ALL LOCATIONS, EXCEPT LOCATION E SHALL HAVE TYPE II MEDIUM DISTRIBUTION.
 - EACH LUMINAIRE SHALL HAVE A DIMMABLE DRIVER (0-10V)
 - EPA = 0.92 SQ. FT. +/- 5%
 - ELECTRICAL COMPONENTS ARE ROHS COMPLIANT
 - LIGHT ENGINE DRIVERS (MIN. OF 2) SHALL HAVE POWER FACTOR OF 90% MINIMUM AND OPERATING RANGE OF 50/60 HZ AND AUTO ADJUSTING UNIVERSAL VOLTAGE INPUT.
 - SHORTING CAP
 - SURGE PROTECTION DEVICE TESTED IN ACCORDANCE WITH ANSI/IEEE C62.45 PER ANSI/IEEE C62.41.2 SCENARIO I CATEGORY C HIGH EXPOSURE 10KV/10KA WAVEFORMS FOR LINE-GROUND, LINE-NEUTRAL AND NEUTRAL-GROUND, AND IN ACCORDANCE WITH DOE MSSLC MODEL SPECIFICATION FOR LED ROADWAY LUMINAIRES APPENDIX D ELECTRICAL IMMUNITY HIGH TEST LEVEL 10KV/10KA.
 - EXPOSED SCREWS SHALL BE COMPLETE WITH CERAMIC PRIMER SEAL. SEALS MADE WITH EPDM, SILICONE, OR RUBBER.
 - 10 YEAR WARRANTY

11.15 INTERNALLY ILLUMINATED STREET NAME SIGNS

- 1.0 ENCLOSURE
- THE SIGN SHALL BE CONSTRUCTED OF 0.125" THICK TYPE 5052-832 GRADE ALUMINUM, WITH A TIG-WELDED FRAME FOR MAXIMUM DURABILITY OF THE SIGN ENCLOSURE.
 - THE SIGN'S VIEWABLE OPENING SHALL BE AVAILABLE IN 15", 18", AND 24" INCH SPANS (HEIGHTS).
 - THE SIGN'S VIEWABLE OPENING SHALL BE AVAILABLE IN 48", 72", 96", AND 120" INCH LENGTHS, AS MEASURED BY THE VIEWABLE OPENING OF THE SIGN.
 - THE SIGN ENCLOSURE SHALL BE NO MORE THAN 3.50" INCHES THICK, REGARDLESS OF WHETHER IT IS A SINGLE-FACED SIGN OR A DOUBLE-FACED SIGN.
 - THE SIGN SHALL BE DESIGNED IN SUCH A WAY AS TO MAKE IT POSSIBLE TO CONVERT THE SIGN FROM A SINGLE-SIDED SIGN TO A DOUBLE-SIDED SIGN (OR THE REVERSE), WITH ONLY A CHANGE IN THE FACE PLATES/BACK PLATES OF THE SIGN. THE ENCLOSURE MUST NOT CHANGE DIMENSIONS WITH THIS CONVERSION FROM A SINGLE-SIDED SIGN TO A DOUBLE-SIDED SIGN (OR THE REVERSE).
 - THE SIGN SHALL WEIGH NO MORE THAN 5 LBS. PER SQUARE FOOT.
 - THE SIGN SHALL UTILIZE A CONTINUOUS STAINLESS STEEL HINGE ON THE BOTTOM OF THE ENCLOSURE FOR A 180 – DEGREE SWING-DOWN DOOR OPERATION. THE SIGN SHALL ALSO BE FABRICATED IN A WAY TO ENSURE THAT NO COMPONENTS FALL OUT WHILE A TECHNICIAN IS OPENING OR WORKING INSIDE THE SIGN ENCLOSURE. BECAUSE ADHESIVE TAPE AND SILICONE ARE NOT ACCEPTABLE ALTERNATIVES FOR FASTENING THE SIGN FACE TO THE DOOR OF THE ENCLOSURE WHEN OPENED, RIGID ALUMINUM BRACKET HARDWARE WILL BE UTILIZED TO KEEP THE SIGN FACE IN THE DOOR.
 - THE SIGN MUST BE DESIGNED FOR DEPENDABLE WEATHER – RESISTANT OPERATION WITHOUT THE USE OF SILICONE TO SEAL THE ENCLOSURE.
 - THE SIGN SHALL UTILIZE A UL-LISTED NEOPRENE GASKET BETWEEN THE DOOR FRAME AND THE SIGN FACE ACRYLIC ON THE DOOR OF THE ENCLOSURE. POLYVINYL CHLORIDE / ACRYLONITRILE BUTADIENE RUBBER / CHLOROPRENE (NEOPRENE ®) GASKET SHALL BE UL 94 LISTED, OUTDOOR OZONE POLYMER NEOPRENE GASKET THAT CONFORMS TO ASTM 1056 FOR COMPRESSION RESISTANCE OF 4-6 PSI AT 25% COMPRESSION, ASTM 1667 FOR WATER ABSORPTION THAT DOES NOT EXCEED 0.1 LBS/FT2, CONFORMITY WITH ASTM-412 FOR A TENSILE STRENGTH MINIMUM OF 50 PSI. THE NEOPRENE GASKET SHALL BE APPLIED TO THE DOOR FRAME, AND WILL NOT BE APPLIED TO THE SIGN FACE ACRYLIC.
 - THE SIGN SHALL ALLOW FOR POWER CONNECTION TO EITHER END OF THE SIGN VIA PRE-FABRICATED "KNOCKOUT."
 - THE SIGN FACE ENCLOSURE SHALL BE DESIGNED AS TO ALLOW COMPLETE REPLACEMENT OF THE SIGN FACE WITH COMMON TOOLS (8/32" NUT DRIVER).
 - THE COMPLETED SIGN ASSEMBLY, INCLUDING THE SIGN PANELS, AND SIGN MOUNTING HARDWARE, SHALL BE DESIGNED AND CONSTRUCTED TO WITHSTAND SUSTAINED WINDS OF 110 MPH, AND GUSTS OF 150 MPH, WITHOUT DAMAGE TO THE SIGN'S EXTERIOR OR ITS INTERNAL COMPONENTS AS DETERMINED BY AN INDEPENDENT TESTING LABORATORY.
 - MOUNTING HARDWARE WILL BE SECURELY AFFIXED TO THE TOP AND BOTTOM OF THE ENCLOSURE FOR A SECURE FIT ON THE ENCLOSURE, AND THE MOUNTING BRACKET HARDWARE SHALL EXTEND NO MORE THAN 3/16" ABOVE THE TOP PLANE OF THE SIGN AND SHALL NOT EXTEND MORE THAN 3/16" BELOW THE BOTTOM PLANE OF THE SIGN, RESPECTIVELY. THE SIGN HARDWARE SHALL NOT BE CONSPICUOUS AS VIEWED FROM THE FRONT OF THE SIGN ENCLOSURE. THE SIGN MUST BE SUPPLIED WITH RIGID BACK BRACE MOUNTING BRACKETS ON TWO POSITIONS ON THE BACK OF THE SIGN. THE RIGID BACK BRACE MOUNTING BRACKETS WILL BE POWDER-COAT PAINTED TO AN EXACT MATCH WITH THE SIGN EXTRUSIONS, AND SHALL BE IN ACCORDANCE WITH MILITARY STANDARD MIL-C-24712.
 - THE SIGN WILL HAVE NO HOLES DRILLED THOUGH THE ENCLOSURE'S BACK PLATE FOR USE IN A RIGID MOUNT MAST ARM CONFIGURATION.
 - ALL OF THE SIGN'S WEIGHT WILL BE SUPPORTED BY A BRACKET WHICH SECURELY GRASPS BOTH THE TOP AND BOTTOM RIGID ALUMINUM EXTRUSIONS. SIGN BRACKETS, AS PROVIDED BY THE MANUFACTURER, WILL BE DESIGNED AS TO ALLOW ADEQUATE VERTICAL TRAVEL FOR ADJUSTABLE INSTALLATION ON BOTH STRAIGHT AND CURVILINEAR MAST ARMS.
 - THE SIGN'S EXTERIOR SURFACES SHALL BE POWDER – COAT PAINTED IN ACCORDANCE WITH MILITARY STANDARD MIL-C-24712. FINISH WILL MEET THE REQUIREMENTS OF ASTM 03359, ASTM 03363, AND ASTM 0552 FOR MAXIMUM DURABILITY AND COLOR RETENTION OVER THE LIFE OF THE SIGN. THE SIGN SHALL NOT BE WET-PAINTED ON ANY PORTION OF THE SIGN. ALL EXTERNAL OPTIONS THAT ACCOMPANY THE SIGN, TO INCLUDE THE EXTERNAL JUNCTION BOX, SHALL ALSO BE POWDER-COATED TO THE SAME STANDARDS.
 - THE SIGN SHALL UTILIZE A UL-LISTED NEOPRENE GASKET BETWEEN THE DOOR FRAME AND THE SIGN FACE ACRYLIC ON THE DOOR OF THE ENCLOSURE. POLYVINYL CHLORIDE / ACRYLONITRILE BUTADIENE RUBBER / CHLOROPRENE (NEOPRENE ®) GASKET SHALL BE UL 94 LISTED, OUTDOOR OZONE POLYMER NEOPRENE GASKET THAT CONFORMS TO ASTM 1056 FOR COMPRESSION RESISTANCE OF 4-6 PSI AT 25% COMPRESSION, ASTM 1667 FOR WATER ABSORPTION THAT DOES NOT EXCEED 0.1 LBS/FT2, CONFORMITY WITH ASTM-412 FOR A TENSILE STRENGTH MINIMUM OF 50 PSI., AND SHALL BE A MINIMUM THICKNESS OF ONE – HALF INCH BEFORE INSTALLATION AND COMPRESSION ON A CLEAN, DE-GREASED SURFACE.

11.16 INTERNALLY ILLUMINATED STREET NAME SIGNS

- THE SIGN SHALL COME FROM THE MANUFACTURER WITH ONE EYE BOLT MOUNTED SECURELY IN THE TOP RIGHT END AND ONE EYE BOLT MOUNTED SECURELY IN THE TOP LEFT END OF THE SIGN, NO MORE THAN 3.25" FROM THE SIGN'S END, FOR THE ATTACHMENT OF SAFETY CABLES UPON INSTALLATION.
- THE SIGN AND POWER SUPPLY SHOULD BE ABLE TO WITHSTAND AND OPERATE AT TEMPERATURE EXTREMES OF -22 DEG F TO +140 DEG F.

2.0 LED LIGHT SOURCE & LUMINANCE

- THE INTERNALLY-ILLUMINATED SIGN'S LEDS SHALL HAVE A LIFE SPAN OF 60,000 HOURS BEFORE LIGHT OUTPUT DEGRADES TO JUST 70% OF ITS INITIAL BRIGHTNESS.
- THE SIGN SHALL BE LISTED AND APPROVED TO UL 48 STANDARDS BY A NATIONALLY RECOGNIZED TESTING LABORATORY. THE OUTSIDE OF THE SIGN SHALL BE MARKED WITH A CERTIFICATION MARK FOR ELECTRIC SIGNS UL 48.
- THE SIGN SHALL HAVE LIGHT OUTPUT RATING OF 750-780 LUX ACROSS THE ENTIRE SIGN FACE AS MEASURED BY A LIGHT METER AT 50 DIFFERENT POINTS ACROSS THE ENTIRE SIGN FACE.
- SIGN PANEL LEDS SHALL BE WIRED TO ENSURE THAT A FAILURE OF ONE LED DOES NOT AFFECT THE SIGN'S LUX OUTPUT BY MORE THAN 10% LUX OVER THE AFFECTED AREA.
- SIGN'S LED PANELS WILL HAVE ONE (1) PRESS CONNECTION TERMINAL ON EACH END OF THE REPLACEABLE LED PANEL SO THAT ONLY COMMON HAND TOOLS ARE REQUIRED FOR THE WIRING REPLACEMENT OF SAID LED PANEL.
- THE SIGN ENCLOSURE SHALL BE DESIGNED AS TO ALLOW COMPLETE REPLACEMENT OF THE HEAT SYNC LED PANELS WITH COMMON TOOLS (PHILLIPS HEAD SCREWDRIVER) IF NECESSARY.
- THREADED STANDOFFS, MOUNTED TO THE INTERIOR OF THE SIGN, SHALL BE MOUNTED 1/4" AWAY FROM ANY EXTERIOR SURFACE TO ALLOW FOR MINIMAL HEAT TRANSFER AND DAMAGE TO THE LED PANEL FROM SUNLIGHT HEATING THE OUTSIDE OF THE ENCLOSURE, MAXIMIZING THE LIFE OF THE LEDS.

3.0 LED SINGLE OUTPUT SWITCHING POWER SUPPLY

- LED SINGLE OUTPUT SWITCHING POWER SUPPLY SHALL BE A FULLY-ENCAPSULATED, CONSTANT-CURRENT DESIGN BUILT TO WITHSTAND 300VAC SURGE INPUT FOR 5 SECONDS, WITH INHERENT SHORT CIRCUIT/OVER CURRENT/OVER VOLTAGE PROTECTION. THE POWER SUPPLY SHALL BE A UL 1310 CLASS 2 POWER UNIT, AND WILL BE HOUSED IN A FULLY ISOLATED PLASTIC CASE TO PREVENT WATER INTRUSION.
- THE SIGN'S LED SINGLE OUTPUT SWITCHING POWER SUPPLY SHALL BE RATED FOR A 1750 MA (MILLIAMPS) RATED CURRENT, A DC VOLTAGE RANGE OF 9-34V, A POWER RATING OF 59.5W, A VOLTAGE TOLERANCE 0+/- 5.0%, AN AC CURRENT OF 0.7A/230VAC, AND VOLTAGE RANGE OF 127-370VDC WITH 87% OPERATING EFFICIENCY RATING, PLUS A WORKING TEMPERATURE 0F-30 TO +70 DEGREES CELSIUS
- SAFETY STANDARDS SHALL MEET THE FOLLOWING CRITERIA: UL1310 CLASS 2, CAN/CSA C22.2 NO. 223-M91 (FOR LPC-60-1750 ONLY), IP67 APPROVED; DESIGN REFER TO TUV EN60950-1, EN61347-2-13.

4.0 ENERGY REQUIREMENTS

THE AVERAGE POWER CONSUMPTION OF THE SIGN SHALL NOT EXCEED:

6FT = 32 WATTS
8FT = 48 WATTS
10FT = 55 WATTS

5.0 SIGN FACE AND MATERIAL

- SIGN FACES SHALL BE DESIGNED USING ONLY CURRENT MUTCD APPROVED FONTS AND FONT SIZES, IN ADDITION TO THE REQUESTING AGENCY'S OWN PREFERENCES AND SPECIFICATIONS.
- THE SIGN SHALL HAVE A 3MM OR 4MM ACRYLIC FRONT PANEL THAT IS UV, WEATHER, ABRASION AND IMPACT RESISTANT. THE FRONT PANEL SHALL BE REPLACEABLE SO THAT MAINTAINING AGENCIES HAVE THE OPTION TO SUPPLY THEIR OWN SHEETING AND 3M 1170 SERIES ELECTROCUT™ FILM FOR THE SIGN FACES.
- THE SIGN SHALL UTILIZE 3M'S 1170 SERIES ELECTROCUT™ FILM FOR THE SIGN LEGEND AND SIGN BACKGROUND.
- 3M 4090 SERIES ASTM TYPE IX DIAMOND GRADE™ SHEETING SHALL BE UTILIZED, WHEN SPECIFIED, TO MEET MINIMUM LEVELS OF THE RETRO-REFLECTIVITY OF THE SIGN FACE, AS RECOMMENDED BY THE MUTCD, IF THE SIGN'S LED'S SHOULD FAIL.
- THE LIGHT TRANSMISSION FACTOR OF THE SIGN PANEL MUST PROVIDE A LETTER TO BACKGROUND RATIO OF A MINIMUM OF 4:1.
- THE SIGN SHALL UTILIZE IMPACT RESISTANT, MATCH-GRADE COMPONENT ACRYLICS (IN BOTH 3MM AND 4MM VARIANTS) WITH THE ABOVE-SPECIFIED 3M ELECTROCUT™ TO PREVENT OUT-GASSING, BUBBLING, PEELING, AND CRACKING OF THE SIGN FACE FILM, ENSURING SIGN FACE DURABILITY OVER THE LIFE OF THE SIGN.

6.0 MANUFACTURER'S WARRANTY

THE SIGN WILL CARRY A 5-YEAR MANUFACTURER'S WARRANTY ON THE SIGN ENCLOSURE AND ALL OF ITS INTERNAL COMPONENTS.

11.17 PHOTOELECTRIC CONTROLS

CONTACTORS SHALL BE THE MECHANICAL ARMATURE MERCURY TYPE.

11.18 REMOVING, REINSTALLING OR SALVAGING EQUIPMENT

SALVAGED ELECTRICAL MATERIALS SHALL BE HAULED TO THE CITY OF TURLOCK AT 901 S. WALNUT ROAD.

THE CONTRACTOR SHALL PROVIDE THE EQUIPMENT, AS NECESSARY, TO SAFELY REMOVE ALL DESIGNATED FLASHING BEACONS, STREET LIGHT POLES, ARMS, STANDARDS AND UNLOAD AND STOCKPILE THE MATERIAL. A MINIMUM OF 2 WORKING DAYS' NOTICE SHALL BE GIVEN PRIOR TO DELIVERY.

11.19 RAILROAD INTERCONNECT

THE RAILROAD COMPANY WILL FURNISH A SET OF NORMALLY CLOSED CONTACTS IN THE RAILROAD CABINET. THE CONTACTS ARE OPENED UPON TRAIN ACTUATION OF THE TRACK CIRCUIT. THE CONTACTS ARE A "FAIL-SAFE" DEVICE WHICH WILL CAUSE AN ACTUATION IF POWER TO THE TRACK CIRCUIT IS INTERRUPTED. INTERCONNECTION FROM THE TRAFFIC SIGNAL CABINET TO THE RAILROAD CABINET SHALL BE INSTALLED BY THE CONTRACTOR.

THE CONDUIT SHALL TERMINATE IN THE RAILROAD CABINET AT A LOCATION AND IN A MANNER TO BE DETERMINED BY UNION PACIFIC RAILROAD ENGINEER. THE ENDS OF THE WIRE SHALL EXTEND A MINIMUM OF 3 FEET BEYOND THE END FITTING INSIDE THE RAILROAD CABINET. ALL WORK INSIDE THE RAILROAD CABINET SHALL BE DONE BY RAILROAD PERSONNEL.

UNDER NO CIRCUMSTANCES IS THE CONTRACTOR TO DO ANY WORK IN THE IMMEDIATE VICINITY OF THE RAILROAD CABINET WITHOUT FIRST NOTIFYING AND RECEIVING PERMISSION OF THE UNION PACIFIC RAILROAD. THE CONTRACTOR WILL OBTAIN SUPERVISORY PERSONNEL FROM THE RAILROAD COMPANY. THE COST OF PROVIDING RAILROAD COMPANY PERSONNEL SHALL BE INCLUDED AS A PART OF THE LUMP SUM AMOUNT BID BY THE CONTRACTOR.

THE CONTRACTOR IS CAUTIONED AGAINST PLACING ANY TYPE OF MATERIALS OR EQUIPMENT IN THE AREA OF THE TRACKS WITHOUT DUE REGARD FOR PROPER CLEARANCE FROM THE TRACK. RAILROAD PREEMPTION DEVICES SHALL BE AS CALLED FOR ON THE PLANS OR IN THE SPECIAL PROVISIONS, RAILROAD PREEMPTION SHALL HAVE PRIORITY OVER FIRE PREEMPTION.

CONTRACTOR SHALL INSTALL A WARNING LABEL INSIDE THE TRAFFIC SIGNAL CONTROLLER CABINET AND THE RAILROAD BUNGALOW TO ALERT TECHNICIANS TO THE PRESENCE OF THE INTERCONNECTION WITH THE RAILROAD CONTROL EQUIPMENT.

ENHANCED CIRCUITRY RELATED TO RAILROAD PREEMPTION SHALL BE IMPLEMENTED BY THE CITY OF TURLOCK AS FOLLOWS:

- **ADVANCED PREEMPTION CIRCUIT:** THE ADVANCED PREEMPTION CIRCUIT IS NEEDED TO BEGIN THE RAILROAD ADVANCED PREEMPTION SEQUENCE.
- **SIMULTANEOUS CIRCUIT (XR):** THE SIMULTANEOUS CIRCUIT (XR) WILL BE USED IN A SITUATION WHERE A STOPPED TRAIN IS WITHIN THE APPROACH BUT NOT YET ENTERED THE ISLAND AND RESTARTS. THIS CIRCUIT WILL ALLOW TRUNCATION OF MINIMUM GREEN TIME AND IMMEDIATELY TRANSITION TO TRACK CLEARANCE GREEN AND ACTIVATE LIGHTS AND GATES. THIS CIRCUIT WILL ALLOW US TO HAVE A FAIL-SAFE CONDITION, IN THAT IF A TRAIN RESTART DOES OCCUR, THE TRAFFIC SIGNAL WILL TRANSITION TO TRACK CLEARANCE GREEN, ASSURING THAT TRAFFIC DOES NOT QUEUE ACROSS THE TRACKS DURING A TRAIN RESTART.
- **GATES DOWN CIRCUIT:** THE GATES DOWN CIRCUIT WILL ALLOW THE TRAFFIC SIGNAL CONTROLLER TO HOLD TRACK CLEARANCE GREEN (PHASES 2 AND 5) UNTIL THE GATES ARE WITHIN 5 DEGREES OF HORIZONTAL, AT WHICH TIME THE DWELL/LIMITED SERVICE STAGES WILL BEGIN.
- **SUPERVISED CIRCUIT:** THE SUPERVISED CIRCUIT WILL PUT THE SIGNAL INTO ALL RED FLASH IN THE EVENT THAT THE INTERCONNECTION CABLE BETWEEN RR BUNGALOW AND THE TRAFFIC SIGNAL CONTROLLER FAILS. THIS WILL ALERT THE CITY THAT THERE IS A PROBLEM THAT NEEDS TO BE INVESTIGATED.
- **TRAFFIC SIGNAL HEALTH CIRCUIT:** THE TRAFFIC SIGNAL HEALTH CIRCUIT CONSTANTLY MONITORS THE STATE OF THE TRAFFIC SIGNAL AND WILL INFORM THE RAILROAD BUNGALOW IN THE EVENT THAT THE TRAFFIC SIGNAL HAS AN OPERATIONAL FAILURE. THIS CIRCUIT WILL SEND ITS SIGNAL AT THE SAME TIME AS THE SUPERVISED CIRCUIT (ALL RED FLASH) SO THAT THE CITY CAN GO OUT AND FIND AND CORRECT THE PROBLEM. THE RAILROAD MAY USE THIS CIRCUIT TO INITIATE OPERATION OF THE ACTIVE WARNING DEVICES AT THE ADVANCED PREEMPTION CALL, RATHER THAN THE SIMULTANEOUS PREEMPTION CALL.

11.20 RAILROAD PREEMPTION OPERATION SPECIFICATION

- 1 TITLE
1.1 NAME
THIS SPECIFICATION SHALL BE KNOWN AS THE RAILROAD PREEMPTION OPERATION SPECIFICATION.
- 2 PURPOSE
2.1 GENERAL
THE PURPOSE OF THIS STANDARD IS TO DEFINE THE REQUIRED INTERFACE BETWEEN A HIGHWAY-RAIL GRADE CROSSING WARNING SYSTEM AND A TRAFFIC CONTROL SIGNAL FOR THE PURPOSE OF RAILROAD PREEMPTION.
- 3 TRAFFIC SIGNAL OPERATION
3.1 GENERAL
WHERE RAILROAD PREEMPTION IS REQUIRED, THE CONTROLLER ASSEMBLY SHALL PROVIDE THE OPERATION REQUIRED IN THIS SPECIFICATION RELATIVE TO THE PREEMPTION FUNCTIONALITY AND OPERATION.

THE CONTROLLER ASSEMBLY SHALL BE PROVIDED WITH ALL HARDWARE, SOFTWARE AND FIRMWARE NECESSARY TO PROVIDE THE OPERATION DESCRIBED HEREIN. THE CONTRACTOR SHOULD CLOSELY REVIEW THE FUNCTIONAL REQUIREMENTS OF THE PERFORMING THE FUNCTIONS AS SPECIFIED. IN MANY CASES, THE RAILROAD CIRCUITS HAVE BEEN DESIGNED TO PROVIDE AND SUPPORT THE SPECIFIC FUNCTIONALITY. AS A RESULT, NO EXCEPTIONS WILL BE PERMITTED TO THESE REQUIREMENTS.

3.2 INTERCONNECTION CIRCUITS
THE FOLLOWING SECTION DESCRIBES VARIOUS INTERCONNECTION CIRCUITS WHICH MAY BE USED BETWEEN THE GRADE CROSSING WARNING SYSTEM (RAILROAD EQUIPMENT) CIRCUITS ARE SPECIFIED IN THE PREEMPTION DESIGN AND ARE REFERRED TO AS

3.2.1 ADVANCE PEDESTRIAN PREEMPTION (APP)
THIS CIRCUIT IS ONLY USED WHEN ADVANCE PEDESTRIAN PREEMPTION OPERATION IS SPECIFIED. WHEN IT IS SPECIFIED, IT IS ALWAYS USED IN CONJUNCTION WITH AN ADVANCE VEHICLE PREEMPTION CIRCUIT. THIS CIRCUIT IS PROVIDED BY THE RAILROAD AND WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER OF AN APPROACHING TRAIN PRIOR TO THE OPERATION OF THE ACTIVE WARNING DEVICES AND PRIOR TO THE OPERATION OF THE ADVANCE VEHICLE PREEMPTION CIRCUIT. THE PERIOD OF TIME BETWEEN THIS NOTIFICATION AND THE INSTANT WHEN ADVANCE VEHICLE PREEMPTION CIRCUIT IS ACTIVATED IS KNOWN AS THE ADVANCE PEDESTRIAN PREEMPTION TIME (APPT). APPT IS USED TO TERMINATE ANY ACTIVE PEDESTRIAN SERVICE DISPLAYING A WALK INDICATION. WHEN THE APP CIRCUIT IS ACTIVATED, ANY REMAINING WALK TIME SHALL BE TRUNCATED TO AN ALTERNATE VALUE. ONCE ANY REMAINING WALK TIME HAS COMPLETED ITS TIME INTERVAL, THE PEDESTRIAN CHANGE INTERVAL SHALL BEGIN. THE PEDESTRIAN CHANGE TIME SHALL BE TRUNCATED TO AN ALTERNATE VALUE. ONCE THE PEDESTRIAN CHANGE INTERVAL HAS COMPLETED TIMING ITS ALTERNATE TIME, NO NEW PEDESTRIAN SERVICE SHALL BEGIN UNTIL THIS CIRCUIT RETURNS TO ITS NON-ACTIVATED STATE. IF NO PEDESTRIAN SERVICE IS ACTIVE WHEN THE APP CIRCUIT IS ACTIVATED, NO NEW PEDESTRIAN SERVICE SHALL BE ALLOWED. ANY PEDESTRIAN CALLS RECEIVED DURING APP SHALL BE STORED UNTIL PEDESTRIAN SERVICE IS ALLOWED. DURING THE APPT, VEHICULAR MOVEMENTS SHALL CONTINUE TO OPERATE NORMALLY.

3.2.2 ADVANCE VEHICLE PREEMPTION (AVP)
THIS CIRCUIT IS ONLY USED WHEN ADVANCE PEDESTRIAN PREEMPTION OPERATION IS SPECIFIED. WHEN IT IS SPECIFIED, IT IS ALWAYS USED IN CONJUNCTION WITH AN ADVANCE PEDESTRIAN PREEMPTION CIRCUIT. THIS CIRCUIT IS PROVIDED BY THE RAILROAD AND WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER OF AN APPROACHING TRAIN PRIOR TO THE OPERATION OF THE RAILROAD ACTIVE WARNING DEVICES. THE PERIOD OF TIME BETWEEN THIS NOTIFICATION AND THE INSTANT WHEN THE RAILROAD GRADE CROSSING WARNING DEVICES ARE ACTIVATED IS KNOWN AS ADVANCE VEHICLE PREEMPTION TIME (AVPT). IN MOST CASES, AVPT IS USED BY THE TRAFFIC SIGNAL CONTROLLER TO TERMINATE ANY ACTIVE NON-TRACK CLEARANCE VEHICULAR MOVEMENTS AND TO ADVANCE TO A PROGRAMMED PREEMPTION CLEARANCE INTERVAL IN ORDER TO PROVIDE VEHICLE OPERATORS WITH AN OPPORTUNITY TO START UP AND CLEAR THE TRACK(S). WHEN THIS INPUT IS ACTIVATED, THE FOLLOW SEQUENCE SHALL OCCUR:

- ANY PEDESTRIAN WALK INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE WALK VALUE (USUALLY ZERO) AND ANY REMAINING WALK TIME SHALL BE COMPLETED. WHEN THE ALTERNATE WALK TIME HAS COMPLETED, THE ASSOCIATED PEDESTRIAN CHANGE INTERVAL SHALL BEGIN.
- ANY PEDESTRIAN CHANGE INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE PEDESTRIAN CHANGE VALUE (USUALLY ZERO).

- ANY MINIMUM GREEN INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE MINIMUM GREEN VALUE.
- THE NORMAL YELLOW CHANGE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE. THE YELLOW CHANGE INTERVAL SHALL BEGIN ONCE THE PEDESTRIAN INTERVALS AND THE MINIMUM GREEN INTERVAL HAVE COMPLETED THEIR TIMING.
- THE NORMAL RED CLEARANCE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.

3.2.3 ADVANCE PREEMPTION (AP)
THIS CIRCUIT IS USED WHEN ADVANCE PEDESTRIAN PREEMPTION OPERATION IS NOT SPECIFIED. WHERE USED, THIS CIRCUIT IS PROVIDED BY THE RAILROAD AND WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER OF AN APPROACHING TRAIN PRIOR TO THE OPERATION OF THE RAILROAD ACTIVE WARNING DEVICES. THE PERIOD OF TIME BETWEEN THIS NOTIFICATION AND THE INSTANT WHEN THE RAILROAD GRADE CROSSING WARNING DEVICES ARE ACTIVATED IS KNOWN AS ADVANCE PREEMPTION TIME (APT). IN MOST CASES, APT IS USED BY THE TRAFFIC SIGNAL CONTROLLER TO TERMINATE ANY ACTIVE NON-TRACK CLEARANCE MOVEMENTS AND TO CHANGE TO A PROGRAMMED PREEMPTION CLEARANCE INTERVAL IN ORDER TO PROVIDE VEHICLE OPERATORS WITH AN OPPORTUNITY TO START UP AND CLEAR THE TRACK(S). WHEN THIS INPUT IS ACTIVATED, THE FOLLOW SEQUENCE SHALL OCCUR:

- ANY PEDESTRIAN WALK INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE WALK VALUE AND ANY REMAINING WALK TIME SHALL BE COMPLETED. WHEN THE ALTERNATE WALK TIME HAS COMPLETED, THE ASSOCIATED PEDESTRIAN CHANGE INTERVAL SHALL BEGIN.
- ANY PEDESTRIAN CHANGE INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE PEDESTRIAN CHANGE VALUE.
- ANY MINIMUM GREEN INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE MINIMUM GREEN VALUE.
- THE NORMAL YELLOW CHANGE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE. THE YELLOW CHANGE INTERVAL SHALL BEGIN ONCE THE PEDESTRIAN INTERVALS AND THE MINIMUM GREEN INTERVAL HAVE COMPLETED THEIR TIMING.
- THE NORMAL RED CLEARANCE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.

3.2.4 SUPERVISION (SUP)
THIS CIRCUIT IS PROVIDED BY THE RAILROAD AND IS USED TO NOTIFY THE TRAFFIC SIGNAL CONTROLLER OF A FAULT CONDITION IN THE INTERCONNECTION CABLE. THE CIRCUIT IS THE INVERSE OPERATION OF ADVANCE PREEMPTION. THE SUPERVISION AND ADVANCE PREEMPTION CIRCUITS SHALL BE CHECKED AGAINST EACH OTHER FOR PROPER OPERATION AT ALL TIMES. IF AT ANY TIME THESE CIRCUITS ARE BOTH ENERGIZED OR ARE BOTH DE-ENERGIZED, THIS SHALL INDICATE A VITAL INTERCONNECT FAILURE AND SHALL CAUSE THE TRAFFIC SIGNAL CONTROLLER UNIT TO TRANSITION TO ALL-RED SOFT FLASH UNTIL THE FAULT IS REPAIRED.

3.2.5 CROSSING ACTIVE (XR)
THIS CIRCUIT IS PROVIDED BY THE RAILROAD AND WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER OF AN APPROACHING TRAIN AT THE POINT THE ACTIVE WARNING DEVICES (RAILROAD FLASHING LIGHTS) BEGIN THEIR OPERATION. THIS CIRCUIT IS COMMONLY REFERRED TO AS AN "XR" CIRCUIT BY THE RAILROAD. IT IS ALSO THE CIRCUIT TYPICALLY USED FOR "SIMULTANEOUS PREEMPTION".

WHERE ADVANCE PREEMPTION IS USED, THE INTENT IS FOR THE TRAFFIC SIGNAL CONTROLLER TO ENTER THE PREEMPTION SEQUENCE DURING THE ADVANCE PREEMPTION TIME AND, IF USED, THE ADVANCE PEDESTRIAN PREEMPTION TIME AND/OR THE ADVANCE VEHICLE PREEMPTION TIME PERIOD FOR THROUGH TRAIN MOVES. WHERE A TRAIN MOVE RESTARTS WITHIN THE APPROACH CIRCUIT TO THE CROSSING, THE ADVANCE PREEMPTION TIME MAY BE REDUCED OR ELIMINATED. THIS COMMONLY OCCURS WHERE RAILROAD SWITCHING OPERATIONS TAKE PLACE, WHERE TRAINS MEET OR PASS, OR WHERE TRAINS STOP AT STATIONS WITHIN THE APPROACH CIRCUIT TO THE CROSSING. THE RAILROAD THEN HAS OPERATING RULES WHICH GOVERN THE MOVEMENT OF TRAINS OVER THE CROSSING. HOWEVER, IN THESE INSTANCES WHERE APT IS REDUCED OR ELIMINATED AND THE CROSSING ACTIVE INPUT IS ACTIVATED, THE PERIOD OF TIME ALLOCATED FOR THE APT HAS NOT COMPLETED ITS PROGRAMMED VALUE AND ANY REMAINING WALK, PEDESTRIAN CHANGE OR MINIMUM GREEN TIME SHALL BE TRUNCATED TO ZERO. YELLOW CHANGE SHALL BEGIN FOR ANY PHASES OTHER THAN THE PREEMPTION CLEARANCE INTERVAL PHASES FOLLOWED BY THE RED CLEARANCE INTERVAL.

WHERE SIMULTANEOUS PREEMPTION IS USED, THE INTENT IS FOR THE TRAFFIC SIGNAL CONTROLLER TO TRANSITION TO THE PREEMPTION CLEARANCE INTERVAL. THE FOLLOWING SEQUENCE SHALL OCCUR:

- ANY PEDESTRIAN WALK INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE WALK VALUE AND ANY REMAINING WALK TIME SHALL BE COMPLETED. WHEN THE ALTERNATE WALK TIME HAS COMPLETED, THE ASSOCIATED PEDESTRIAN CHANGE INTERVAL SHALL BEGIN.
- ANY PEDESTRIAN CHANGE INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE PEDESTRIAN CHANGE VALUE.
- ANY MINIMUM GREEN INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE MINIMUM GREEN VALUE.
- THE NORMAL YELLOW CHANGE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.
- THE NORMAL RED CLEARANCE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.

3.2.6 GATE DOWN (GD)
THIS CIRCUIT IS PROVIDED BY THE RAILROAD AND WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER WHEN THE GATE(S) CONTROLLING ACCESS OVER THE TRACK(S) APPROACHING THE INTERSECTION IS/ARE LOWERED TO WITHIN APPROXIMATELY 5 DEGREES OF HORIZONTAL OR WHEN A TRAIN HAS PHYSICALLY ENTERED THE LIMITS OF THE GRADE CROSSING (ISLAND CIRCUIT). THE TRAFFIC SIGNAL CONTROLLER UNIT SHALL NOT LEAVE THE PREEMPTION CLEARANCE INTERVAL (TRACK CLEARANCE) UNTIL THE CONTROLLER UNIT RECEIVES AN INDICATION THAT THE RAILROAD GATES ARE NOW WITHIN 5 DEGREES OF HORIZONTAL OR THAT THE ISLAND HAS BEEN OCCUPIED. ONCE THE GATE DOWN INPUT TO THE CONTROLLER UNIT IS ACTIVATED, THE CONTROLLER UNIT MUST THEN COMPLETE A TRACK CLEARANCE GREEN EXTENSION TIME PRIOR TO THE DISPLAY OF YELLOW CHANGE.

3.2.7 ISLAND OCCUPIED (ISL)
THIS CIRCUIT IS PROVIDED BY THE RAILROAD AND WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER WHEN A TRAIN HAS PHYSICALLY ENTERED THE LIMITS OF THE GRADE CROSSING. THIS IS REFERRED TO AS THE "ISLAND".

3.2.8 TRAFFIC SIGNAL HEALTH CIRCUIT (TSH)
THIS CIRCUIT IS PROVIDED BY THE TRAFFIC SIGNAL CONTROLLER AND WILL NOTIFY THE RAILROAD WARNING SYSTEM WHENEVER THE TRAFFIC SIGNAL HAS ENTERED CONFLICT FLASH, MANUAL FLASH, SOFT FLASH, MANUAL SIGNALS OFF, OR WHEN COMMERCIAL POWER AND BACKUP POWER SYSTEM HAS FAILED (SIGNALS OFF). THE TRAFFIC SIGNAL HEALTH CIRCUIT IS AN OPTIONAL OUTPUT FROM THE TRAFFIC SIGNAL CONTROLLER TO THE RAILROAD CONTROL EQUIPMENT THAT IS PART OF THE INTERCONNECTION.

3.3 FUNCTIONAL IMPLEMENTATION
THE PREEMPTION SEQUENCING SHALL BE IMPLEMENTED THROUGH THE RAILROAD PREEMPTION SYSTEM INSTALLED IN THE CABINET ASSEMBLY. BASED ON THE STATES OF THE INTERCONNECTION INPUTS FROM THE RAILROAD WARNING SYSTEM, THE SYSTEM WILL CALL PRE-DEFINED PREEMPTION PLANS IN THE CONTROLLER UNIT. EACH PREEMPTION PLAN MUST BE CONFIGURED FOR NON-LOCKING OPERATION PROVIDING THE OPERATION DESCRIBED IN THE FOLLOWING STATEMENTS:

3.3.1 PLAN 1 – ALL-RED SOFT FLASH WHEN ACTIVATED, THIS PLAN HAS PRIORITY OVER ALL OTHER PREEMPTION PLANS. THE CONTROLLER UNIT SHALL TRANSITION TO ALL-RED SOFT FLASH VIA THE FOLLOWING STEPS:

- A PREEMPTION DELAY PERIOD SHALL ELAPSE PRIOR TO TRANSITION TO THIS PLAN. THIS DELAY PERIOD IS TYPICALLY SET TO ALLOW A RAILROAD PREEMPTION SYSTEM MODULE TO BE CHANGED WITHIN A SHORT PERIOD OF TIME WITHOUT PLACING THE INTERSECTION INTO FLASHING OPERATION.
- ANY PEDESTRIAN WALK INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE WALK VALUE AND ANY REMAINING WALK TIME SHALL BE COMPLETED. WHEN THE ALTERNATE WALK TIME HAS COMPLETED, THE ASSOCIATED PEDESTRIAN CHANGE INTERVAL SHALL BEGIN.
- ANY PEDESTRIAN CHANGE INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE PEDESTRIAN CHANGE VALUE.
- ANY MINIMUM GREEN INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE MINIMUM GREEN VALUE.
- THE NORMAL YELLOW CHANGE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.
- THE NORMAL RED CLEARANCE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.
- THE ALL-RED FLASH INTERVAL SHALL BE DISPLAYED AND BEGIN TO TIME ITS PROGRAMMED MINIMUM TIME. ONCE THE PROGRAMMED TIME HAS COMPLETED, THE SEQUENCE SHALL REMAIN IN ALL-RED SOFT FLASH OPERATION UNTIL THE PLAN 1 INPUT IS NO LONGER ACTIVE.

- WHEN THE PLAN 1 INPUT IS NO LONGER ACTIVE, THE SEQUENCE SHALL ADVANCE TO THE PROGRAMMED EXIT PHASES FOLLOWING A PROGRAMMABLE STEADY ALL-RED DISPLAY.

3.3.2 PLAN 2 – PREEMPTION CLEARANCE INTERVAL
WHEN ACTIVATED, THIS PLAN HAS PRIORITY OVER LOWER NUMBERED PREEMPTION PLANS. THE CONTROLLER UNIT SHALL TRANSITION TO THE PREEMPTION CLEARANCE INTERVAL VIA THE FOLLOWING STEPS:

- ANY PEDESTRIAN WALK INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO ZERO.
- ANY PEDESTRIAN CHANGE INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO ZERO.
- ANY MINIMUM GREEN INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO ZERO.
- THE NORMAL YELLOW CHANGE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.
- THE NORMAL RED CLEARANCE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.
- THE PREEMPTION CLEARANCE INTERVAL SHALL BE DISPLAYED AND BEGIN TO TIME ITS PROGRAMMED MINIMUM TIME. ONCE THE PROGRAMMED TIME HAS COMPLETED, THE SEQUENCE SHALL REMAIN IN THE PREEMPTION CLEARANCE INTERVAL.
- WHEN THE PLAN 2 INPUT IS NO LONGER ACTIVE, THE SEQUENCE SHALL ADVANCE TO THE PROGRAMMED EXIT PHASES.

3.3.3 PLAN 3 – PREEMPTION CLEARANCE INTERVAL
WHEN ACTIVATED, THIS PLAN HAS PRIORITY OVER LOWER NUMBERED PREEMPTION PLANS. THE CONTROLLER UNIT SHALL TRANSITION TO THE PREEMPTION CLEARANCE INTERVAL VIA THE FOLLOWING STEPS:

- ANY PEDESTRIAN WALK INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE WALK VALUE, AND ANY REMAINING WALK TIME SHALL BE COMPLETED. WHEN THE ALTERNATE WALK TIME HAS COMPLETED, THE ASSOCIATED PEDESTRIAN CHANGE INTERVAL SHALL BEGIN.
- ANY PEDESTRIAN CHANGE INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE PEDESTRIAN CHANGE VALUE.
- ANY MINIMUM GREEN INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE MINIMUM GREEN VALUE.
- THE NORMAL YELLOW CHANGE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.
- THE NORMAL RED CLEARANCE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.
- THE PREEMPTION CLEARANCE INTERVAL SHALL BE DISPLAYED AND BEGIN TO TIME ITS PROGRAMMED MINIMUM TIME. ONCE THE PROGRAMMED TIME HAS COMPLETED, THE SEQUENCE SHALL REMAIN IN THE PREEMPTION CLEARANCE INTERVAL.
- WHEN THE PLAN 3 INPUT IS NO LONGER ACTIVE, THE SEQUENCE SHALL ADVANCE TO THE PROGRAMMED EXIT PHASES.

3.3.4 PLAN 4 – PEDESTRIAN CHANGE INTERVAL
WHEN ACTIVATED, THIS PLAN HAS PRIORITY OVER LOWER NUMBERED PREEMPTION PLANS. THE CONTROLLER UNIT SHALL TRANSITION TO THE PEDESTRIAN CHANGE INTERVAL VIA THE FOLLOWING STEPS:

- ANY PEDESTRIAN WALK INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE WALK VALUE AND ANY REMAINING WALK TIME SHALL BE COMPLETED. WHEN THE ALTERNATE WALK TIME HAS COMPLETED, THE ASSOCIATED PEDESTRIAN CHANGE INTERVAL SHALL BEGIN.
- ANY PEDESTRIAN CHANGE INTERVAL WHICH HAS NOT COMPLETED ITS PROGRAMMED VALUE SHALL BE TRUNCATED TO AN ALTERNATE PEDESTRIAN CHANGE VALUE.
- AS LONG AS THE PLAN 4 INPUT IS ACTIVE, ALL ALLOWED VEHICLE PHASES SHALL CONTINUE TO OPERATE NORMALLY. NO NEW PEDESTRIAN SERVICE MAY BEGIN.
- WHEN THE PLAN 4 INPUT IS NO LONGER ACTIVE, THE SEQUENCE SHALL ADVANCE TO THE PROGRAMMED EXIT PHASES.

3.3.5 PLAN 5 – PREEMPTION DWELL INTERVAL
WHEN ACTIVATED, THIS PLAN HAS PRIORITY OVER LOWER NUMBERED PREEMPTION PLANS. THE CONTROLLER UNIT SHALL TRANSITION TO THE PREEMPTION DWELL INTERVAL VIA THE FOLLOWING STEPS:

- THE NORMAL YELLOW CHANGE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.
- THE NORMAL RED CLEARANCE INTERVAL SHALL COMPLETE ITS PROGRAMMED VALUE.
- THE PREEMPTION DWELL OPERATION SHALL COMMENCE OPERATION AND REMAIN AS LONG AS THE PLAN 5 INPUT IS ACTIVE.

- WHEN THE PLAN 5 INPUT IS NO LONGER ACTIVE, THE SEQUENCE SHALL ADVANCE TO THE PROGRAMMED EXIT PHASES.

3.3.6 PLAN 6 – SPECIAL APPLICATIONS INTERVAL
PLAN 6 IS TYPICALLY USED WHERE TWO PREEMPTION CLEARANCE INTERVALS ARE REQUIRED BASED ON SITE SPECIFIC INTERSECTION GEOMETRY.

4 TRAFFIC SIGNAL INTERFACE
4.1 GENERAL
THE TRAFFIC SIGNAL CONTROLLER SHALL PROVIDE A SOLID STATE INTERFACE, USING A MINIMUM OF TWO AND UP TO FOUR SPECIAL RAILROAD PREEMPTION SYSTEM MODULES. THE MODULES MAY BE INSTALLED IN A 170/2070 COMPLIANT INPUT FILE. OPTIMUM FUNCTIONALITY AND SAFETY FEATURES ARE ACHIEVED WHEN THE MODULES ARE INSTALLED IN A STANDALONE COMPANION INPUT FILE RACK WITH MODULE INSERTION VERIFICATION PROTECTION. THE COMPANION INPUT FILE RACK SHALL PROVIDE TWO TO FOUR SLOTS FOR THE PREEMPTION SYSTEM MODULES. THE CONTRACTOR MUST ASSURE THAT AN ADEQUATE NUMBER OF INPUT FILE SLOTS ARE AVAILABLE FOR EACH SPECIFIC INTERSECTION IF THE COMPANION INPUT FILE RACK IS NOT USED. IF NECESSARY, THE CONTRACTOR WILL BE REQUIRED TO FURNISH AND INSTALL A SECOND INPUT FILE IN ORDER TO PROVIDE ADEQUATE POSITIONS FOR INPUT MODULES. THIS SHALL BE INCIDENTAL TO THE RAILROAD PREEMPTION SYSTEM COMPONENTS. UNLESS OTHERWISE STATED, THE CONTRACTOR SHALL FURNISH A STANDALONE COMPANION INPUT FILE RACK WITH MODULE INSERTION VERIFICATION PROTECTION FOR THE RAILROAD PREEMPTION COMPLETE WITH THREE MODULES. THE INTERFACE SHALL FUNCTION AS FOLLOWS:

- THE RAILROAD PREEMPTION SYSTEM SHALL OPERATE FORM NOMINAL 120 VAC POWER APPLIED VIA THE COMPANION INPUT FILE RACK OR THE INPUT FILE PINS.
- EACH INTERCONNECTION CIRCUIT TO THE RAILROAD WARNING SYSTEM SHALL OPERATE ON 24 VAC AND BE ISOLATED FROM ALL TRAFFIC SIGNAL CABINET INTERNAL VOLTAGE SOURCES, AC LINE, GROUNDS OR AC NEUTRAL. THE SYSTEM SHALL BE CAPABLE OF UTILIZING "SINGLE-BREAK" OR "DOUBLE-BREAK" CIRCUITRY. CONFIGURATION HEADERS SHALL BE PROVIDED ON THE APPROPRIATE MODULES TO PERMIT SELECTION OF EITHER MODE.
- THE RAILROAD PREEMPTION SYSTEM SHALL GENERATE THE ISOLATED 24 VAC SUPPLY FOR THE INTERCONNECTION CIRCUITS.
- EACH INPUT FROM THE RAILROAD SHALL BE OPTICALLY ISOLATED FROM OTHER INPUTS AND NOT REFERENCED TO ANY TRAFFIC SIGNAL CABINET INTERNAL VOLTAGE SOURCES, AC LINE, GROUNDS OR AC NEUTRAL.
- THE RAILROAD PREEMPTION SYSTEM SHALL PROVIDE A TRAFFIC SIGNAL HEALTH ISOLATED OUTPUT. THIS OUTPUT SHALL BE AN ISOLATED 12 VDC AND SHALL BE ENERGIZED WHEN TRAFFIC SIGNAL HEALTH AS DESCRIBED BELOW IS VALID. THE SYSTEM SHALL MONITOR THE 120 VAC LOAD SWITCH SIGNAL BUS CONTROL CIRCUIT. IN ADDITION, THE SYSTEM SHALL MONITOR AN APPROPRIATE SIGNAL OUTPUT TO SENSE "SOFT FLASH" OPERATION. SOFT FLASH IS FLASHING OPERATION GENERATED BY THE CONTROLLER UNIT BY PROVIDING OUTPUTS TO THE LOAD SWITCHES THAT ARE TURNED OFF AND ON TO DEVELOP THE SPECIFIC FLASH PATTERN. THESE TWO INPUTS SHALL BE REFERENCED TO 120 VAC NEUTRAL. IF THE SIGNAL BUS BECOMES DE-ENERGIZED OR FLASHING OPERATION IS SENSED, THE SYSTEM SHALL DE-ENERGIZE THE TRAFFIC SIGNAL HEALTH OUTPUT TO THE RAILROAD.
- THE RAILROAD PREEMPTION SYSTEM SHALL PROVIDE OUTPUTS REFERENCED TO CONTROLLER UNIT LOGIC GROUND FOR SELECTION OF PROGRAMMED FUNCTIONS.

4.2 SUPPLEMENTAL TERMINALS
ALL SUPPLEMENTAL TERMINALS PROVIDED AS A PART OF THE PREEMPTION INTERFACE SHALL UTILIZE A "CAGE-CLAMP" DESIGN, SUCH AS MANUFACTURED BY WAGO CORPORATION OR EQUIVALENT. TERMINALS WHICH PROVIDE "SIDE WIPE" CONNECTIONS OR SET SCREWS ARE NOT ACCEPTABLE.

4.3 CONTROLLER HARNESS
THE APPROPRIATE HARNESS FOR THE SPECIFIC CONTROLLER UNIT PROVIDED SHALL BE FURNISHED AND CONNECTED TO THE PREEMPTION INTERFACE PANEL.

4.4 RAILROAD PREEMPTION PROCESSOR MODULE
THE RAILROAD PREEMPTION PROCESSOR MODULE SHALL BE A PROCESSOR BASED UNIT THAT INCORPORATES AN ORGANIC LIGHT-EMITTING DIODE (OLED) DISPLAY WHICH PLUGS INTO THE RAILROAD PREEMPTION SYSTEM COMPANION INPUT FILE RACK. IT SHALL BE PROVIDED WITH AN INTERNAL POWER SUPPLY TO OPERATE FROM THE 120 VAC SOURCE PROVIDED IN THE INPUT FILE. THE ISOLATOR SHALL PROVIDE THE FOLLOWING FUNCTIONS AND FEATURES:

- LIGHT-EMITTING DIODE (LED) INDICATOR FOR "POWER".
- LED INDICATOR FOR "HEALTH".
- LED INDICATOR FOR "FAULT".
- MENU-DRIVEN OLED GRAPHIC DISPLAY TO INDICATE UNIT STATUS, INPUTS, OUTPUTS AND SYSTEM TIMING.
- FOUR-BUTTON KEYPAD FOR USER OPERATION.
- INPUT ISOLATION FOR ADVANCE PREEMPTION, SUPERVISED, CROSSING ACTIVE AND GATE DOWN FROM RAILROAD WARNING SYSTEM.
- OUTPUTS (FOUR) FOR TRAFFIC SIGNAL CONTROLLER UNIT TO SELECT PREEMPTION PLANS.

4.5 RAILROAD PREEMPTION EXPANSION MODULE
THE RAILROAD PREEMPTION EXPANSION MODULE SHALL BE A PROCESSOR BASED UNIT WHICH PLUGS INTO THE RAILROAD PREEMPTION SYSTEM COMPANION INPUT FILE RACK TO THE LEFT OF THE RAILROAD PREEMPTION PROCESSOR MODULE. THE EXPANSION MODULE SHALL PROVIDE THE FOLLOWING FUNCTIONS AND FEATURES:

- INPUT FOR 120 VAC SIGNAL BUS (LOAD SWITCH POWER).
- INPUT FOR 120 VAC FLASHING SIGNAL INDICATION FOR SOFT FLASH SENSE (SOFT FLASH INDICATION).
- 12 VDC ISOLATED OUTPUT TO DRIVE RAILROAD VITAL RELAY FOR TRAFFIC SIGNAL HEALTH.
- ISOLATED OPTION INPUT FOR TRACK CLEARANCE GREEN(S) MONITORING FROM TRAFFIC SIGNAL LOAD SWITCH OUTPUTS.
- ISOLATED OPTION INPUT FOR GATE UP, ISLAND OR DOUBLE-BREAK SUPERVISION FROM RAILROAD WARNING SYSTEM.
- OUTPUTS (TWO) FOR THE TRAFFIC SIGNAL CONTROLLER UNIT TO SELECT PREEMPTION PLANS
- OUTPUT (ADVANCE) FOR CONTROL OF BLANK-OUT SIGNS OR OTHER DEVICES.
- OUTPUT (SIMULTANEOUS) FOR CONTROL OF BLANK-OUT SIGNS OR OTHER DEVICES.

4.6 RAILROAD PREEMPTION OUTPUT MODULE
THE RAILROAD PREEMPTION OUTPUT MODULE SHALL BE A PROCESSOR BASED UNIT WHICH PLUGS INTO TWO SLOTS OF THE INPUT FILE (2-IN. WIDE FACEPLATE) TO THE LEFT OF THE RAILROAD PREEMPTION EXPANSION MODULE. THE OUTPUT MODULE SHALL PROVIDE THE FOLLOWING FUNCTIONS AND FEATURES:

- DIRECTLY DRIVES 6 OUTPUTS TO REFLECT ALL 6 INPUTS ON THE RAILROAD PREEMPTION ISOLATOR PROCESSOR AND EXPANSION MODULES.
 - OUTPUT (GROUND TRUE) FOR INDICATION OF ADVANCE PREEMPTION.
 - OUTPUT (GROUND TRUE) FOR INDICATION OF SUPERVISED.
 - OUTPUT (GROUND TRUE) FOR INDICATION OF SIMULTANEOUS PREEMPTION.
 - OUTPUT (GROUND TRUE) FOR INDICATION OF GATE DOWN.
 - OUTPUT (GROUND TRUE) FOR INDICATION OF TRACK CLEARANCE GREEN.
 - OUTPUT (GROUND TRUE) FOR INDICATION OF EXPANSION MODULE OPTIONAL ISOLATED INPUT FROM RAILROAD WARNING SYSTEM.

- SINKS UP TO 200 MA PER OUTPUT.

- SUPPLIES UP TO 450 MA TOTAL AT 24 VDC.

- PROVIDES AN ISOLATED GROUND REFERENCE FOR THE 24 VDC POWER.

- THIS OPTIONAL MODULE IS INTENDED TO DRIVE INPUTS TO A RECORDER AND INDICATOR PANEL FOR FIELD USE.

4.7 RAILROAD PREEMPTION ISOLATOR MODULE COMPANION INPUT FILE RACK
THE COMPANION INPUT FILE RACK PROVIDES A MINIMUM OF TWO AND UP TO FOUR SLOTS FOR THE PREEMPTION SYSTEM ISOLATOR MODULES. THE COMPANION INPUT FILE RACK SHALL PROVIDE THE FOLLOWING FEATURES:

- TWO MODULE CONFIGURATION, INPUT FILE RACK, FOR SHELF MOUNTING RAILROAD PREEMPTION ISOLATOR PROCESSOR AND EXPANSION MODULES.
- THREE MODULE CONFIGURATION, INPUT FILE RACK, FOR SHELF MOUNTING RAILROAD PREEMPTION ISOLATOR PROCESSOR, EXPANSION AND OUTPUT MODULES.
- WAGO "CAGE-CLAMP" OR EQUIVALENT CONNECTORS FOR FIELD WIRING.

- MODULE INSERTION VERIFICATION RELAY PROTECTION ON PROCESSOR MODULE SLOT. VERIFIES IF THE PROCESSOR MODULE IS PROPERLY SEATED, WHEN VIEWED FROM THE FRONT, IN THE RIGHT MODULE SLOT. AN IMPROPERLY SEATED OR MISSING MODULE WILL PLACE A CALL TO THE TRAFFIC SIGNAL CONTROLLER PREEMPTION PLAN PROGRAMMED FOR FLASH OPERATION.

5 RAILROAD INTERFACE
UNLESS OTHERWISE SPECIFIED, THE RAILROAD BUNGALOW SHALL BE PROVIDED WITH ISOLATED RELAY CONTACTS FOR THE INTERFACE. SOLID STATE OUTPUTS FROM THE RAILROAD MAY BE USED AS AN OPTION TO THE RELAY CONTACTS AS REQUIRED BY THE RAILROAD. THE INTERFACE SHALL PROVIDE THE CIRCUITS DESCRIBED AS REQUIRED AND SPECIFIED IN THE PREEMPTION INTERCONNECTION DESIGN:

5.1 ADVANCE PEDESTRIAN PREEMPTION
THIS OPTIONAL CIRCUIT WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER OF AN APPROACHING TRAIN PRIOR TO THE OPERATION OF THE ADVANCE VEHICLE PREEMPTION CIRCUIT. TWO HEEL-FRONT CONTACTS ON THE ADVANCE PEDESTRIAN PREEMPTION RELAY ARE REQUIRED.

5.2 ADVANCE VEHICLE PREEMPTION
THIS OPTIONAL CIRCUIT WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER OF AN APPROACHING TRAIN PRIOR TO THE OPERATION OF THE ACTIVE WARNING DEVICES. TWO HEEL-FRONT CONTACTS ON THE ADVANCE VEHICLE PREEMPTION RELAY ARE REQUIRED.

5.3 ADVANCE PREEMPTION
THIS CIRCUIT WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER OF AN APPROACHING TRAIN PRIOR TO THE OPERATION OF THE ACTIVE WARNING DEVICES. TWO HEEL-FRONT-BACK CONTACTS ON THE ADVANCE PREEMPTION RELAY ARE REQUIRED. THE BACK CONTACTS ON THIS RELAY WILL FUNCTION AS THE SUPERVISED INTERCONNECTION CIRCUIT.

5.4 SIMULTANEOUS PREEMPTION (WARNING SYSTEM ACTIVE)
THIS CIRCUIT WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER OF AN APPROACHING TRAIN AT THE POINT THE ACTIVE WARNING DEVICES BEGIN THEIR OPERATION. TWO HEEL-FRONT CONTACTS ON THE XR OR EQUIVALENT RELAY ARE REQUIRED. THE XR CIRCUIT SHALL BE CONNECTED IN SUCH A WAY THAT THE SIMULTANEOUS PREEMPTION RELAY CAN NEVER BE DOWN WITH THE XR RELAY UP. THIS IS COMMONLY CIRCUITED BY HAVING THE XR RELAY AS A REPEATER OF THE PREEMPTION RELAY.

5.5 GATE DOWN
THIS CIRCUIT WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER WHEN THE GATE(S) CONTROLLING ACCESS TO THE INTERSECTION OVER THE TRACK(S) IS LOWERED. THE NORMAL POSITION OF THIS RELAY IS DOWN UNTIL THE GATE DOWN CONTACT CLOSES AND PICKS UP THE RELAY. TWO HEEL-FRONT CONTACTS OF THE GATE DOWN RELAY ARE REQUIRED. IF MORE THAN ONE GATE CONTROLS ACCESS OVER THE CROSSING APPROACHING THE INTERSECTION, THEN BOTH MECHANISMS MUST INDICATE THAT THEY ARE LOWERED PRIOR TO PICKING UP THE GATE DOWN RELAY. IF PREEMPTION IS PROVIDED ON EACH SIDE OF THE CROSSING, TWO GATE DOWN RELAYS ARE REQUIRED AND SHOULD BE CONNECTED TO PROVIDE THE APPROPRIATE GATE DOWN INFORMATION. IN ACCORDANCE WITH AREMA 16.30.10, THE GATE DOWN HEEL-FRONT CONTACTS SHALL BE WRAPPED BY THE HEEL-BACK CONTACT ON THE ISLAND RELAY. THIS WILL PROVIDE A GATE DOWN INDICATION TO THE TRAFFIC SIGNAL CONTROLLER IN THE EVENT ONE OR MORE OF THE INCLUDED GATES IS NOT DOWN AND THE TRAIN OCCUPIES THE ISLAND CIRCUIT.

5.7 ISLAND
THIS CIRCUIT WILL NOTIFY THE TRAFFIC SIGNAL CONTROLLER WHEN AN APPROACHING TRAIN HAS ENTERED THE ISLAND CIRCUIT. TWO HEEL-FRONT CONTACTS ON THE ISLAND RELAY ARE REQUIRED.

5.8 TRAFFIC SIGNAL HEALTH
THIS CIRCUIT IS AN INPUT TO THE RAILROAD WARNING SYSTEM FROM THE TRAFFIC SIGNAL CONTROLLER AND WILL NOTIFY THE RAILROAD WARNING SYSTEM WHENEVER THE TRAFFIC SIGNAL HAS ENTERED MALFUNCTION FLASH, MANUAL FLASH, SOFT FLASH, MANUAL SIGNALS OFF OR THE POWER HAS FAILED (SIGNALS OFF). THE RAILROAD MAY, AT THEIR OPTION PROVIDE A TRAFFIC SIGNAL HEALTH RELAY WHICH WILL NORMALLY BE ENERGIZED BY THIS INPUT. ONE HEEL-FRONT CONTACT OR EQUIVALENT OF THE ADVANCE PREEMPTION RELAY (AND THE ADVANCE PEDESTRIAN PREEMPTION RELAY, IF USED) SHALL BE IN SERIES WITH THE XR RELAY. THIS / THESE CONTACT(S) SHALL BE WRAPPED BY A HEEL-FRONT ON THE TRAFFIC SIGNAL HEALTH RELAY. WHENEVER THE TRAFFIC SIGNAL HEALTH RELAY IS DOWN, THE OPERATION OF THE RAILROAD WARNING DEVICES SHALL BE EXTENDED BY THE ADVANCE PREEMPTION (AND ADVANCE PEDESTRIAN PREEMPTION, IF USED) TIME. THE TRAFFIC SIGNAL HEALTH CIRCUIT SHALL PROVIDE A STICK FUNCTION THROUGH THE XR RELAY SUCH THAT ONCE DOWN, THE TRAFFIC SIGNAL HEALTH RELAY MUST REMAIN DOWN UNTIL THE XR RELAY PICKS UP.

11.21 INDUCTIVE LOOP DETECTORS

THE CONTRACTOR SHALL FURNISH LOOP DETECTOR SENSOR UNITS.

LOOP WIRE SHALL BE TYPE 2.

LOOP DETECTOR LEAD-IN CABLE SHALL BE TYPE B.

SLOTS SHALL BE FILLED WITH HOT-MELT RUBBERIZED ASPHALT SEALANT.

TRAFFIC SIGNAL LOOPS SHALL BE TYPE "A" AND TYPE "D" AS DESIGNATED ON THE PLANS

THE DEPTH OF LOOP SEALANT ABOVE THE TOP OF THE UPPERMOST LOOP WIRE IN THE SAWED SLOTS SHALL BE 2 INCH, MINIMUM.

THE FURTHERMOST RIGHT TYPE "D" DETECTOR, NEAREST THE STOP BAR OR CROSSWALK OF EACH PHASE, SHALL BE DESIGNATED FOR BICYCLE DETECTION AND SHALL HAVE A BICYCLE LOOP DETECTOR SYMBOL INSTALLED IN THE CENTER OF THE DETECTION AREA, UNLESS OTHERWISE SPECIFIED IN THE PROJECT PLANS OR SPECIFICATIONS.

THE BICYCLE LOOP DETECTOR SYMBOL SHALL BE PER THE CURRENT EDITION OF THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, STANDARD PLANS.



NOTE:
ALL REFERENCES AND WRITTEN DIMENSIONS SHALL SUPERCEDE ALL SCALED DISTANCES AND SHALL BE VERIFIED IN THE FIELD. ANY DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

MICHAEL G. PITCOCK, P.E.
DIRECTOR OF DEVELOPMENT SERVICES/CITY ENGINEER
12/12/16
PLANS APPROVAL DATE



NATHAN B. BRAY, P.E.
PRINCIPAL CIVIL ENGINEER
DATE: 12/12/16



CITY OF TURLOCK
DEVELOPMENT SERVICES
ENGINEERING DIVISION
156 S. BROADWAY, STE 150
(209) 668-5520

TRAFFIC SIGNAL SPECIFICATIONS
CAPITAL PROJECT NO. 14-28
INTERSECTION IMPROVEMENTS AT
GOLDEN STATE BLVD. AND FULKERTH ROAD

VERIFY SCALE
BAR IS 1" ON ORIGINAL DRAWING
0 1/4" 3/4" 1"
1/2"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWN BY: XX
REV. BY: --
CH. BY: XX
DATE: DECEMBER, 2016
SCALE: SCALE
14-28 BASE.dwg

SHEET
15
OF 20

KEY NOTES

- 1

PLACE TYPE IV (L) ARROW (15 S.F.)
- 2

PLACE TYPE I (10'-0") ARROW (14 S.F.)
- 3

44 L.F. ~ 24" WHITE LIMIT LINE
- 4

PLACE "KEEP" (24 S.F.) "CLEAR" (27 S.F.) SYMBOL
- 5

101 L.F. ~ DETAIL 39A
- 6

35 L.F. ~ DETAIL 39A
- 7

PLACE BICYCLE LANE SYMBOL WITH PERSON (7 S.F.)
- 8

63 L.F. ~ DETAIL 39
- 9

PLACE TYPE IV (R) ARROW (15 S.F.)
- 10

59 L.F. ~ DETAIL 39
- 11

32 L.F. ~ 12" LIMIT LINE
- 12

11 L.F. ~ 12" LIMIT LINE
- 13

73 L.F. ~ DETAIL 10
- 14

73 L.F. ~ DETAIL 38
- 15

55 L.F. ~ DETAIL 38A
- 16

63 L.F. ~ DETAIL 26. BOTH SIDES OF MEDIAN
- 17

7 L.F. ~ DETAIL 23
- 18

INSTALL R6-1r
- 19

INSTALL W10-11a "45 FEET"
- 20

PLACE WHITE REFLECTORS ON CURB WITHIN 35' OF XING, BOTH SIDES AT 10' SPACING (TYP.)

21

INSTALL W10-11a "73 FEET MAST ARM"

22

STANDARD MEDIAN NOSE PER CITY OF TURLOCK STANDARDS, DWG. NO. ST-17

23

21 L.F. ~ 12" WHITE LIMIT LINE

24

20 L.F. ~ DETAIL 39

25

12" WHITE LIMIT LINE

26

INSTALL W10-11a "45 FEET MAST ARM"

27

99 L.F. ~ DETAIL 40A

28

115 L.F. ~ DETAIL 40A

29

179 L.F. ~ DETAIL 40A

30

212 L.F. ~ DETAIL 40A

31

PLACE "RAILROAD CROSSING" (70 S.F.)

32

INSTALL R4-4

33

INSTALL R3-7R

34

INSTALL W10-2 (RT)

35

INSTALL W4-5

36

INSTALL R8-8

37

33 L.F. ~ 24" WHITE LIMIT LINE

38

PLACE 24" WHITE CROSSWALK (263 S.F.)

39

27 L.F. ~ DETAIL 39

40

24 L.F. ~ 24" WHITE LIMIT LINE

41

30 L.F. ~ DETAIL 10

42

290 L.F. ~ DETAIL 27B

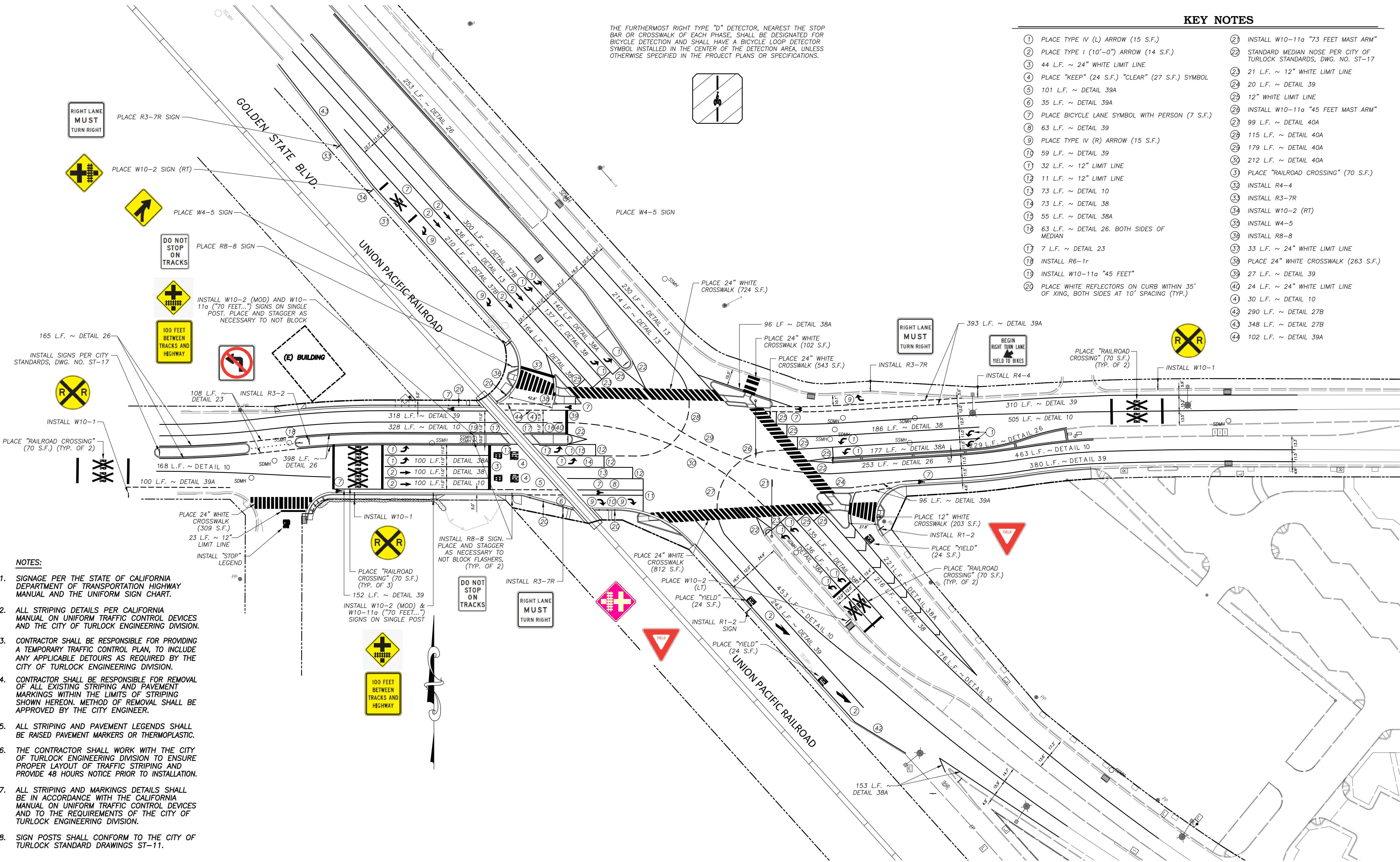
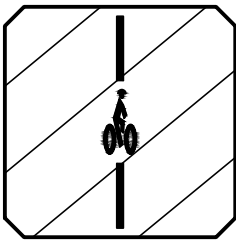
43

348 L.F. ~ DETAIL 27B

44

102 L.F. ~ DETAIL 39A

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NOTES:

1. SIGNAGE PER THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION HIGHWAY MANUAL AND THE UNIFORM SIGN CHART.
2. ALL STRIPING DETAILS PER CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND THE CITY OF TURLOCK ENGINEERING DIVISION.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A TEMPORARY TRAFFIC CONTROL PLAN, TO INCLUDE ANY APPLICABLE DETOURS AS REQUIRED BY THE CITY OF TURLOCK ENGINEERING DIVISION.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL OF ALL EXISTING STRIPING AND PAVEMENT MARKINGS WITHIN THE LIMITS OF STRIPING SHOWN HEREON. METHOD OF REMOVAL SHALL BE APPROVED BY THE CITY ENGINEER.
5. ALL STRIPING AND PAVEMENT LEGENDS SHALL BE RAISED PAVEMENT MARKERS OR THERMOPLASTIC.
6. THE CONTRACTOR SHALL WORK WITH THE CITY OF TURLOCK ENGINEERING DIVISION TO ENSURE PROPER LAYOUT OF TRAFFIC STRIPING AND PROVIDE 48 HOURS NOTICE PRIOR TO INSTALLATION.
7. ALL STRIPING AND MARKINGS DETAILS SHALL BE IN ACCORDANCE WITH THE CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND TO THE REQUIREMENTS OF THE CITY OF TURLOCK ENGINEERING DIVISION.
8. SIGN POSTS SHALL CONFORM TO THE CITY OF TURLOCK STANDARD DRAWINGS ST-11.

NOTE:
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CITY OF TURLOCK
DEVELOPMENT SERVICES
ENGINEERING DIVISION
156 S. BROADWAY, STE 150
(209) 668-5520

STRIPING AND SIGNAGE PLAN
FULKERTH ROAD/HAWKEYE AVENUE ~ BEGIN TO STA. 13+00
CAPITAL PROJECT NO. 14-28
INTERSECTION IMPROVEMENTS AT
GOLDEN STATE BLVD. AND FULKERTH ROAD

VERIFY SCALE
BAR IS 1" ON ORIGINAL DRAWING
0 1/4" 3/4" 1"
1/2"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DRAWN BY: AZ
REV. BY: --
CH. BY: SRF
DATE: DECEMBER, 2016
SCALE: 1"=40'
14-28 BASE.dwg

SHEET

16

OF 20



