BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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Application of the Metro Gold Line Foothill Extension Construction Authority for an order authorizing construction of two light rail tracks, and alteration of two commuter rail tracks and two freight tracks, at two (2) highway-rail crossings at (1) at Garey Avenue, and (2) Fulton Road in the Cities of Pomona and La Verne in Los Angeles County, California.	Application _____

APPLICATION

SUBMITTED BY THE METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY

The Metro Gold Line Foothill Extension Construction Authority (Authority), acting for and on behalf of Los Angeles County Metropolitan Transportation Authority (LACMTA), files this application and respectfully requests authorization from the Public Utilities Commission of California (CPUC or Commission) to construct two Light Rail Transit (LRT) tracks and alterations for two existing Southern California Regional Rail Authority (SCRRA) commuter rail tracks and up to two freight transit (FRT) tracks, for two at-grade highway-rail grade crossings located at:

1. Garey Avenue (City of Pomona)
2. Fulton Road (Cities of Pomona and La Verne)

In support of its request, the Authority asserts:

I (Applicant Information)

The Metro Gold Line Foothill Extension Construction Authority (Authority) was created by the legislature pursuant to Section 132400 et seq. of the Public Utilities Code of the State of California (PU Code) to award and oversee all design and construction contracts for completion of the Los Angeles - Pasadena Foothill Extension Gold Line light rail project extending from Union Station in the City of Los Angeles to Sierra Madre Villa (Madre Street) in the City of

Pasadena (known as Phase I) and any mass transit guideway planned east of Sierra Madre Boulevard along the former Atchison Topeka and Santa Fe Railway right-of-way extending to the City of Montclair in the County of San Bernardino (known as Phase II).

The authority sought in this application is requested pursuant to Section 9.08 of the Commission General Order 143-B and is made in accordance with Rule 3.9 of the Commission's Rules of Practice and Procedure.

II (Applicant Address)

Applicants' exact legal name is Metro Gold Line Foothill Extension Construction Authority with its principle place of business at:

406 East Huntington Drive, Suite 202

Monrovia, California 91016

III (Correspondence)

Correspondence in regard to this application should be addressed to:

Mr. Christopher Burner

Chief Project Officer

Metro Gold Line Foothill Extension Construction Authority

406 East Huntington Drive, Suite 202

Monrovia, CA 91016

626-305-7022

cburner@foothillgoldline.org

IV (Crossing Ownership)

Pursuant to Sections 132425 and 132430 of the PU Code, LACMTA has transferred to the Authority all real and personal property, and other assets, as well as the unencumbered balance of all local funds accumulated for completion of the project. Phase I of the project extended from Union Station to Sierra Madre Villa and was turned back to LACMTA for operation in July 2003. Phase II, Segment A of the project extended from Sierra Madre Villa to Glendora was completed and turned back to LACMTA for operation in September 2015. Phase II, Segment B of the project extends from Glendora to Montclair and is currently under design.

The Authority owns the railroad right-of-way through the Trust Agreement between the LACMTA and the Authority and has the right to occupy and construct on the property, including the subject crossings within the railroad right-of-way formerly owned by the Atchison Topeka and Santa Fe (AT & SF) Railway, now known as the Pasadena and San Gabriel Subdivisions.

V (Interested Parties)

The LACMTA was created by the legislature pursuant to Section 130050.2 of the PU Code to be the successor agency to the Southern California Rapid Transit District and the Los Angeles County Transportation Commission (LACTC), and which two agencies ceased to exist as of April 1, 1993.

Pursuant to Section 132400, et seq. of the PU Code, the Authority is proceeding with contracting for completion of the design and the construction of the 12.3-mile Phase II Segment B of the Metro Gold Line between the interim terminal station at Citrus Avenue and the eastern boundary of the City of Montclair in San Bernardino County. Upon completion of Phase II Segment B, LACMTA will maintain and operate the LRT system including the San Bernardino County segment.

Southern California Regional Rail Authority (SCRRA), acting on behalf of its member agency the LACMTA, is responsible for the dispatch and maintenance of the active freight tracks, signal and crossings along the Pasadena Subdivision and San Gabriel Subdivision. BNSF railway operates typically one round-trip freight train each weekday (excluding Saturdays and Sundays), to serve customers over the Pasadena and San Gabriel Subdivision.

On February 21, 2018, on-site field crossing diagnostics were conducted with interested parties, including members from LACMTA, SCRRA, BNSF railway, City Pomona, City of La Verne, CPUC, and the Authority. The interested parties did not object to the application. Meeting minutes from the crossing diagnostic meetings are documented in Exhibit H.

The Authority, LACMTA, SCRRA, BNSF railway, City of Pomona, City of La Verne and CPUC are considered interested parties for document service purposes.

VI (Project Description)

The Metro Gold Line Foothill Extension project Phase II, is approximately 24 miles in length and constructed in two segments. This first segment, Segment A, continued the Metro Gold Line from East Pasadena for approximately 11.5 miles of double LRT tracks with six (6)

stations located in the cities of Arcadia, Monrovia, Duarte, Irwindale, and Azusa, and a Maintenance Operations Campus in Monrovia within the County of Los Angeles. Segment A was completed and turned back to LACMTA for operation in September 2015.

The second segment, Segment B is currently under design and crossings are subject to this application. Segment B continues the Metro Gold Line from its current terminus in Azusa for approximately 12.3 miles of double LRT track with six (6) stations located in the cites of Glendora, San Dimas, La Verne, Pomona, and Claremont in the County of Los Angeles and City of Montclair in the County of San Bernardino. Segment B will also improve and relocate approximately 10.4 miles of FRT track and 1.9 miles of SCRRA track to allow room for the LRT tracks.

East of Citrus Avenue, the right-of-way will continue as a shared corridor with both LRT and FRT operations utilizing their separate designated tracks. Continuing eastward, the existing FRT tracks will be relocated south within the ROW (right-of-way) to make room for the dual LRT tracks and one LRT station (Glendora) to the north half of the typical 100-foot ROW until Lone Hill Avenue. At Lone Hill Avenue LRT will be grade separated above the FRT tracks & roadway and FRT will continue at-grade but will be relocated and re-aligned south-to-north within the ROW to continue rail service for customers, typically one round-trip per day. The LRT will transition from north of the ROW to the south as well to service three LRT Stations (San Dimas, La Verne, and Pomona).

The LRT tracks remain south of FRT tracks within the railroad ROW to approximately Towne Avenue, where FRT transitions from north to south within the ROW to join the San Gabriel Subdivision west of Cambridge Avenue at approximate FRT MP 32.15. Within the San Gabriel Subdivision the exist SCRRA tracks will be relocated to the south of the ROW to make room for the dual LRT tracks and two LRT stations (Claremont and Montclair). The SCRRA commuter rail/freight tracks remain at-grade through the transition to end the project in Montclair.

LRT remains to the north of the typical 100-foot right of way until the terminus point in Montclair. The SCRRA commuter rail/freight tracks are separate and independent of the LRT system, except for the integrated gates and signals operations at the at-grade highway rail crossings.

Once the crossings are complete, LACMTA will operate on and maintain two LRT tracks. SCRRA will continue to maintain the FRT track and signal equipment for BNSF operations on the Pasadena Subdivision and two SCRRA main line tracks and signal equipment on the San Gabriel Subdivision until the terminus point of the Gold Line in Montclair. SCRRA commuter and FRT service continue easterly.

This application is for the construction and alteration of the Garey Avenue and Fulton Road highway-rail crossings of approximately 50 crossings of Segment B of the project. Additional crossings are subject of separate CPUC approvals. The construction of the project including the subject crossings is expected to begin during the year 2019, with revenue service projected in 2027.

VII (Crossing Descriptions)

The Authority requests authorization to construct two (2) at-grade highway rail crossings in the Cities of Pomona and La Verne, County of Los Angeles. The proposed CPUC identification numbers and crossing types are summarized in Table 1 below:

Table 1 – Crossings Subject to Approval

No.	Crossing	PUC Numbers	Clearances	Summary of Equipment
1	Garey Avenue	LRT 84P-34.28-B FRT 101PA-106.60 DOT 026185J SCRRA 101SG-31.2 DOT 747335F	LRT Grade Separation Minimum 16.5-ft. from roadway to LRT structure Typical 15-ft. from crossing equipment to track centerline	CPUC No 9 entry gates and exit gate, raised medians, CPUC No 9 Pedestrian gates, swing gate and Channelization
2	Fulton Road	LRT 84P-33.86 FRT 101PA-107.10 DOT 026186R SCRRA 101SG-30.79 DOT 747331D	Typical 19-ft. to overhead catenary wire Typical l0-ft. to l5-ft. from crossing equipment to track centerline	CPUC No 9 entry and exit gates, raised medians, CPUC No 9 Pedestrian gates, swing gate and Channelization

Standard Highway Rail Safety Equipment

Standard highway-rail safety equipment for at-grade crossing include a minimum of:

1. Commission Standard No. 9 automatic (automotive) gates with flashing lights;
2. Where specified, Commission Standard No. 9E automatic "Exit" gates with flashing lights and loop protection
3. Raised curb medians typically 100-feet in length with “No U-turn” signs, and raised medians between LRT and SCRRA/FRT tracks as space permits;
4. Commission Standard No. 9 automatic pedestrian gates with flashing lights, bells, and emergency swing gates;
5. Advance preemption and automatic train protection and for the at-grade crossing equipment;
6. Raised pavement markers and striping along pedestrian crossing/road edge;
7. Handrails and fencing to channelize pedestrians to the designated crossing;
8. Detectible warning strips, appropriate pavement and “wait here” striping; and
9. Standard California Manual on Uniform Traffic Control Devices (CA-MUTCD) rail crossing signage, such as the “RAILROAD CROSSING” Cross-buck sign referred as R15-1, number of rail tracks sign referred to as R15-2, and pavement markings.

Reference Exhibit C drawings GXT-001 through GXT-006 for crossing details.

The Authority is evaluating the detectable directional tile as shown in Detail A of the GXT-006 and GG-series drawings. Should the white detectable directional tile not be warranted or not approved by Metro and SCRRA, the project will include the standard white striping in place of the detectable directional tile for the pedestrian crossing.

Garey Avenue Crossing Discussion

The Garey Avenue crossing contains the north LRT grade separation/FRT crossing (DOT 02185J) and the south SCRRA dual track crossing (DOT 747335F), with crossing signal interconnection to prevent queuing onto adjacent tracks. The distance between the SCRRA and FRT tracks are adequate for the design vehicle (WB-65 truck), and the crossing can continue to operate with (2) separate Standard No. 9 entrance gates located prior to each set of SCRRA and FRT tracks (not a "sealed" single crossing). The south SCRRA crossing activation will initiate both the SCRRA entrance gate and FRT entrance gates to prevent vehicles from continuing onto adjacent tracks. Similarly, the north FRT crossing activation will initiate the FRT entrance gates and SCRRA entrance gates. The FRT tracks will receive new Standard No. 9 entrance gates.

Garey Avenue

The Garey Avenue (84P-34.28-B, DOT 026185J) highway-rail crossing alterations include grade separation of the two Light Rail Transit (LRT) tracks and additional highway-rail and pedestrian crossing safety equipment for the at-grade Freight Rail (FRT) tracks. One of the three existing FRT tracks will be removed, resulting in two FRT tracks shifted to the north of the right-of-way to allow room for the LRT grade separated bridge on the south. Los Angeles County Metropolitan Transportation Authority (LACMTA) is responsible for operations and maintenance of the LRT grade separated bridge and Southern California Regional Rail Authority (SCRRA) will be responsible FRT tracks.

The existing two-lane Santa Fe Street just south of the crossing will be reduced to a one-way street only for eastbound traffic, turning right onto southbound Garey Ave. A raised median will extend over 100-feet south of the SCRRA Metrolink crossing to prevent left turns into or out of Santa Fe Street. An existing raised median north of the FRT crossing is over 700-feet extending to Bonita Avenue. An existing median is also south of the FRT crossing, between the FRT and SCRRA Metrolink tracks. Railing is included in the raised medians to further prevent illegal pedestrian crossing near the tracks. The east side maintenance road and driveway will remain between the tracks.

The Garey Avenue (DOT 747335F) highway-rail crossing alterations include additional pedestrian crossing safety equipment for the existing at-grade SCRRA Metrolink tracks. The pedestrian safety equipment includes automatic pedestrian gates, emergency swing gates,

detectible warning strips, appropriate pavement and "wait here" striping, and CA-MUTCD signage. A Standard 9E exit gate will be included at the south-west quadrant of the SCRRA Metrolink crossing. SCRRA will continue to be responsible for the crossing maintenance.

The Garey Avenue crossing will include the standard highway-rail safety equipment *(Standard No. 9 gates, No. 9E exit gate, raised medians, pedestrian gates, and CA-MUTCD signage/striping)*. The driveways and intersections adjacent to the Garey Avenue crossing have been evaluated for truck turning movements and turning movements and do not affect crossing safety. See Exhibit D drawings for details of crossing equipment, street improvements, and signing and striping.

Fulton Road Crossing Discussion

The Fulton Road Crossing contains the north dual track LRT/ single track FRT crossing (DOT 026186R) and the SCRRA dual track crossing (DOT 747331). Currently the Fulton Road crossing contains separate crossing gates for both FRT and SCRRA, such that northbound motorists may clear the SCRRA tracks but stop for FRT train, and southbound motorist clear the FRT track but stop for SCRRA trains.

With addition of the LRT tracks, the distance between the SCRRA and LRT/FRT tracks are not adequate for the design vehicle (WB-65 truck) to function with two (2) separate Standard No. 9 entrance gates, and the Fulton Road crossing will be modified to operate as a "sealed" single crossing. The existing standard No. 9 entrance gates located southbound prior to the SCRRA and northbound prior to the FRT tracks will be removed, and there will not be gates between the tracks to allow for motorists to clear through the crossing. A new entrance gate will be provided prior to the FRT tracks for southbound motorists and prior to the SCRRA tracks for northbound motorists.

Due to the unique configuration of the Fulton Road crossing, the *Fulton Road At-grade Safety Report* was conducted to ensure safe at-grade operations (See Exhibit G). In summary, the Fulton Road report recommended installing an automatic gate at the parking lot driveway to prevent motorists from crossing the tracks during crossing activation.

Fulton Road

The Fulton Road (84P-33.86, DOT 026186R) highway-rail at-grade crossing alterations include addition of two LRT tracks adjacent to the existing FRT track, and additional highway-rail and pedestrian crossing safety equipment for the existing two at-grade SCRRA Metrolink commuter rail tracks (DOT 747331D). The existing FRT track (DOT 026186R) will be relocated to the northside of the right-of-way to allow room for the two new LRT tracks on the south. There are 30-foot track centers between the FRT track and LRT track number 2. Fulton Road will operate as a "sealed" crossing and there will not be (interior) Standard No. 9 crossing gates located between the tracks for motorists, except the crossing gate at the east parking lot driveway. The Fulton Road crossing will include the standard highway-rail safety equipment *(Standard No. 9 gates, exit gates, raised medians, pedestrian gates, and CA-MUTCD signage/striping).* Raised medians will be located between the tracks, north, and south of the crossing. The two (2) existing SCRRA Metrolink commuter rail tracks south of the crossing will remain and will generally be upgraded with median, exit gate and pedestrian crossing treatments including Standard No. 9 pedestrian crossing gates across each set of tracks. A pedestrian sidewalk will also be installed on the westside of Fulton Road. See Exhibit E drawings for details of crossing equipment, traffic signal, street improvements, and signing and striping.

A signalized crosswalk will be located between the LRT/FRT tracks and SCRRA tracks, to allow pedestrians to cross Fulton Road. The traffic signals at the crossing will be interconnected to the crossing to stop northbound, southbound and driveway motorists prior to entering the crossing. The southbound traffic signal and presignal includes advance preemption that will control the presignal to stop southbound motorists prior to the tracks and clearing motorists within crossing, should motorists stop within the crossing or crosswalk for pedestrian activity. The traffic signal will also stop northbound and southbound motorists prior to the tracks to allow for pedestrian crossing. See Exhibit F drawings for details of crossing preemption calculations and signal timing.

The existing stop sign controlled SCRRA parking lot driveway between the tracks is restricted to right turns in and out, and is provided with a traffic signal, raised median and crossing gate to prevent right turns during crossing preemption. "Keep Clear" pavement markings are located between the sets of SCRRA and LRT/FRT tracks to help ensure motorists do not stop between the tracks.

The Design-Build Contractor

The Authority will award a design-build contract to advance the design, construct the crossing and support the Authority with coordination among crossing stakeholders and CPUC as necessary. The design-builder must not compromise crossing safety of the designs documented in this application. The design-build contractor will advance designs following required standards and provide a compliance submission of 100% design level drawings to the stakeholders no later than 60 days prior to commencing crossing construction. The compliance submission will serve to ensure safety is not compromised, such that:

- Crossing gates, traffic signals, signs and other equipment locations may be adjusted, but cannot result in equipment removal or restrict visibility as specified in Note 2 of the traffic signal drawings;
- Drainage, utilities, street grade, track profiles, alignment, and other preliminary designs provided in this application must be finalized to determine final locations for crossing and traffic equipment, and if additional safety measures are necessary;
- Width of traffic lanes, crossing, crosswalks, sidewalks, medians, and similar features maybe adjusted, but cannot compromise the minimum width required by design criteria, CA-MUTCD, ADA or other requirements without prior approval;
- Additional safety enhancements such as additional traffic signals heads, signage, striping, etc. maybe considered;
- Railroad flashers must be adequate to warn in the directions of oncoming pedestrians and motorists as shown in GXD-***.01 drawings;
- Final traffic signals designs, specifications, phasing, timing, preemption, interconnection, etc. must be provided for both 100% design and the as-built configuration;
- Pavement markings and striping to be complaint with CA-MUTCD, city and design criteria requirements, and documented analysis and approval if criteria cannot be met;
- Landscaping, walls, fencing, channelization, LRT bridges, and other features near crossings must not interfere with line of sight or result in other safety concerns;

No significant changes to the CPUC approved crossing designs can be made without securing CPUC staff approval. In the event the design-build contractor does not comply with the abovementioned bullets and significantly changes the crossing safety design approved by the CPUC, the design-build contractor must attain formal CPUC modification approval or reconstruct the crossing to meet CPUC approved plans.

IX (Public Benefit)

As required by the CPUC Rules of Practice and Procedures 3.7c, the public will benefit from the delivery of supplementary public transportation by extending the Metro Gold Line Foothill Extension LRT from Azusa to Montclair, resulting in lower greenhouse gas effects and reducing traffic congestion in the San Gabriel Valley and Inland Empire. The proposed crossings improvements, in connection with the LRT service, will increase safety and provide transportation benefits to system users.

X (Grade Separation Practicability)

Grade separation is proposed for the two LRT tracks at Garey Ave. The primary reason grade separation is not practicable for the existing at-grade Fulton Road crossing is the location of the adjacent LRT Pomona Station, limiting the grades and profiles of the LRT alignments. Additionally, there is restricted distance between Fulton Road crossing and existing roads, residences, and the clearance requirements. The at-grade crossing is in the immediate proximity (less than 50 feet) to the existing streets, neighboring homes, parking lot and existing buildings that result in constraints and prevent grade separation. The adjacent access needed for the grade separation may prevent access to neighboring residences, buildings etc.

The existing SCRRA and FRT operations is at-grade and has not resulted in accident as referenced in the FRA crossing inventory. The project has significantly considered grade separations and is providing several grade separations for the LRT alignment. Additionally, the traffic at Fulton Road has been evaluated and analysis results in safe at-grade operation.

XI (Authorization)

This application requests authorization for alterations of two (2) highway-rail crossings. In general, the application request provides addition of two (2) LRT tracks for the existing at-grade crossings, therefore, authority sought in this application is requested pursuant to PU Code 99152 and is made in accordance with Rule 3.7 through 3.11 of the Commission's Rules of Practice and Procedure.

XII (Environmental clearance)

In accordance with CPUC Rules of Practice and Procedure 3.9(a), the project's Final Environmental Impact Report (FEIR) for Segment A&B extension was certified in 2013. A copy of the letter of transmittal of the FEIR to the State and the Gold Line Foothill Extension Board of Director's certification of the FEIR is attached as Exhibit I.

A copy of the full FEIR, including addenda are also provided in attached the one (1) Archival Grade DVD and copies to six (6) CD-ROMs attached as Exhibit I. Alterations of the subject crossing requested herein are within the scope of the FEIR cited above. If there are changes to the FEIR, the revised requirements will be incorporated by an addendum.

XIII (Exhibits)

The Following Exhibits are transmitted as required by the CPUC Rules of Practice and Procedures 3.7:

Exhibit A: Vicinity map showing the crossings in relation to the existing roads

Exhibit B: Aerial intersection map

Exhibit C: Typical At-Grade Pedestrian Crossing Details

Exhibit D: Garey Avenue Grade Crossing Drawings

Exhibit E: Fulton Road Grade Crossing Drawings

Exhibit F: Fulton Road Preemption Time Details

Exhibit G: Fulton Road At-Grade Safety Study

Exhibit H: Meeting Minutes from Crossing Diagnostic (agreement of interested parties)

Exhibit I: The Final Environmental Impact Report (FEIR) legal description letter, FEIR copied to one (1) Archival Grade DVD and FEIR copied to six (6) CD-ROMs

Exhibit J: The Scoping Memo Information for the Application.

XIV (Temporary Traffic Controls)

The design-build contractor will be responsible in meeting the terms and conditions of the prescriptive specifications of the contract that will require submittal of a Traffic Maintenance Plan design that maintains traffic movements, private entrance access, safety mitigations and minimizes congestion. The Traffic Maintenance Plan shall comply with all applicable rules including CPUC General Orders and temporary traffic controls as described in the CA-MUTCD, as amended.

XV (Order)

WHEREFORE, the Metro Gold Line Foothill Construction Authority respectfully requests that the California Public Utilities Commission (CPUC) issue an order authorizing:

1. The Metro Gold Line Foothill Construction Authority (Authority) to construct the two (2) highway-rail grade crossings consisting of two Los Angeles County Metropolitan Transportation Authority (LACMTA) light rail transit (LRT) tracks and alterations of the existing at-grade freight and Southern California Regional Rail Authority (SCRRA) Metrolink commuter rail tracks.
2. The crossings shall have the configurations described and specified in this application and its attachments. The crossings shall be identified by the following CPUC and Department of Transportation (DOT) Crossing Numbers:

No.	Crossing	Configuration	CPUC Number	DOT Number
1	Garey Avenue	Two LRT tracks grade separated Existing at-grade crossings for two FRT tracks and two SCRRA tracks	LRT 84P-34.28-B FRT 101PA-106.60 SCRRA 101SG-31.2	026185J 747335F
2	Fulton Road	Two LRT tracks at-grade Existing at-grade crossings for one FRT track and two SCRRA tracks	LRT 84P-33.86 FRT 101PA-107.10 SCRRA 101SG-30.79	026186R 747331D

3. The Metro Gold Line Foothill Extension Construction Authority shall have its design-build contractor provide a compliance filing of 100% design level drawings for the at-grade crossings to the CPUC's Safety and Enforcement Division, Rail Crossings and Engineering Branch no later than 60 days prior to commencing construction. The compliance filing will serve to demonstrate conformance with the crossing designs approved in this Order.
4. Requests that the authorization shall be effective for five (5) years, unless time is extended.

Dated this 26th day of July, 2018 at Monrovia, California by:

Christopher Burner

Chief Project Officer

CERTIFICATE OF SERVICE

I, Christopher Burner, certify on behalf of Metro Gold Line Foothill Extension Construction Authority, that this application with attachments is served to the interested parties on the below service list by e-mail as specified by Rule 1.9 of the Commission's Rules of Practice and Procedure.

I declare, under penalty of perjury, that the foregoing is true and correct.

Dated this 26th day of July, 2018 at Monrovia, California by:

Christopher Burner
Chief Project Officer

Mathew Bond California Public Utilities Commission 320 W. Fourth Street, Suite 500 Los Angeles, CA 90013 mathew.bond@cpuc.ca.gov	Jose Pereyra California Public Utilities Commission 320 W. Fourth Street, Suite 500 Los Angeles, CA 90013 jose.pereyra@cpuc.ca.gov
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Tiera Adams BNSF 740 East Carnegie Dr. San Bernardino, CA 92408 Tiera.Adams@BNSF.com	Walter Smith BNSF 740 East Carnegie Dr. San Bernardino, CA 92408 Walter.Smith1@BNSF.com

VERIFICATION

I, Christopher Burner, an employee of applicant, Metro Gold Line Foothill Extension Construction Authority, and authorized to make this verification on its behalf. The statements in the foregoing document are true to my own knowledge, or believed, by myself, to be true.

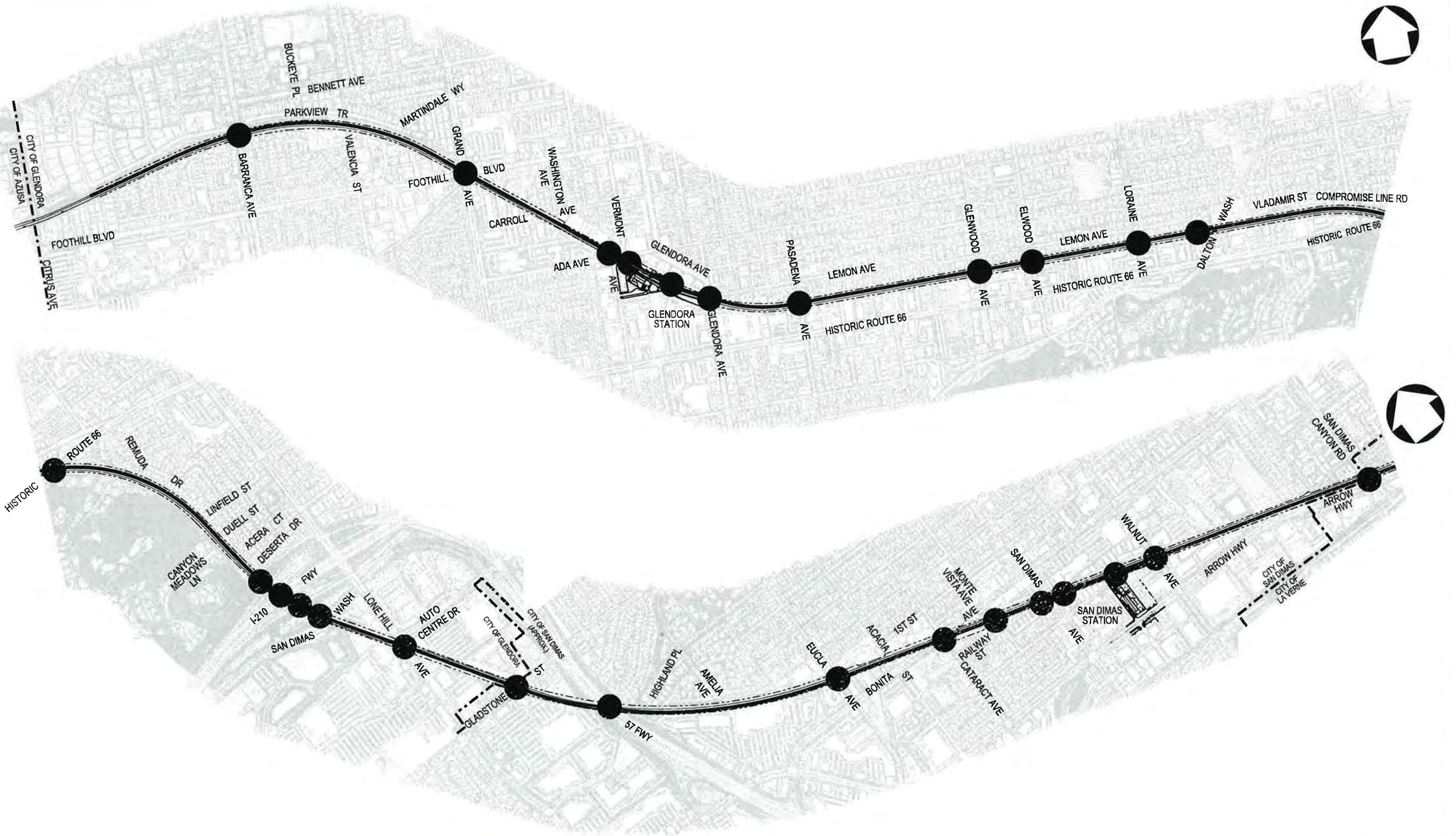
I declare under penalty of perjury that the foregoing is true and correct.

Dated this 26th day of July, 2018 at Monrovia, California by:

Christopher Burner
Chief Project Officer
Metro Gold Line Foothill Extension Construction Authority
406 E. Huntington Drive, Suite 202
Monrovia, CA 91016
cburner@foothillgoldline.org

Exhibit A:

Vicinity Map



REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

Hill International
406 E. HUNTINGTON, SUITE 202
MONROVIA, CA 91016 - 3633

METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

VICINITY MAP 1 OF 2

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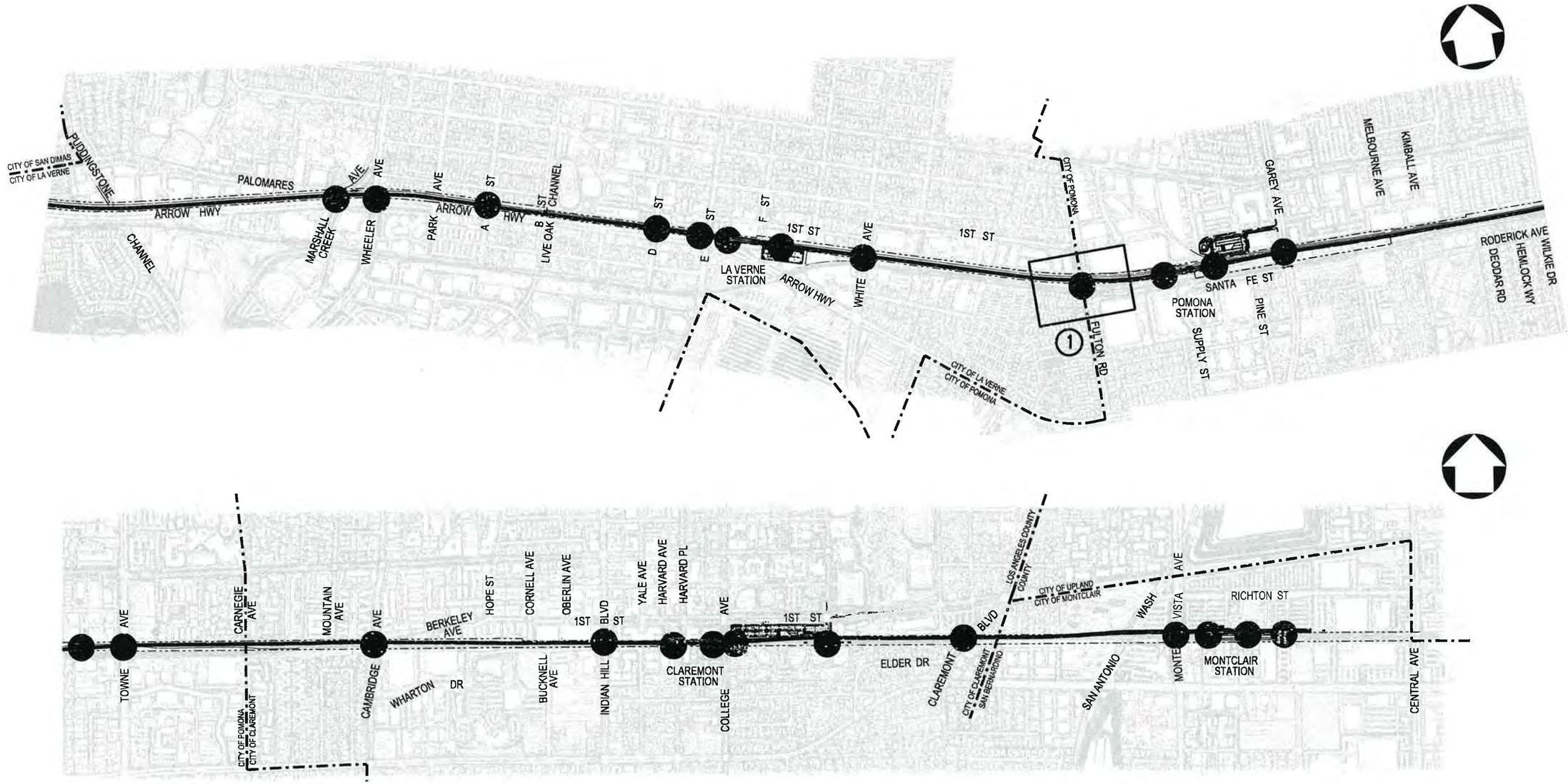

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METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

VICINITY MAP 2 OF 2

DRAWING NO: G-202
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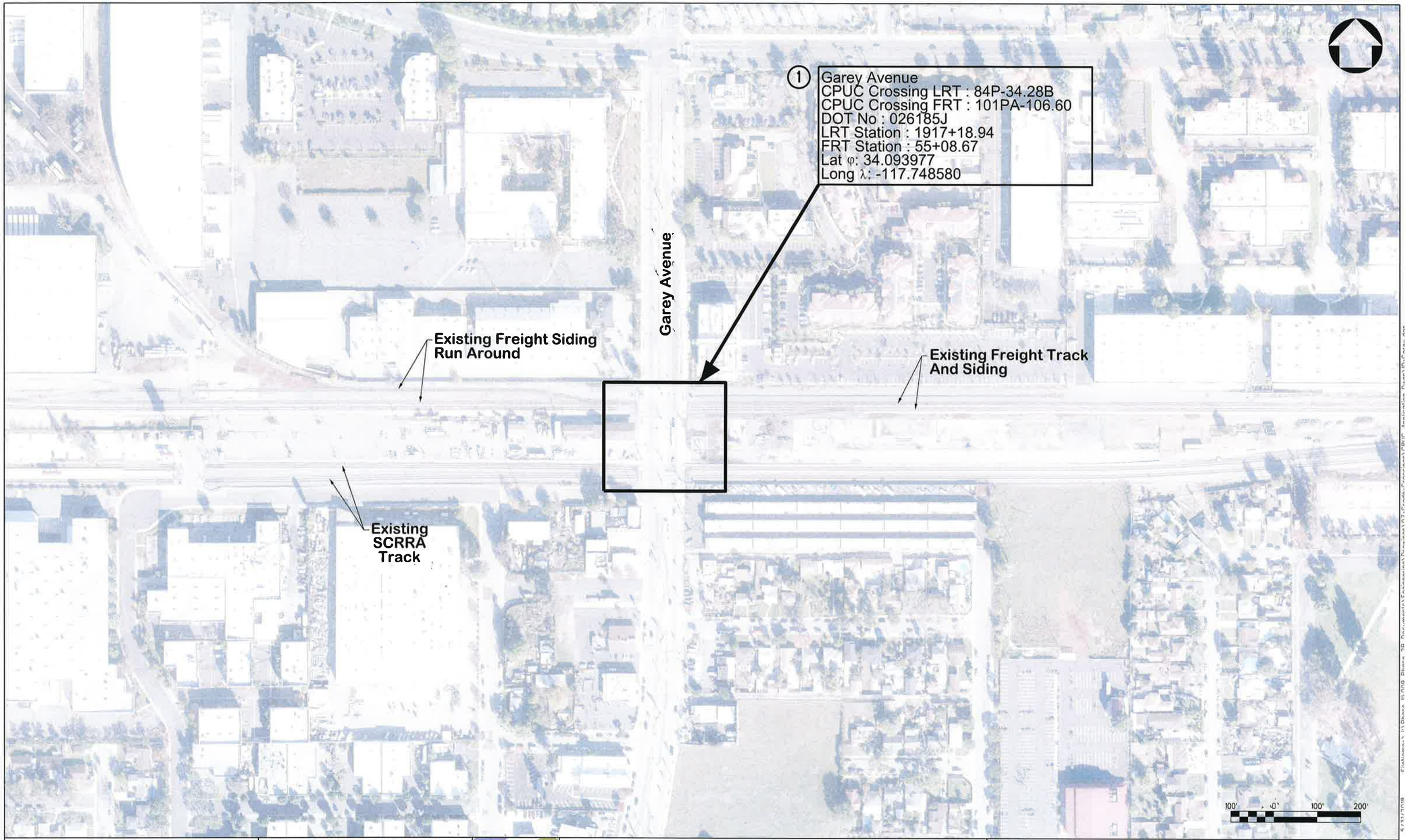
Exhibit B:

Aerial Intersection Description Maps



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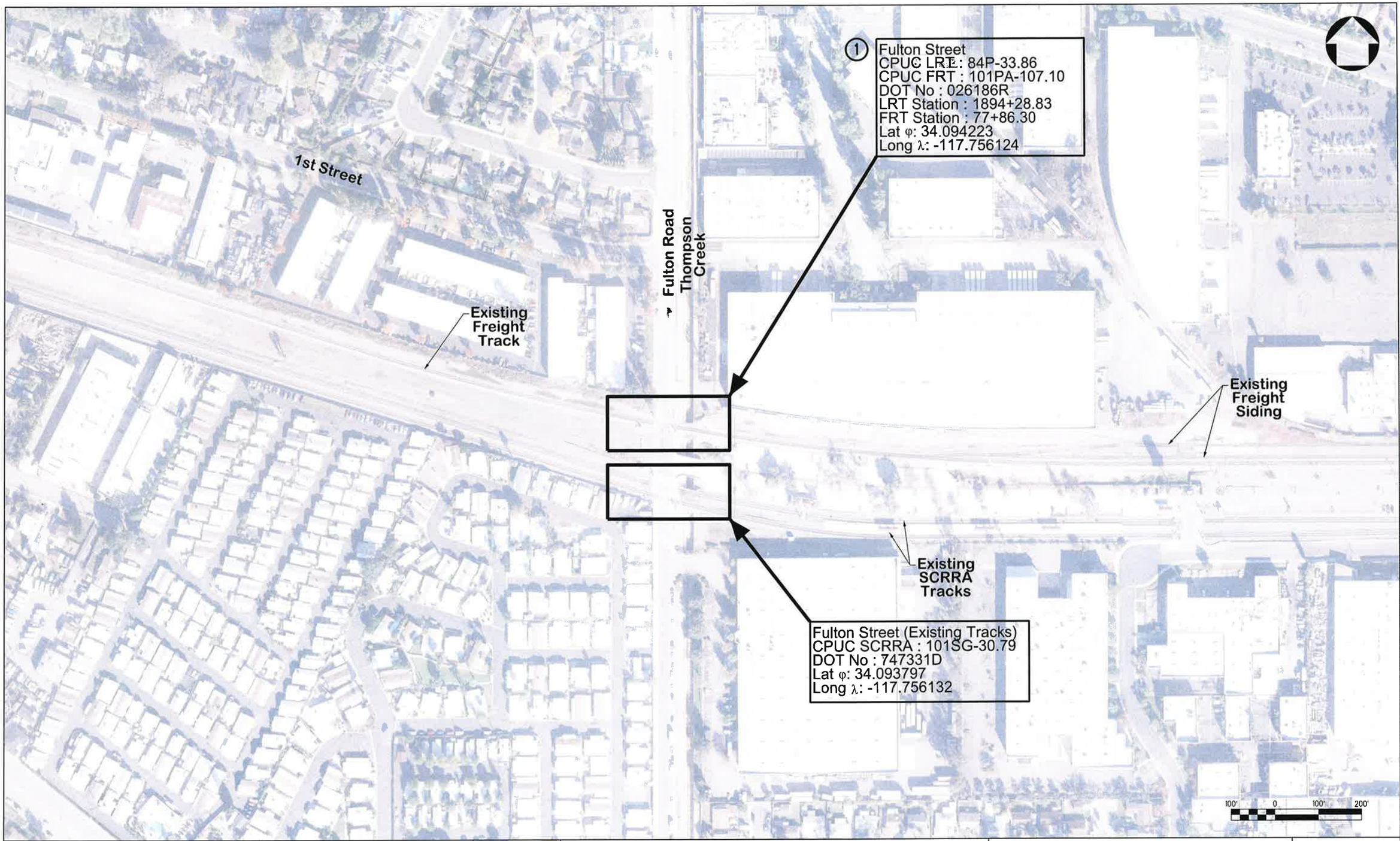
MONROVIA, CA 91016 - 3633

METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

INTERCEPTION DESCRIPTION
GAREY AVENUE

DRAWING NO: ID-GAREY
REV:
SHEET NO:



REVISIONS				
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REV.	DATE	DESCRIPTION	DES.	ENG.

HILL
Hill International
406 E. HUNTINGTON, SUITE 202
MONROVIA, CA 91016 - 3633

METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
JULY 23, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

INTERSECTION DESCRIPTION
FULTON ROAD

DRAWING NO: ID-FULTON
REV: C
SHEET NO:

Exhibit C:

Typical At-Grade Crossing Details

(GXR-001, GXT-001, 002, 003, 004 & 006)

CONSTRUCTION NOTES

GRADE CROSSINGS

1. CPUC STANDARD NO. 8 FLASHING LIGHT SIGNAL ASSEMBLY
2. CPUC STANDARD NO. 9 FLASHING LIGHT SIGNAL ASSEMBLY
3. CPUC STANDARD NO. 9 FLASHING LIGHT SIGNAL ASSEMBLY WITHOUT AUDIBLE DEVICE
4. CPUC STANDARD NO. 9E FLASHING LIGHT SIGNAL
5. CPUC STANDARD NO. 9A FLASHING LIGHT SIGNAL ASSEMBLY WITH OVERHEAD FLASHING LIGHT SIGNALS ON A CANTILEVERED MAST ARM WITH GATE
6. 4' WIDE EMERGENCY SWING GATE
7. RAILROAD CONCRETE PANELS
8. TACTILE TILE
9. 12" 'WAIT HERE' AREA STRIPING
10. DIRECTIONAL NOISE SHROUD
11. DIRECTIONAL TILE
12. RAILING
13. TRAFFIC LOOP
14. BALLAST #5
15. UNEVEN FINISH TEXTURE TBD
16. RETAINING WALL
17. SOUNDWALL
18. FIRE HYDRANT
19. BOLLARD
20. LANDSCAPE AREA
21. DURA CURB (ON CURB)

STREET IMPROVEMENTS

31. INSTALL RAISED MEDIAN
32. CURB AND GUTTER
33. CURB AND GUTTER (MEDIAN)
34. CURB ONLY
35. CONCRETE CURB AND GUTTER W=XX AND CF=XX PER PLAN
36. CROSS AND LONGITUDINAL GUTTERS
37. CONCRETE SIDEWALK
38. STAMPED CONCRETE
39. CURB RAMP
40. DRIVEWAY
41. PORTLAND CEMENT CONCRETE PAVEMENT
42. ASPHALT CONCRETE PAVEMENT ON BASE
43. AGGREGATE BASE
44. AC MILL AND OVERLAY
45. PROTECT IN PLACE

SIGNING AND STRIPING

51. EXISTING TO REMAIN
54. INSTALL SIGN ON EXISTING SIGN POST
55. PAINTED RED CURB
56. INSTALL SIGN AND POST
57. INSTALL SIGN ON POLE
58. INSTALL RAILROAD CROSSING SYMBOL
59. INSTALL PAVEMENT MARKING PER CALTRANS STANDARD PLANS A24C, A24D AND A24E
60. PAINT MEDIAN NOSE - YELLOW
61. INSTALL 24" LIMIT LINE
62. INSTALL YIELD LINE
63. INSTALL 12" WHITE CHEVRON STRIPE
64. INSTALL 12" SOLID YELLOW STRIPE PER CALTRANS /CITY STANDARD PLANS
65. INSTALL 4" SOLID WHITE STRIPE PER CALTRANS STANDARD PLANS
66. INSTALL 12" SOLID WHITE LINE PER CALTRANS STANDARD PLANS
67. INSTALL TYPE I ARROW PER CALTRANS STANDARD PLANS
68. INSTALL TYPE IV (L) OR (R) ARROWS PER CALTRANS STADNARD PLANS
69. INSTALL TYPE VI (L) OR (R) ARROWS PER CALTRANS STANDARD PLANS
70. INSTALL TYPE VII (L) OR (R) ARROWS PER CALTRANS STANDARD PLANS
71. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20A DETAIL 5
72. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20A DETAIL 8
73. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20A DETAIL 11
74. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 28
75. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20A DETAIL 22
76. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 29
77. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 32
78. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20D DETAIL 38
79. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20D DETAIL 38B
80. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 25A OR DETAIL 26
81. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 27B
82. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20D DETAIL 40
83. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20A DETAIL 9
84. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20D DETAIL 39 OR DETAIL 39A
85. INSTALL STRIPE PER CALTRANS STANDARD PLANS A20C DETAIL 37B

REMOVAL NOTES:

52. REMOVE CONFLICTING STRIPING AND RAISED PAVEMENT MARKERS BY WET SANDBLASTING

STREET SIGNS

- A. RAILROAD CROSSING (W10-1)
- A1. RAILROAD CROSSBUCK (R15-1)
- B1. RAILROAD NUMBER OF TRACKS (W48 (CA))
- B2. RAILROAD NUMBER OF TRACKS (R15-2P)
- C. TRACK CROSSING AT INTERSECTION (W10-2R)
- D. TRACK CROSSING AT INTERSECTION (W10-2L)
- E. TRACK CROSSING AT "T" INTERSECTION (W10-4L)
- F. TRACK CROSSING AT "T" INTERSECTION (W10-4R)
- G. THRU TRAFFIC MERGE LEFT (W4-7)
- H. TYPE K REFLECTIVE OBJECT MARKER
- I. TYPE N (CA) OBJECT MARKER
- J. NO TURN ON RED (R10-11)
- K. NO TURN ON RED (R13A (CA))
- L. NO U TURN (R3-4)
- M. NO PARKING ANYTIME (R26A (CA))
- N. DO NOT STOP ON TRACKS (R8-8)
- O. STOP HERE ON RED (R10-6 (L) OR (R))
- P. KEEP RIGHT (R4-7)
- Q. ONE WAY (R6-1R OR R6-1L)
- R. RIGHT TURN ONLY (R3-5R)
- S. LEFT TURN ONLY (R3-5L)
- T. STOP (R1-1)
- U. YIELD (R1-2)
- V. NO LEFT TURN (R3-2)
- W. WRONG WAY (R5-1A)
- X. DO NOT ENTER (R5-1)
- Y. PEDESTRIAN CROSSING (W11-2)
- Z. NO PEDESTRIAN CROSSING (R9-3A)
- AA. USE CROSSWALK (R9-3bP (LT))
- AB. USE CROSSWALK (R9-3bP (RT))
- AC. LEFT ONLY, LEFT ONLY, RIGHT ONLY (R81-13 (CA))
- AD. LEFT ONLY, THROUGH, RIGHT ONLY (R3-8b)
- AE. BLANKOUT SIGN (R3-1) (NO RIGHT)
- AF. BLANKOUT SIGN (R3-2) (NO LEFT)
- AG. LEFT ONLY, THROUGH RIGHT (R61-5 (CA))
- AH. THROUGH LEFT, RIGHT ONLY (R61-7)
- AJ. LEFT ONLY, RIGHT ONLY (RE61-19 (CA))
- AK. LEFT ONLY, THROUGH LEFT, RIGHT ONLY (R3-18)
- AL. ONE WAY (R6-2)
- AM. ROUND ABOUT (R6-5P)
- AN. RIGHT LANE ENDS (W9-1)
- AO. AHEAD (W16-9P)
- AP. RIGHT LANE MUST TURN RIGHT (R3-7)
- AQ. NO PARKING ANY TIME (R28 (S) (CA))
- AR. TRUCK ROUTE (R14-1)
- AS. OBJECT MARKER (OM4-1)
- AT. MERGE LANE SIGN (W4-1)
- AU. TAPER LANE (W4-2)
- AV. DEAD END SIGN (W14-1)
- AW. END SIGN (W31 (CA))
- AX. REPORT EMERGENCY OR PROBLEM (I-13)
- AY. SPEED LIMIT XX (R2-1)
- AZ. NO LEFT OR U-TURN (R3-18)
- BA. LEFT ONLY, LEFT ONLY, THROUGH, THROUGH (R3-8 (MOD))
- BB. THROUGH, THROUGH, RIGHT ONLY (R3-8 (MOD))
- BC. LEFT ONLY, THROUGH, THROUGH, RIGHT ONLY (R3-8 (MOD))
- BD. BEGIN ONE WAY (R6-6)
- BE. USE PED SIGNAL (R9-5)
- BF. BIKE LANE (R81 (CA))
- BG. SIDEWALK CLOSED CROSS HERE (R9-11a (L) OR (R))
- BH. THRU TRAFFIC MERGE LEFT (W74 (CA))

REVISIONS

REV.	DATE	DESCRIPTION	DES.	ENG.

NOT FOR CONSTRUCTION

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Hill International
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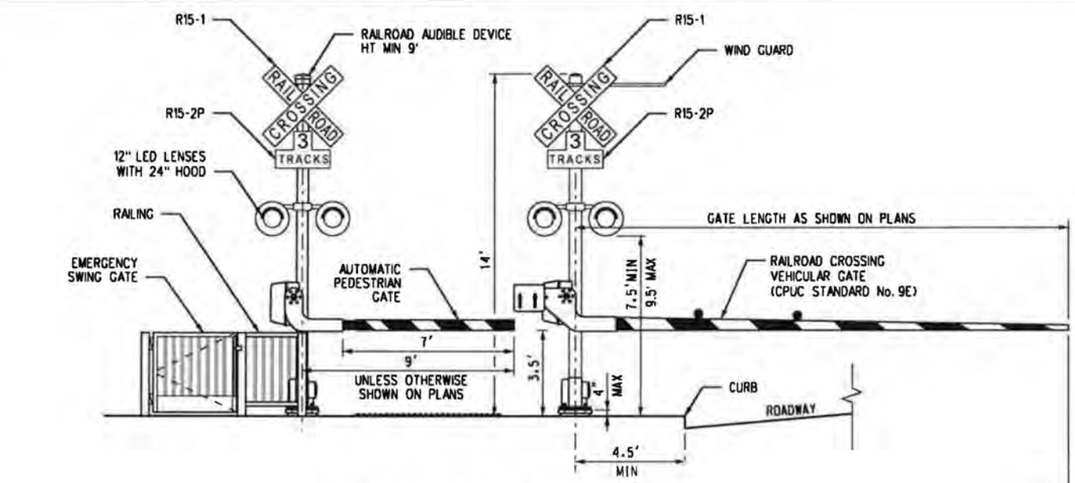
METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
JULY 23, 2018

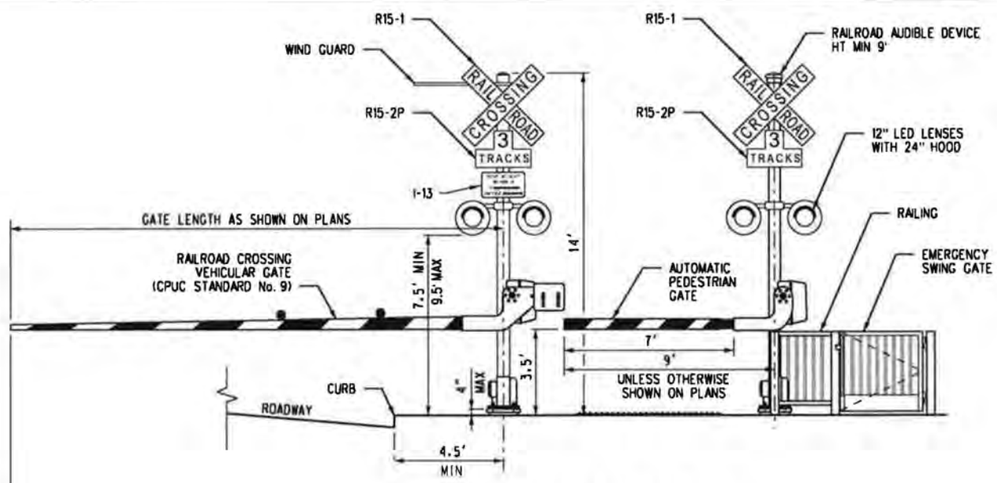
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
CONSTRUCTION NOTES

DRAWING NO. GXR-001
REV. C
SHEET NO.

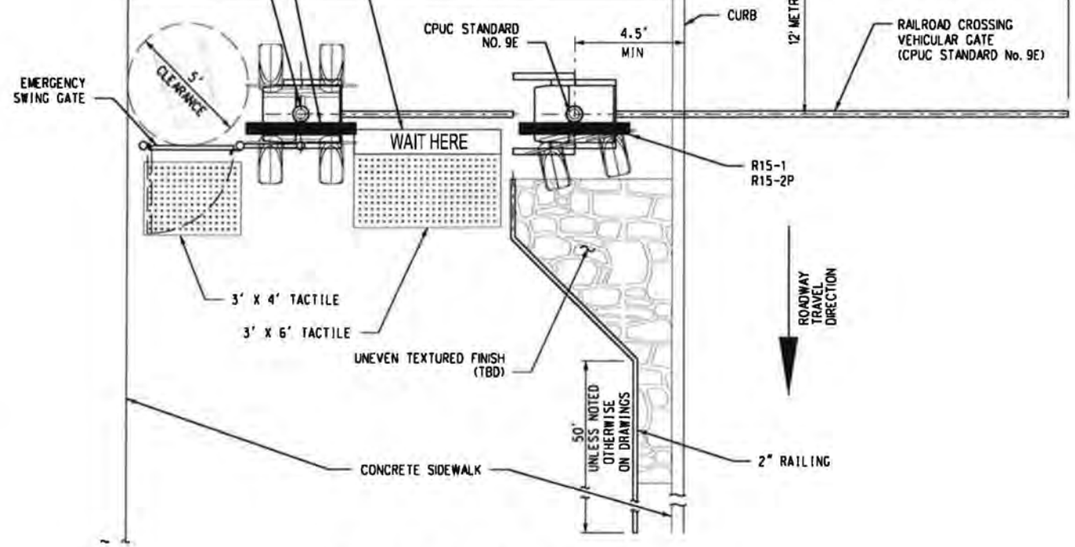


ELEVATION VIEW

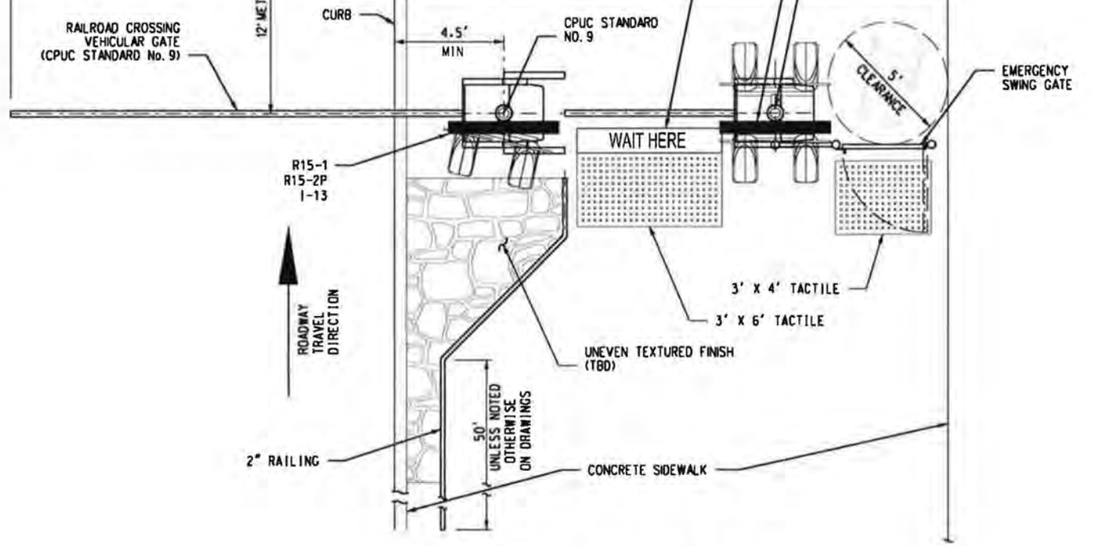


ELEVATION VIEW

1.0' TYP



A GXT-001 EXIT GATE DETAIL NTS



B GXT-001 ENTRY GATE DETAIL NTS

REVISIONS				
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REV.	DATE	DESCRIPTION	DES.	ENG.

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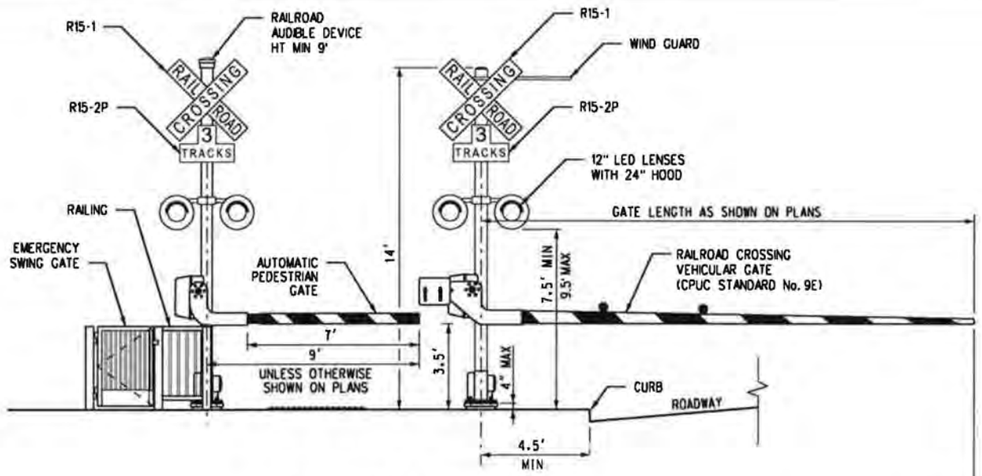
JULY 23, 2018

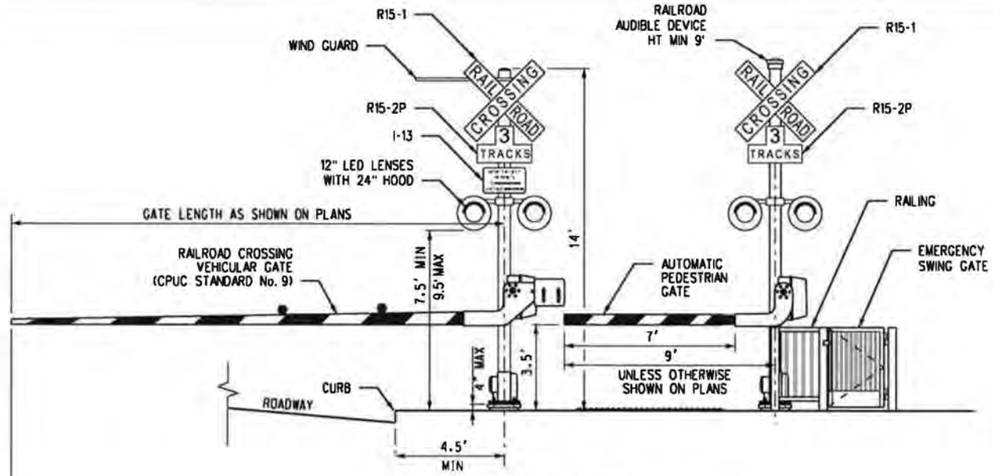
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
TYPICAL METRO GATE DETAILS

DRAWING NO: GXT-001 REV: C
SHEET NO:

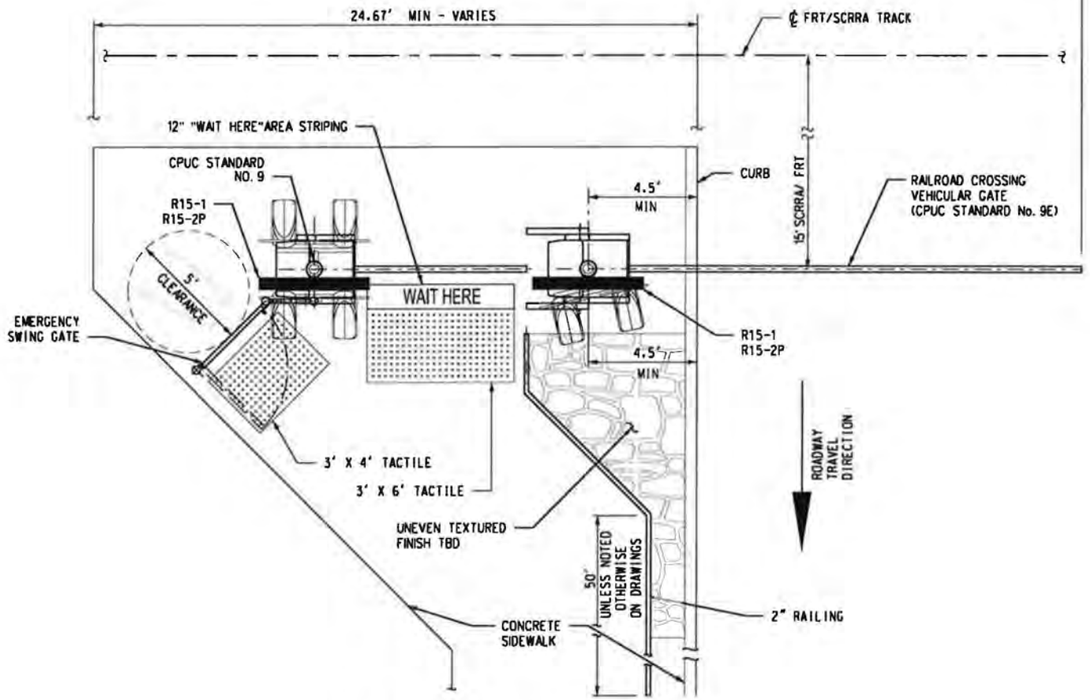


ELEVATION VIEW



ELEVATION VIEW

1.0' TYP



C GXT-002 EXIT GATE DETAIL NTS

D GXT-002 ENTRY GATE DETAIL NTS

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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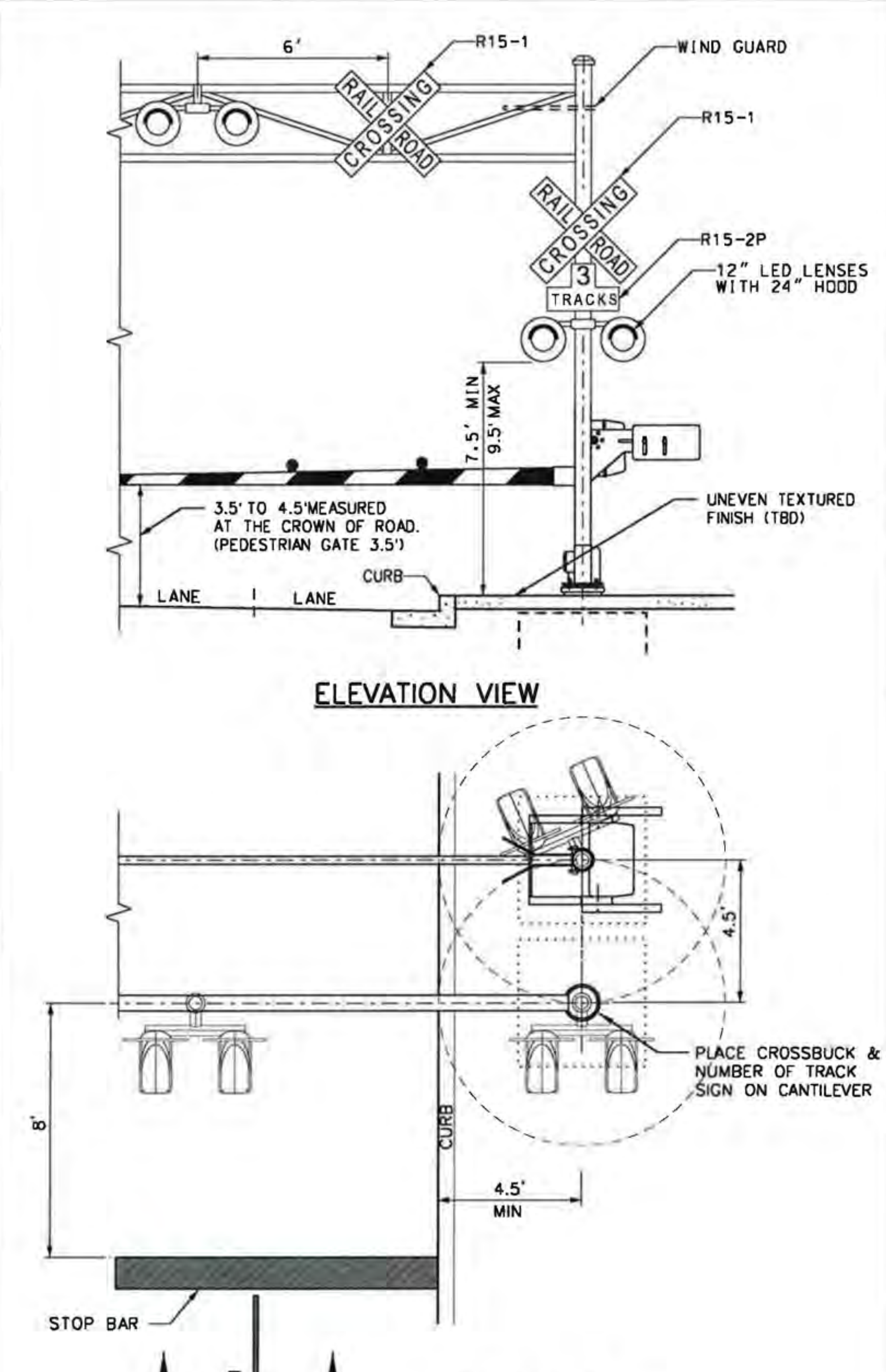
REQUEST FOR PROPOSAL (RFP) C2002
JULY 23, 2018

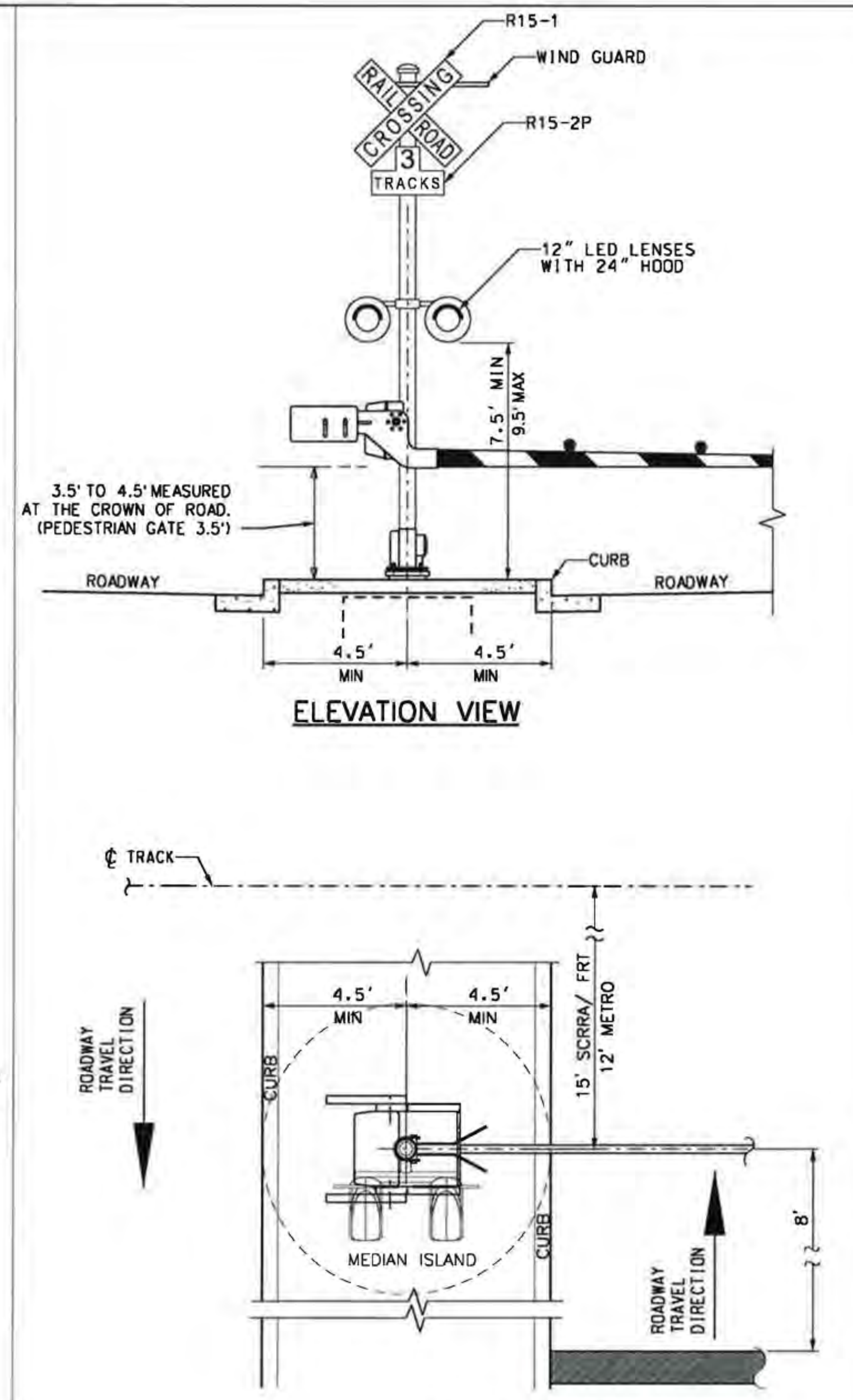
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
TYPICAL FRT/ SCRRA GATE DETAILS

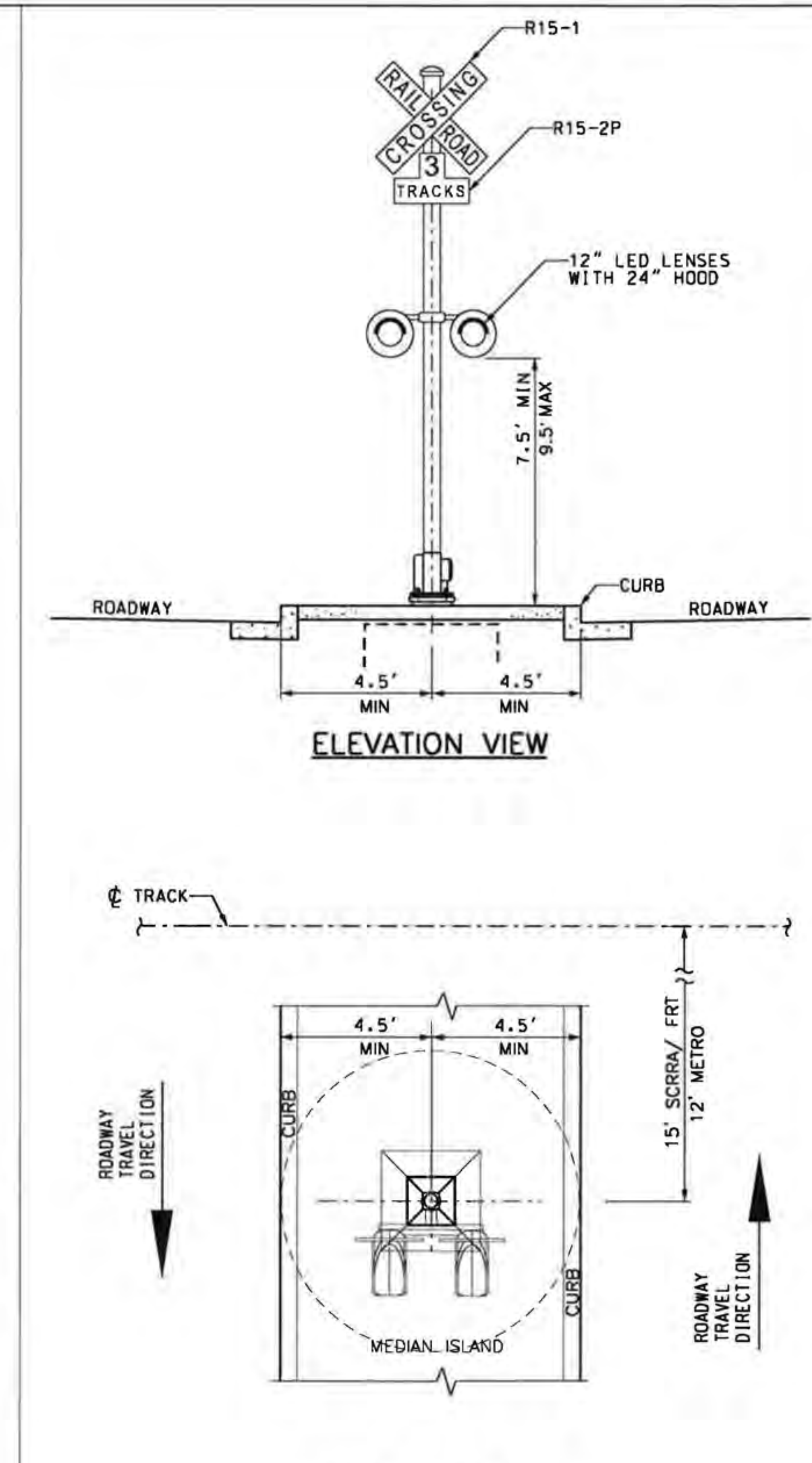
DRAWING NO: GXT-002 REV: C
SHEET NO:



E GXT-003 CANTILEVER CPUC NO. 9A NTS



F GXT-003 MEDIAN MOUNTED CPUC NO. 9 NTS



G GXT-003 MEDIAN MOUNTED CPUC NO.8 NTS

REVISIONS				
REV.	DATE	DESCRIPTION	DES.	ENG.
		NOT FOR CONSTRUCTION		

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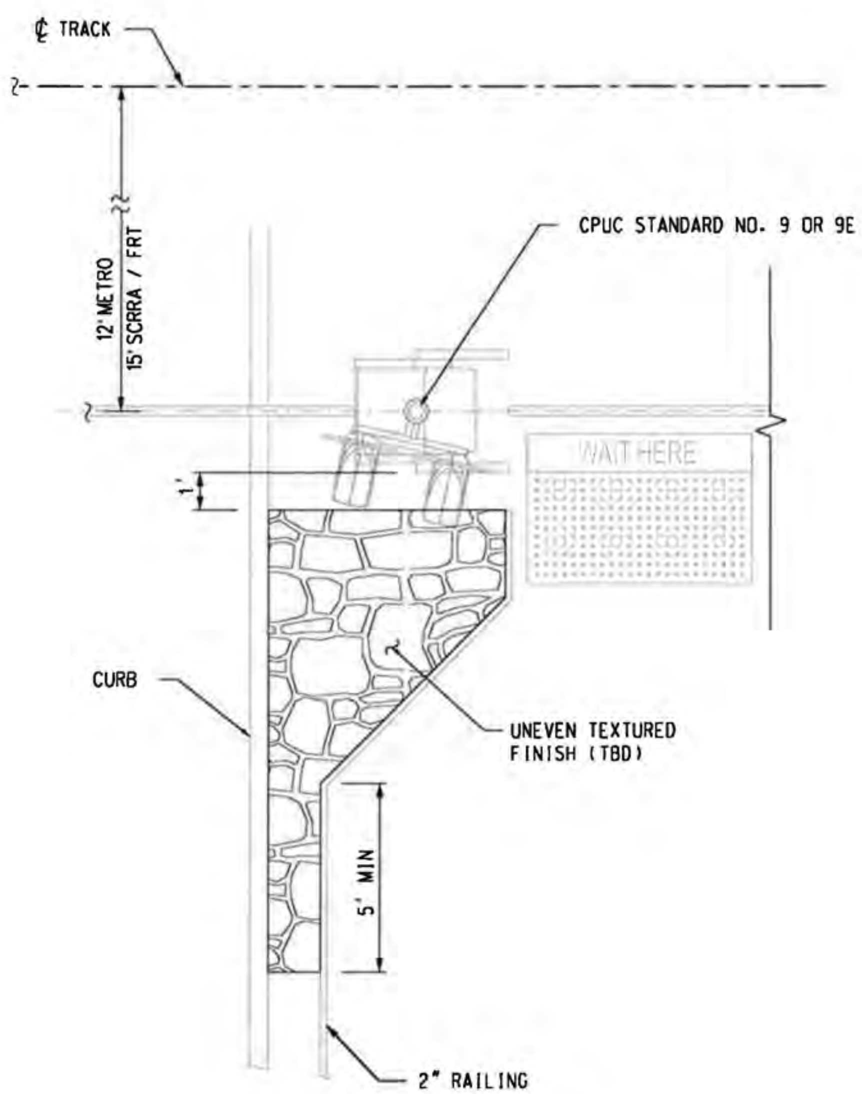
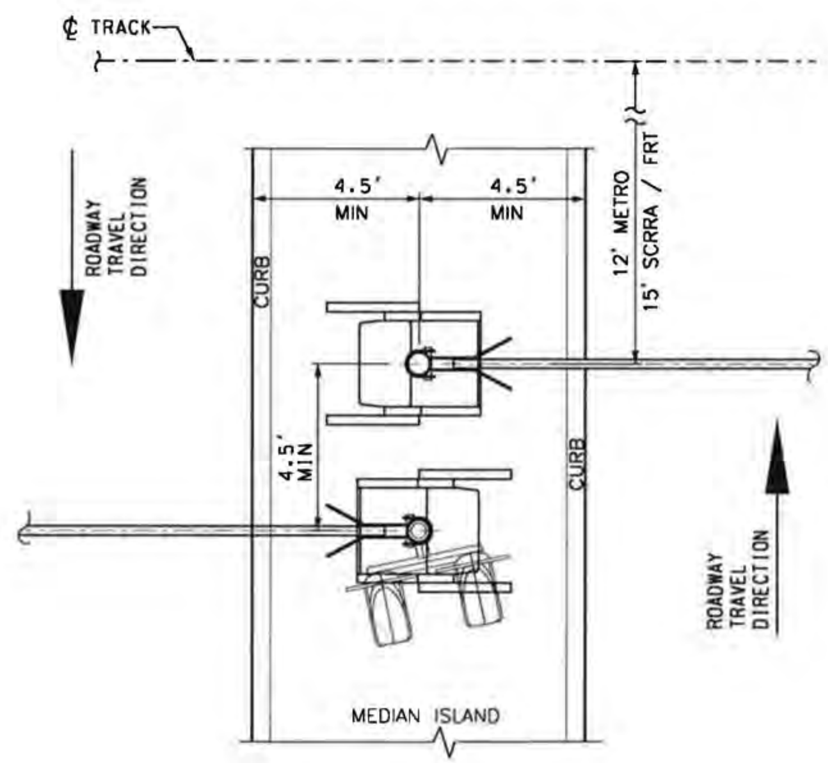
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
TYPICAL GATE DETAILS, SHEET 1

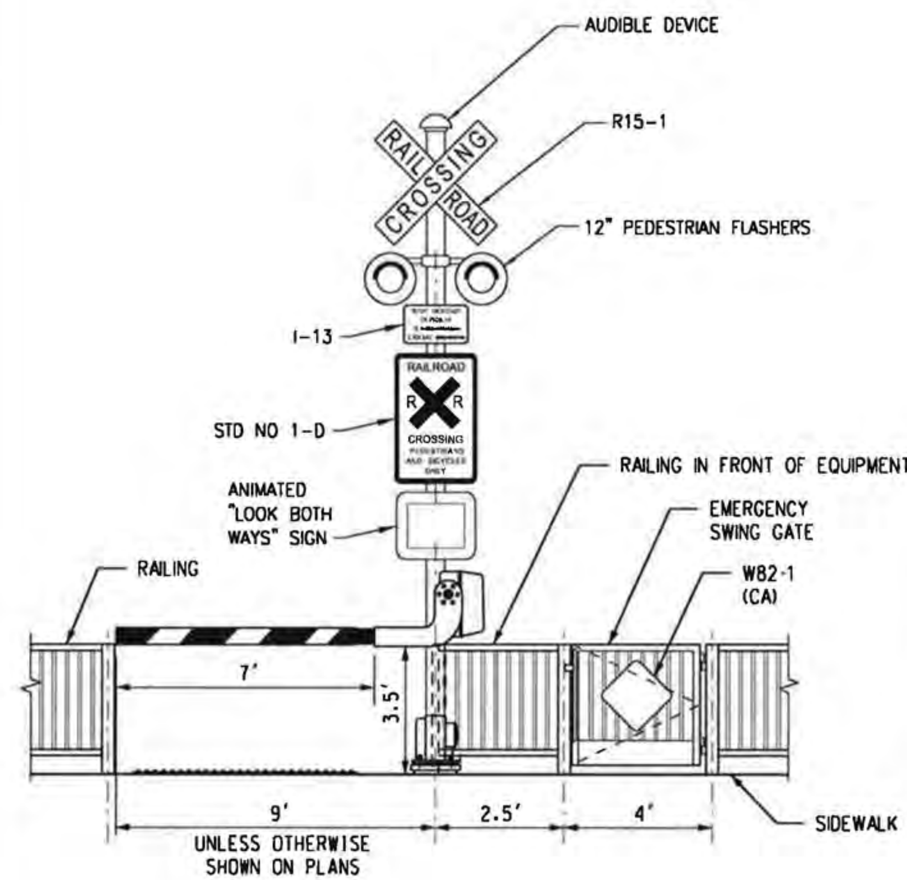
DRAWING NO. GXT-003
REV C



H GXT-004 TEXTURED FINISH (TBD)
NTS



I GXT-004 STACKED MEDIAN MOUNTED CPUC STANDARD NO. 9 GATES
NTS



J GXT-004 ELEVATION - STATION ENTRANCE
NTS

REVISIONS				
REV.	DATE	DESCRIPTION	DES.	ENG.
		NOT FOR CONSTRUCTION		

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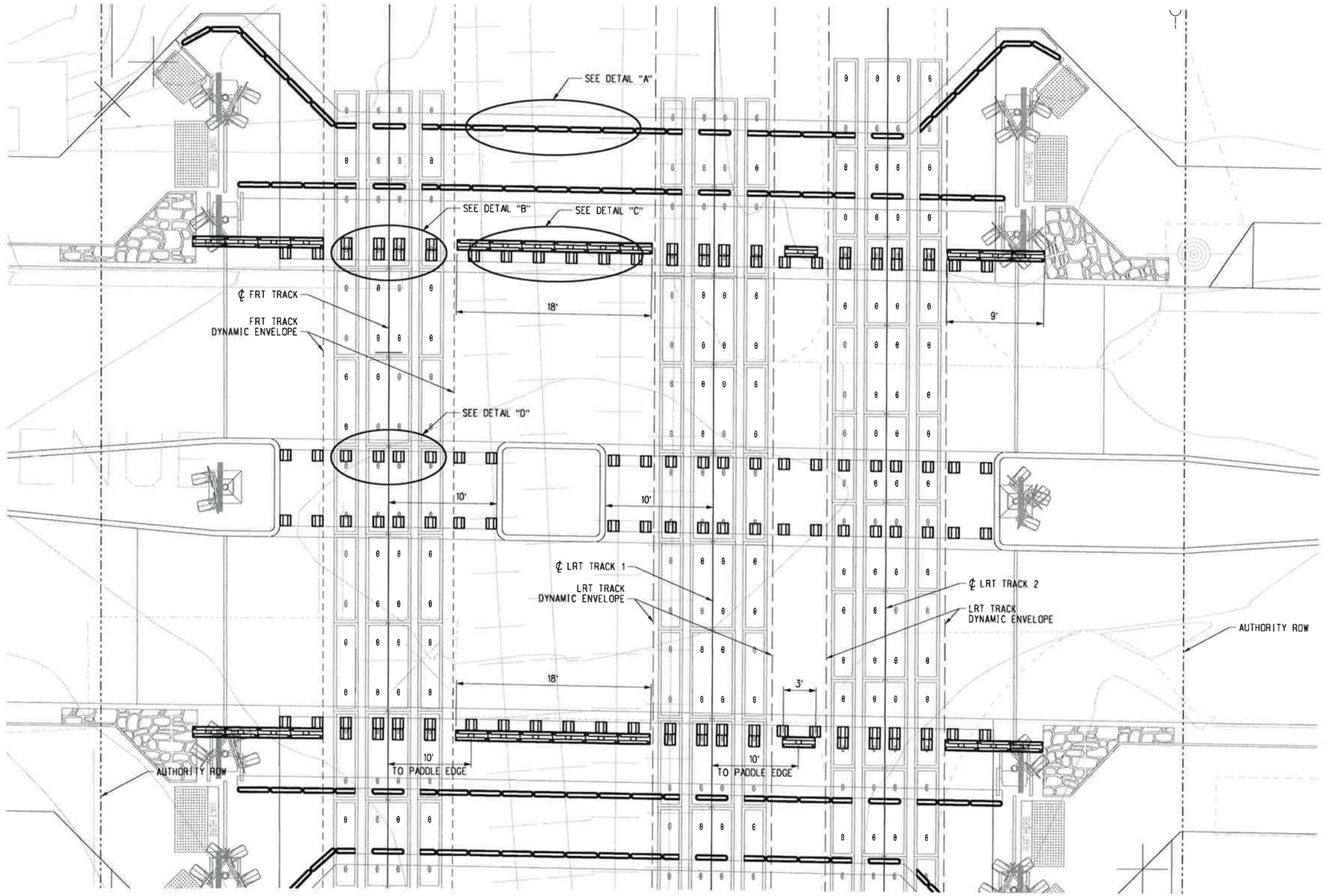
JULY 23, 2018

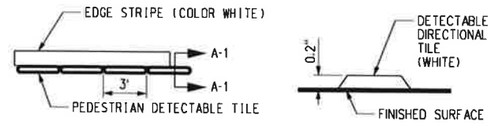
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
TYPICAL GATE DETAILS, SHEET 2

DRAWING NO: GXT-004
REV: C
SHEET NO:

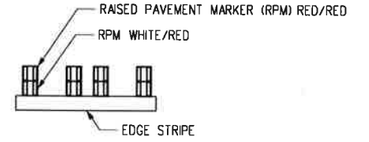
7/18/2018 2:38:03 PM



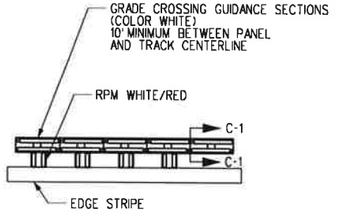


DETAIL "A"

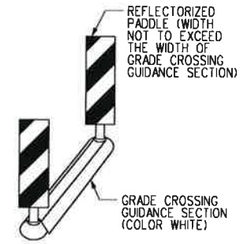
A-1 (TYPICAL SECTION)



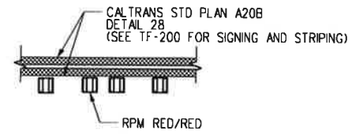
DETAIL "B"



DETAIL "C"



C-1 (ISOMETRIC VIEW)



DETAIL "D"

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

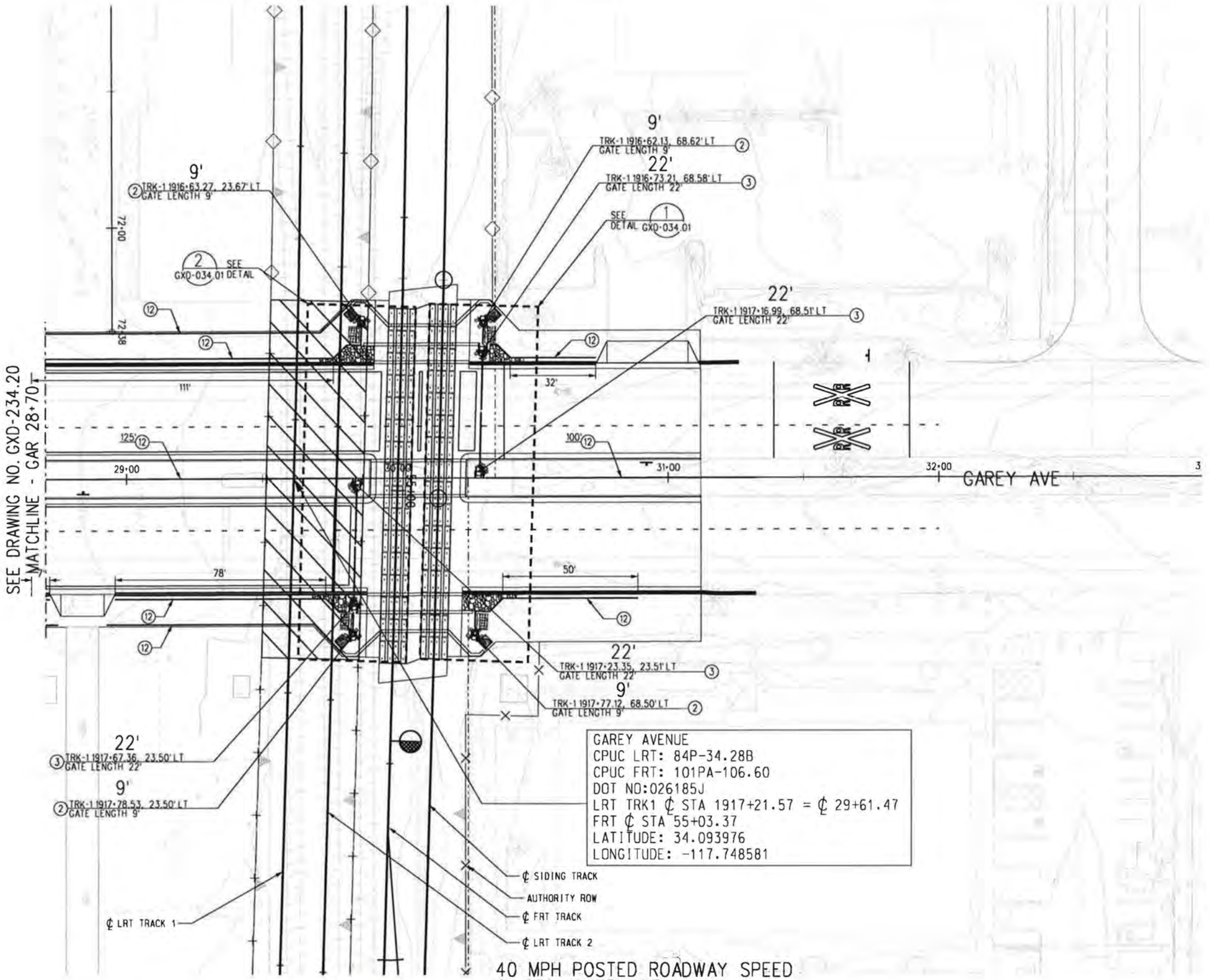
GRADE CROSSING
GRADE CROSSING GUIDANCE DETAILS

DRAWING NO: GXT-006 | REV: A
SHEET NO:

FileName=> I:\Phase II\009 Phase 2B Documents\Engineering\Drawings\11-Grade Crossing Guidance\C2002_GXT-006-Details.dgn
5/15/2018
2:25:47 PM
USER: Phuong

Exhibit D:

Garey Avenue Grade Crossing Drawings



NOTES:

1. SEE SHEET GXR-001.00 FOR CONSTRUCTION NOTES.
2. AC AT END OF TRACK PANELS AND PEDESTRIAN CROSSINGS SHALL TAPER.

20' 10' 0 20' 40'

HORIZ. SCALE

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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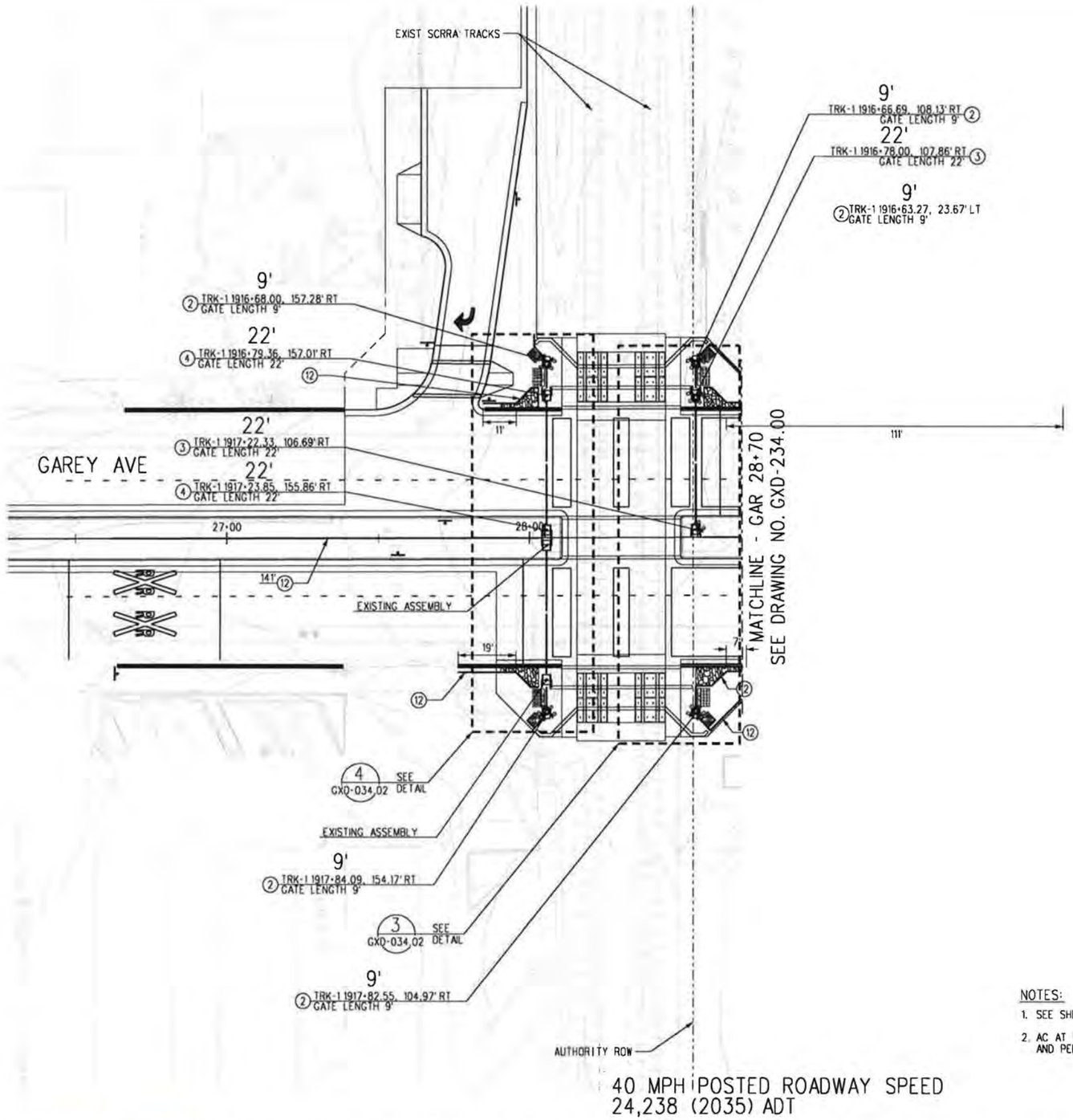
METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
GAREY AVENUE PLAN

DRAWING NO: GXD-034.00 REV: A
SHEET NO:



NOTES:

1. SEE SHEET GXR-001.00 FOR CONSTRUCTION NOTES.
2. AC AT END OF TRACK PANELS AND PEDESTRIAN CROSSINGS SHALL TAPER.

20' 10' 0 20' 40'

HORIZ. SCALE

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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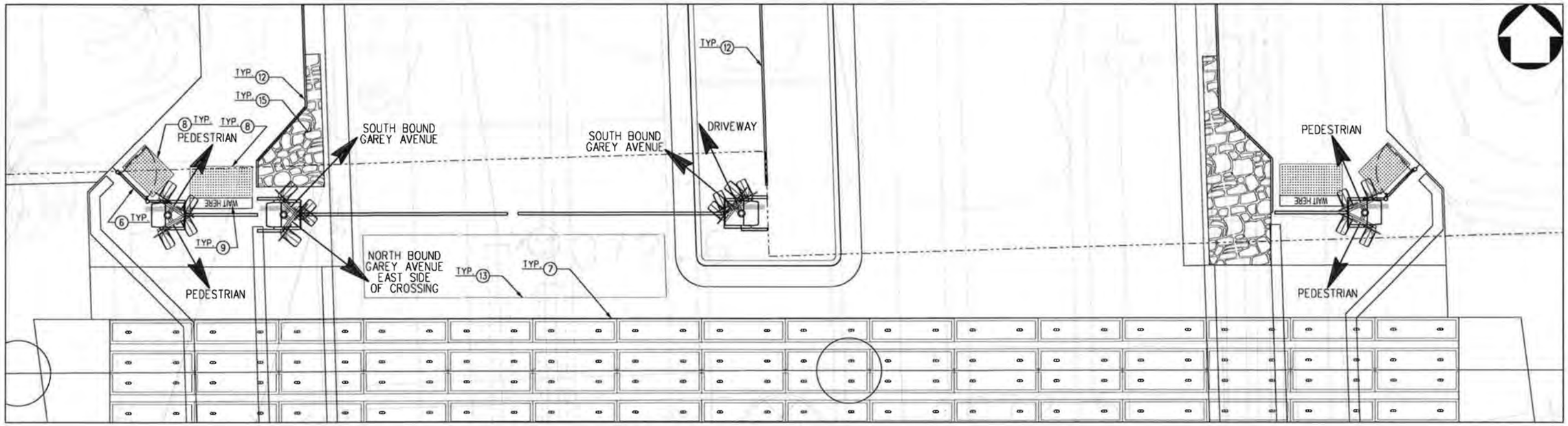
METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

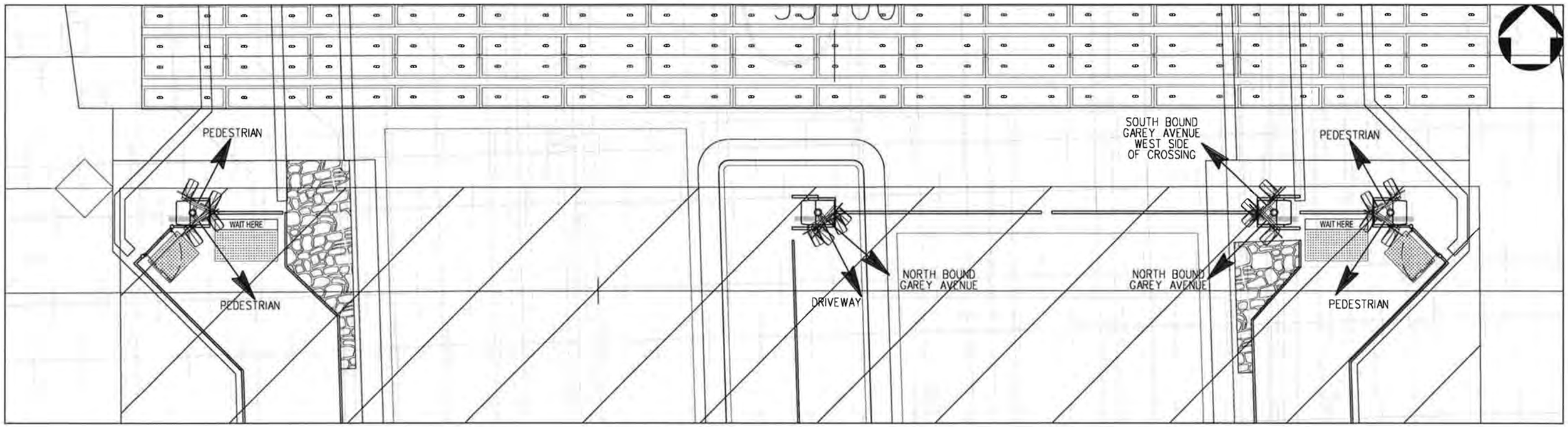
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
GAREY AVENUE PLAN

DRAWING NO: GXD-034.20
REV: A
SHEET NO:



1 DETAIL PLAN
GXD-034.01 SCALE: 1" = 5'



2 DETAIL PLAN
GXD-034.01 SCALE: 1" = 5'

NOTES:

1. SEE SHEET GXR-001 FOR LIST OF CONSTRUCTION NOTES
2. SEE SHEET GXD-001.00 FOR PROJECT NOTES

REVISIONS

NOT FOR CONSTRUCTION

REV.	DATE	DESCRIPTION	DES.	ENG.

Hill International
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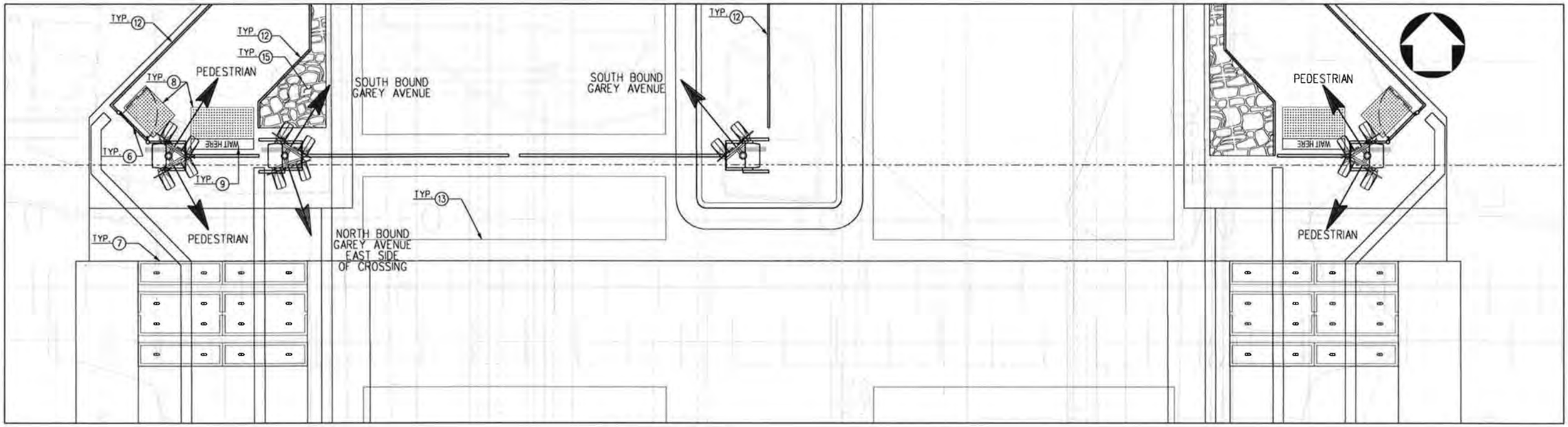
MONROVIA, CA 91016 - 3633

METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

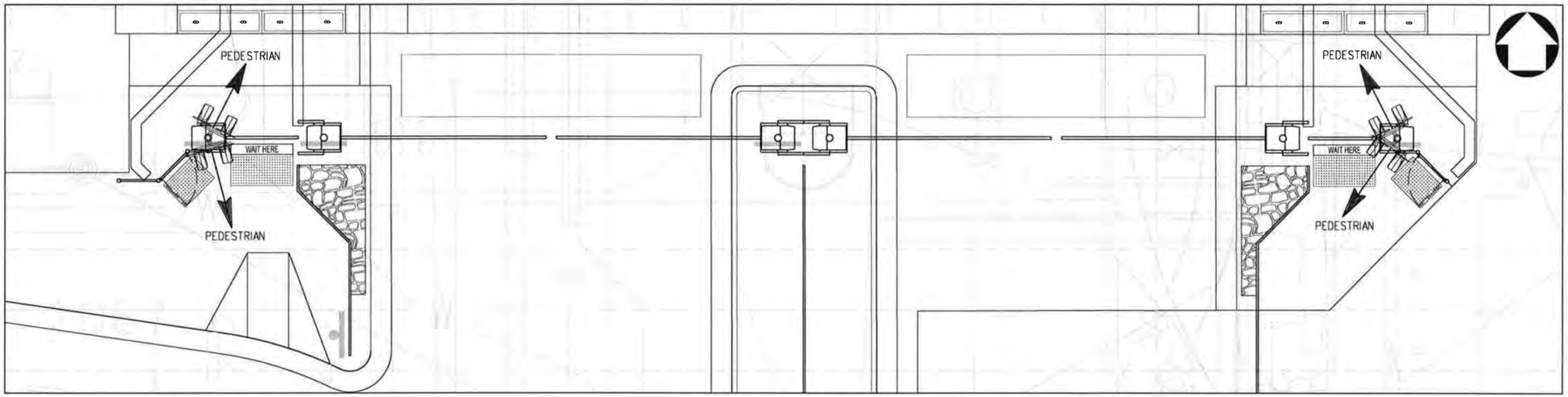
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
GAREY AVENUE DETAILS (FRT)

DRAWING NO: GXD-034.01 REV: A
SHEET NO:



DETAIL (3) PLAN
GXD-034.02 SCALE: 1" = 5'



4 DETAIL PLAN
GXD-034.02 SCALE: 1" = 5'

NOTES:

1. SEE SHEET GXR-001 FOR LIST OF CONSTRUCTION NOTES
2. SEE SHEET GXD-001.00 FOR PROJECT NOTES

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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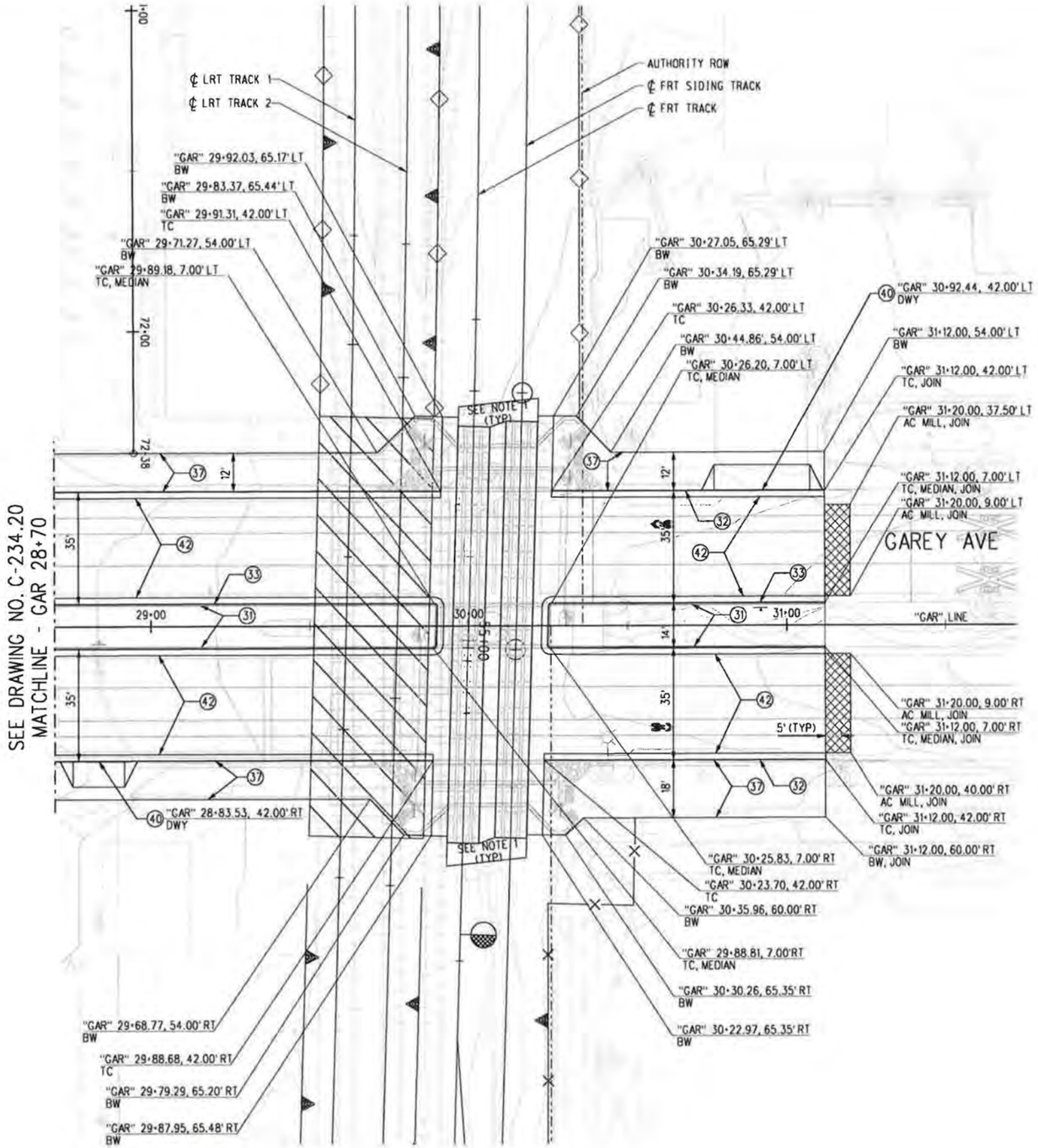
METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
GAREY AVENUE DETAILS (SCRRA)

DRAWING NO: GXD-034.02 REV: A
SHEET NO:



CONSTRUCTION NOTES:

(31) INSTALL RAISED MEDIAN
(32) CURB AND GUTTER
(33) CURB AND GUTTER (MEDIAN)
(34) CURB ONLY
(37) CONCRETE SIDEWALK
(39) CURB RAMP
(40) DRIVEWAY
(42) ASPHALT CONCRETE PAVEMENT ON BASE

NOTES:

1. AC AT END OF TRACK PANELS AND PEDESTRIAN CROSSINGS SHALL TAPER FROM TOP OF BALLAST AT 12 HORIZ. : 1 VERT. OR FLATTER.
2. SEE SHEET C-201 FOR PROJECT NOTES.

LEGEND:

ASPHALT CONCRETE PAVEMENT ON BASE

AC MILL AND OVERLAY

20' 0 20' 40'
HORIZ. SCALE

REVISIONS				
REV.	DATE	DESCRIPTION	DES.	ENG.

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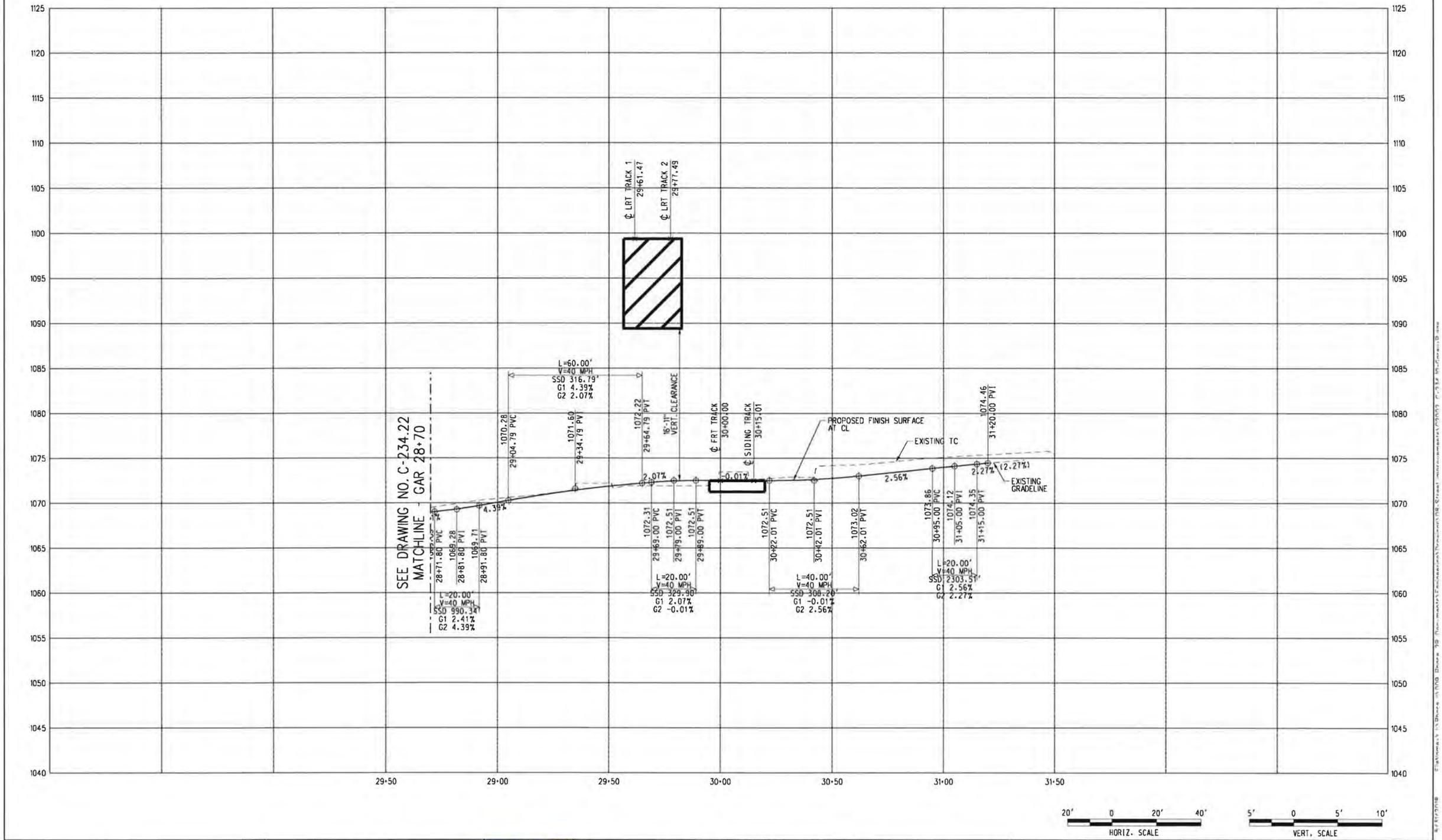
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

STREET IMPROVEMENTS
GAREY AVENUE PLAN

DRAWING NO. C-234.00 REV. A
SHEET NO.



REVISIONS				
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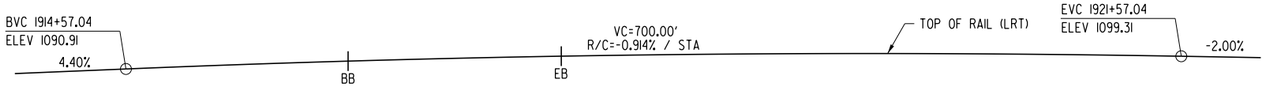
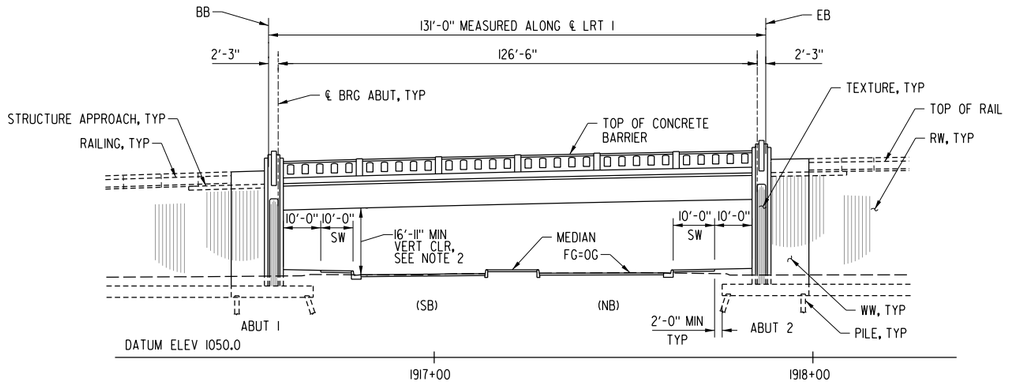
STREET IMPROVEMENTS
GAREY AVENUE PROFILE

DRAWING NO: C-234.10 | REV: A
SHEET NO:



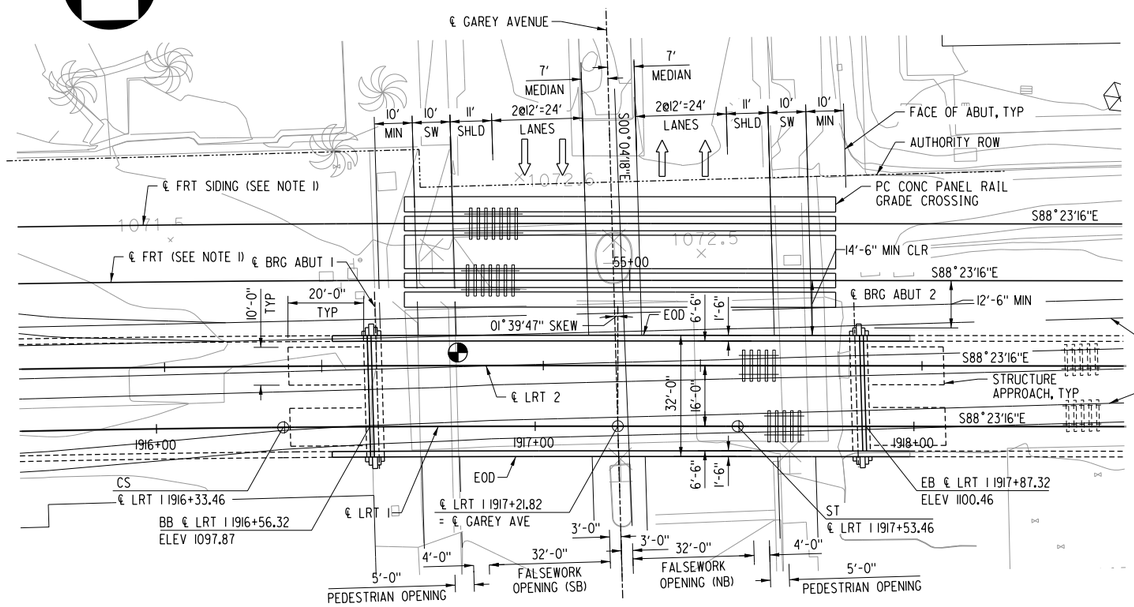
TOP OF RAIL PROFILE (℄ LRT 1)

NO SCALE



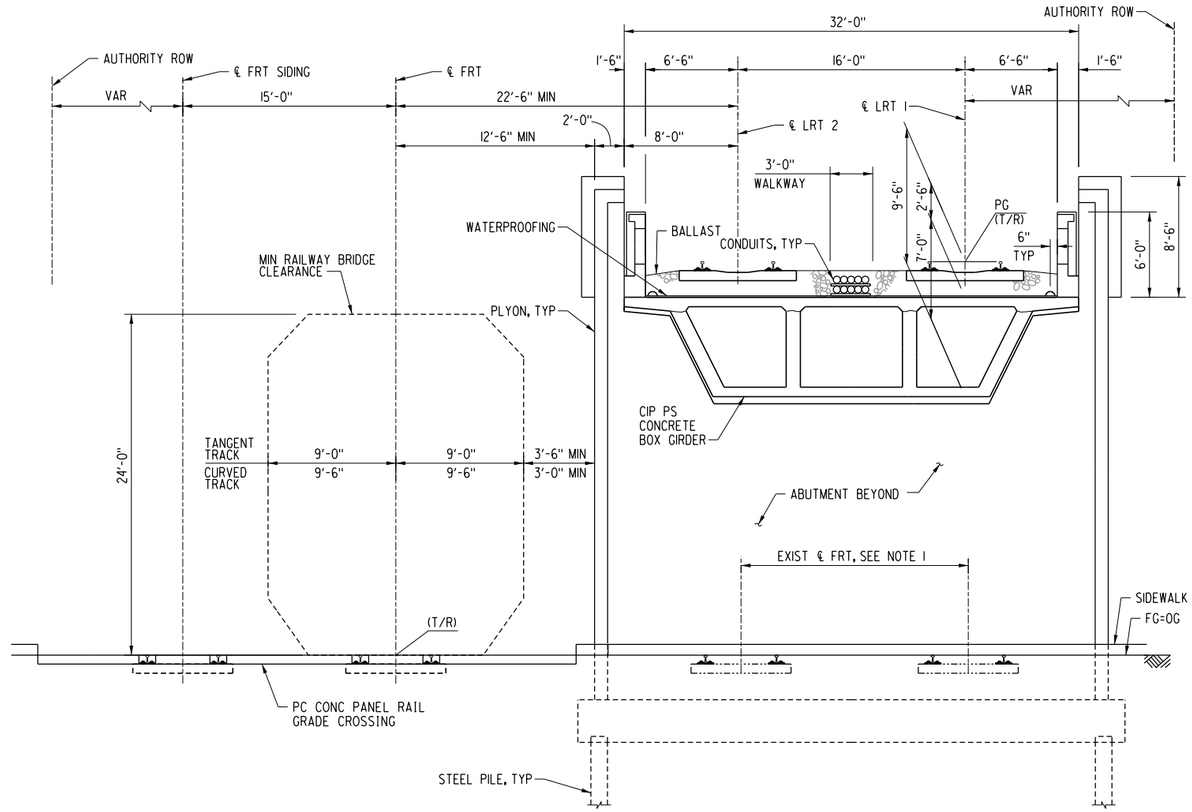
ELEVATION

1" = 20'



PLAN

1" = 20'



TYPICAL SECTION

3/16" = 1'-0"

NOTES:

1. EXIST FRT SHALL BE RELOCATED AND RAILROAD TRAFFIC HAS BEEN SHIFTED PRIOR TO LRT STRUCTURE CONSTRUCTION.
2. TRAFFIC WILL PASS THROUGH CONSTRUCTION SITE. FALSEWORK OPENING IS REQUIRED. MINIMUM 15'-0" VERTICAL CLEARANCE IS REQUIRED. SPECIAL FALSEWORK WITH MAX 1'-6" BEAM DEPTH FOR CONSTRUCTION SHALL BE PROVIDED BY THE CONTRACTOR.

LEGEND:

- POINT OF MINIMUM VERTICAL CLEARANCE
- DIRECTION OF TRAFFIC

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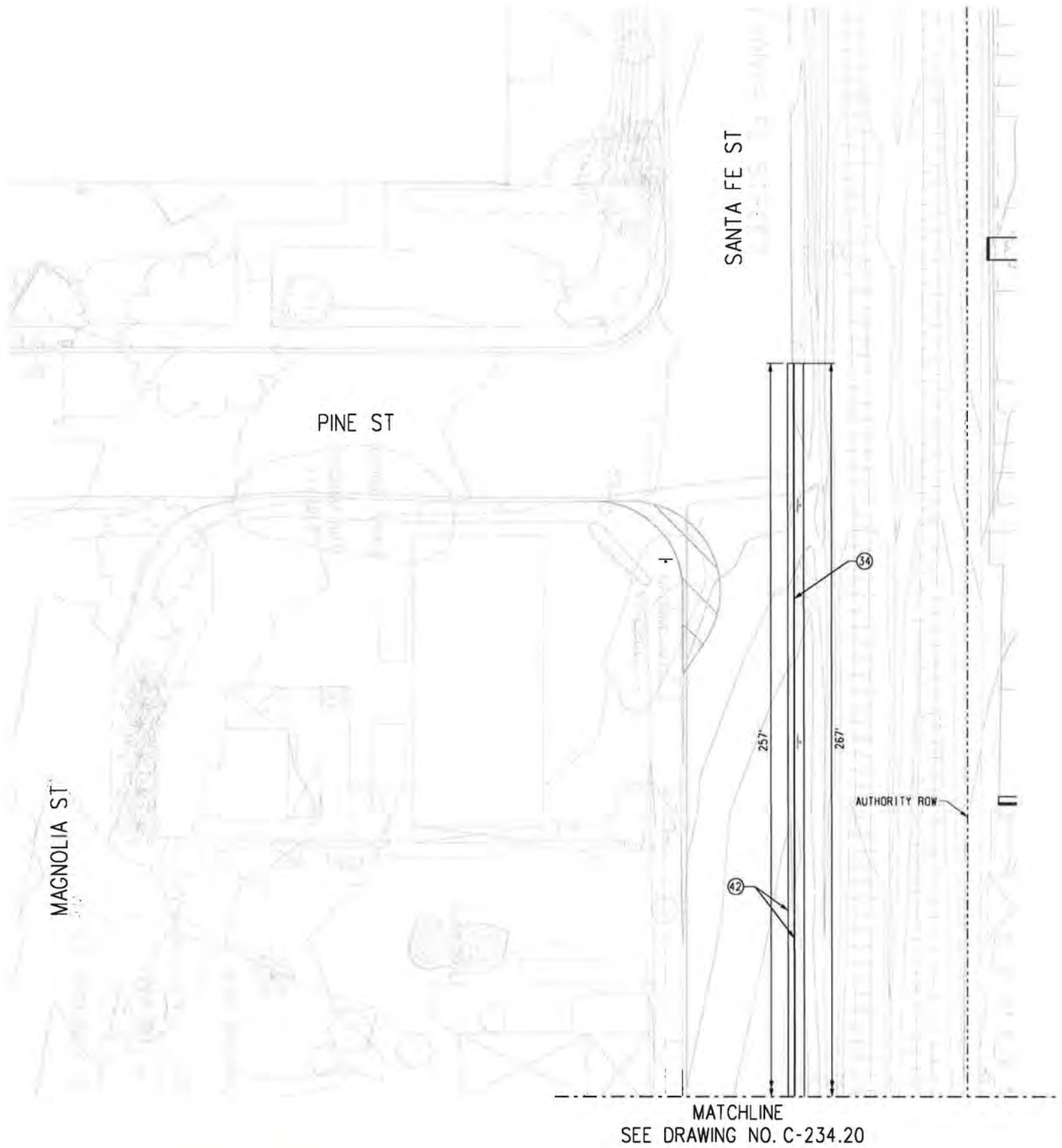
LRT - GAREY AVENUE GRADE SEPARATION
GENERAL PLAN

DRAWING NO: S-20
REV: A
SHEET NO:

21-MAY-2018 11:44
FileName=> S-20.dgn
TDoung



CONSTRUCTION NOTES:

(34) CURB ONLY
(42) ASPHALT CONCRETE PAVEMENT ON BASE

NOTES:

1. AC AT END OF TRACK PANELS AND PEDESTRIAN CROSSINGS SHALL TAPER FROM TOP OF BALLAST AT 12 HORIZ. : 1 VERT. OR FLATTER.
2. SEE SHEET C-201 FOR PROJECT NOTES.

LEGEND:

ASPHALT CONCRETE PAVEMENT ON BASE

AC MILL AND OVERLAY

20' 0 20' 40'
HORIZ. SCALE

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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ADVANCED CONCEPTUAL ENGINEERING
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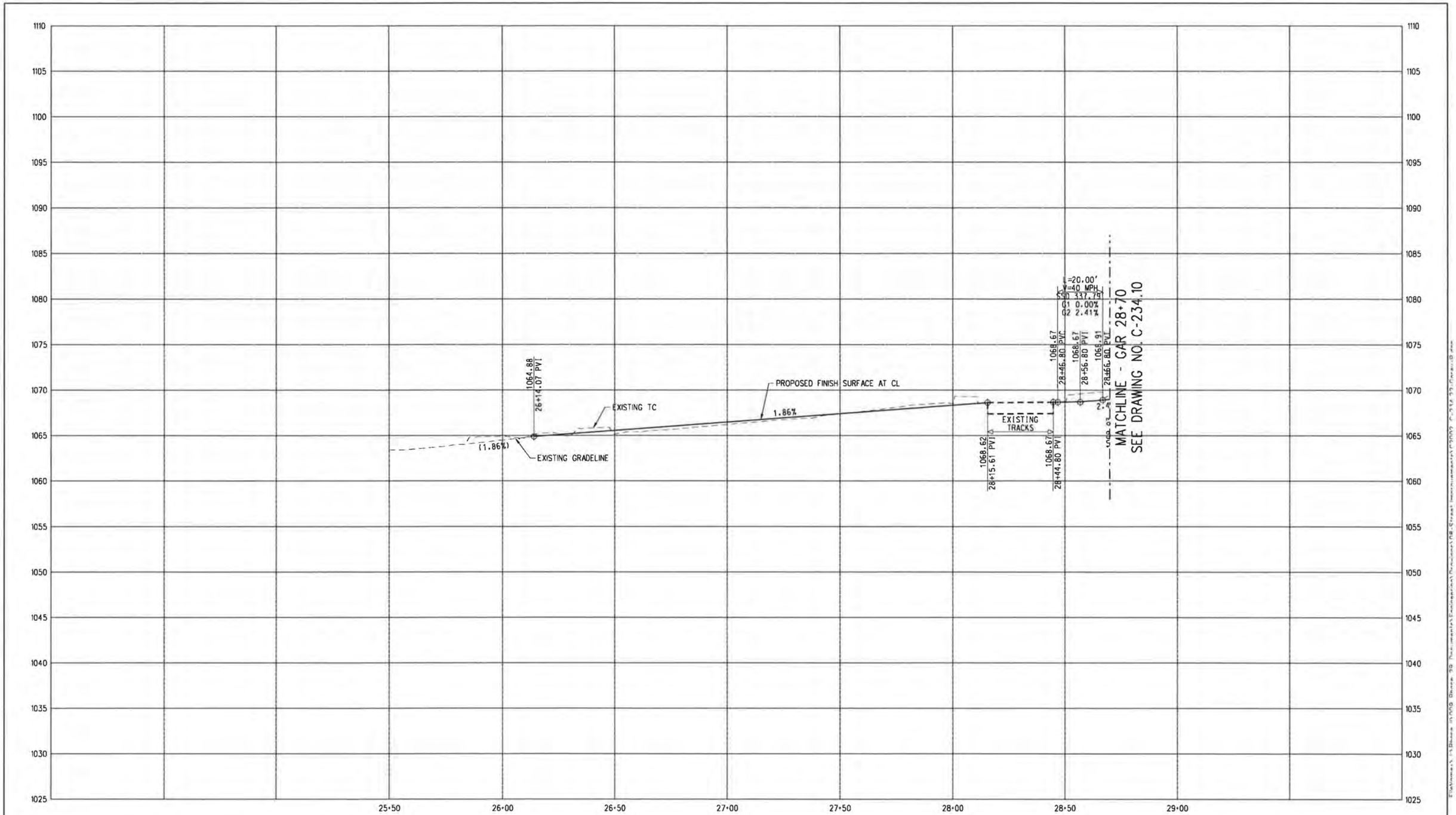
STREET IMPROVEMENTS
GAREY AVENUE PLAN

DRAWING NO: C-234.21
REV: A
SHEET NO:



REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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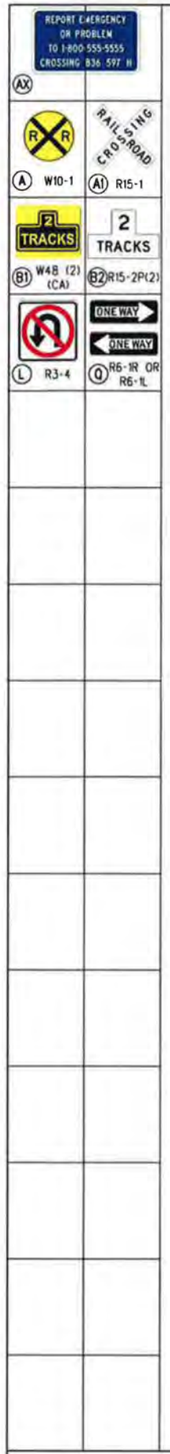
MAY 30, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

STREET IMPROVEMENTS
GAREY AVENUE PROFILE

DRAWING NO: C-234.22
REV: A
SHEET NO:



CONSTRUCTION NOTES:

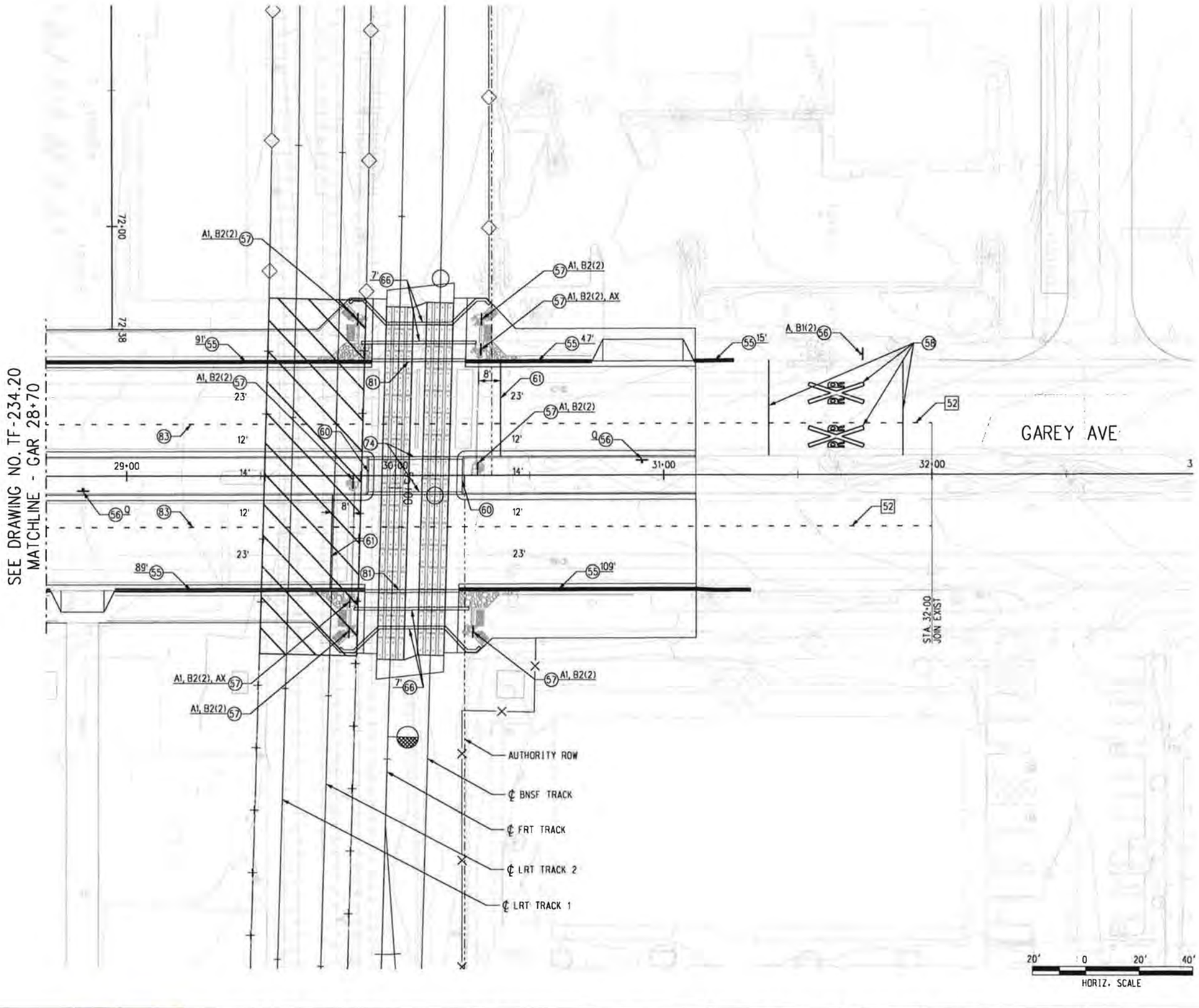
(55) PAINTED RED CURB
(56) INSTALL SIGN AND POST
(57) INSTALL SIGN ON POLE
(58) INSTALL RAILROAD CROSSING SYMBOL
(61) INSTALL 24" LIMIT LINE
(66) INSTALL 12" SOLID WHITE LINE PER CALTRANS STANDARD PLANS
(74) INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 28
(81) INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 27B
(83) INSTALL STRIPE PER CALTRANS STANDARD PLANS A20A DETAIL 9

REMOVAL NOTES:

[52] REMOVE CONFLICTING STRIPING AND RAISED PAVEMENT MARKERS BY WET SANDBLASTING OR GRINDING

NOTES:

1. SEE TF-100 FOR COMPLETE LIST OF CONSTRUCTION NOTES.
2. SEE TF-201.00 FOR PROJECT NOTES AND GENERAL NOTES.
3. FINAL DESIGN PER MUTCD (CA) AND CALTRANS STANDARDS.



REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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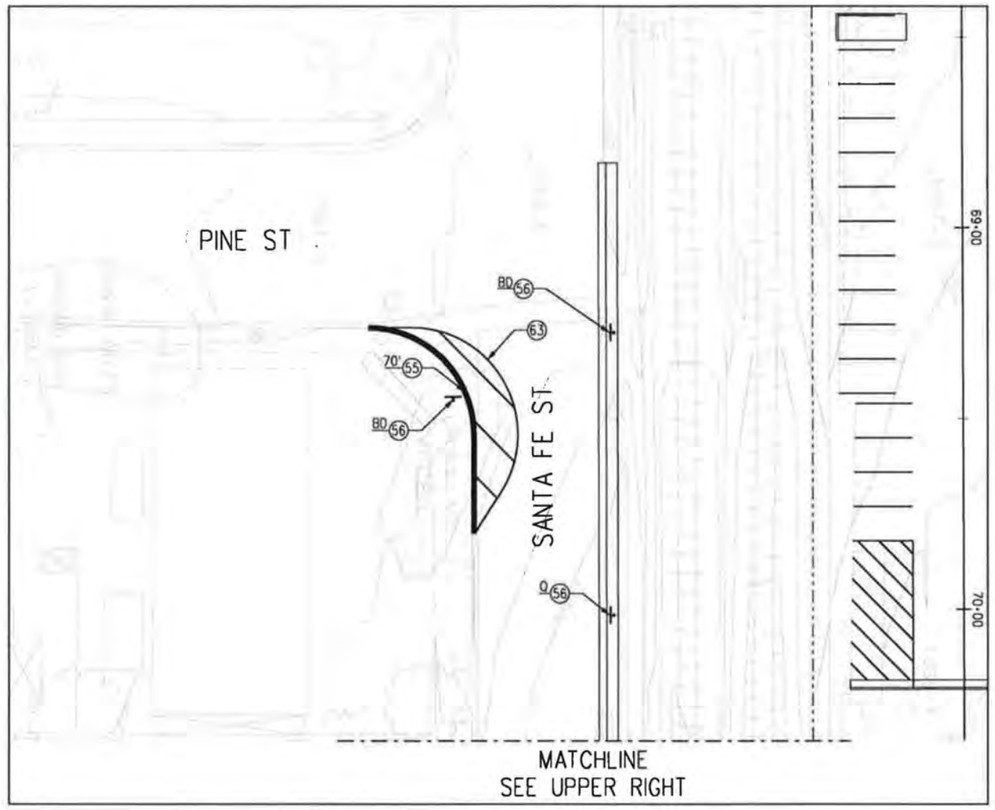
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

SIGNING AND STRIPING
GAREY AVENUE PLAN

DRAWING NO. TF-234.00 REV. A
SHEET NO.

REPORT EMERGENCY OR PROBLEM TO [illegible] CROSSING [illegible]	(AX) I-13
(A) W10-1	(A1) R15-1 RAILROAD CROSSING
(B1) W48 (2) (CA) 2 TRACKS	(B2) R15-2P(2) 2 TRACKS
(L) R3-4	(Q) R6-1R OR R6-1L ONE WAY / ONE WAY
(R) R3-5R ONLY	(T) R1-1 STOP
(W) R5-1A WRONG WAY	(X) R5-1 DO NOT ENTER
(BD) R6-6 BEGIN ONE WAY	



CONSTRUCTION NOTES:

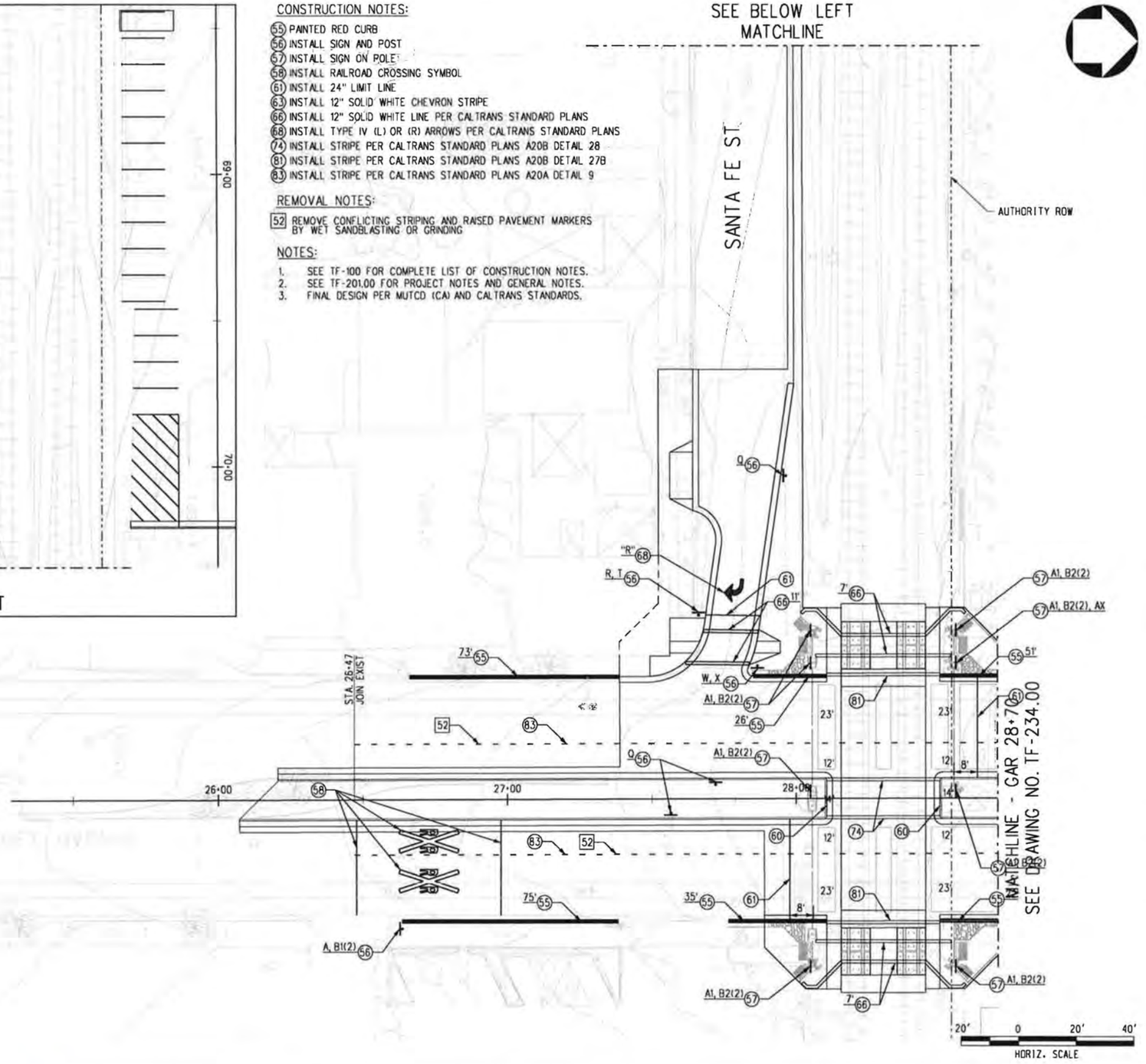
(55) PAINTED RED CURB
(56) INSTALL SIGN AND POST
(57) INSTALL SIGN ON POLE
(58) INSTALL RAILROAD CROSSING SYMBOL
(61) INSTALL 24" LIMIT LINE
(63) INSTALL 12" SOLID WHITE CHEVRON STRIPE
(66) INSTALL 12" SOLID WHITE LINE PER CALTRANS STANDARD PLANS
(68) INSTALL TYPE IV (L) OR (R) ARROWS PER CALTRANS STANDARD PLANS
(74) INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 28
(81) INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 27B
(83) INSTALL STRIPE PER CALTRANS STANDARD PLANS A20A DETAIL 9

REMOVAL NOTES:

[52] REMOVE CONFLICTING STRIPING AND RAISED PAVEMENT MARKERS BY WET SANDBLASTING OR GRINDING

NOTES:

1. SEE TF-100 FOR COMPLETE LIST OF CONSTRUCTION NOTES.
2. SEE TF-201.00 FOR PROJECT NOTES AND GENERAL NOTES.
3. FINAL DESIGN PER MUTCD (CA) AND CALTRANS STANDARDS.



REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

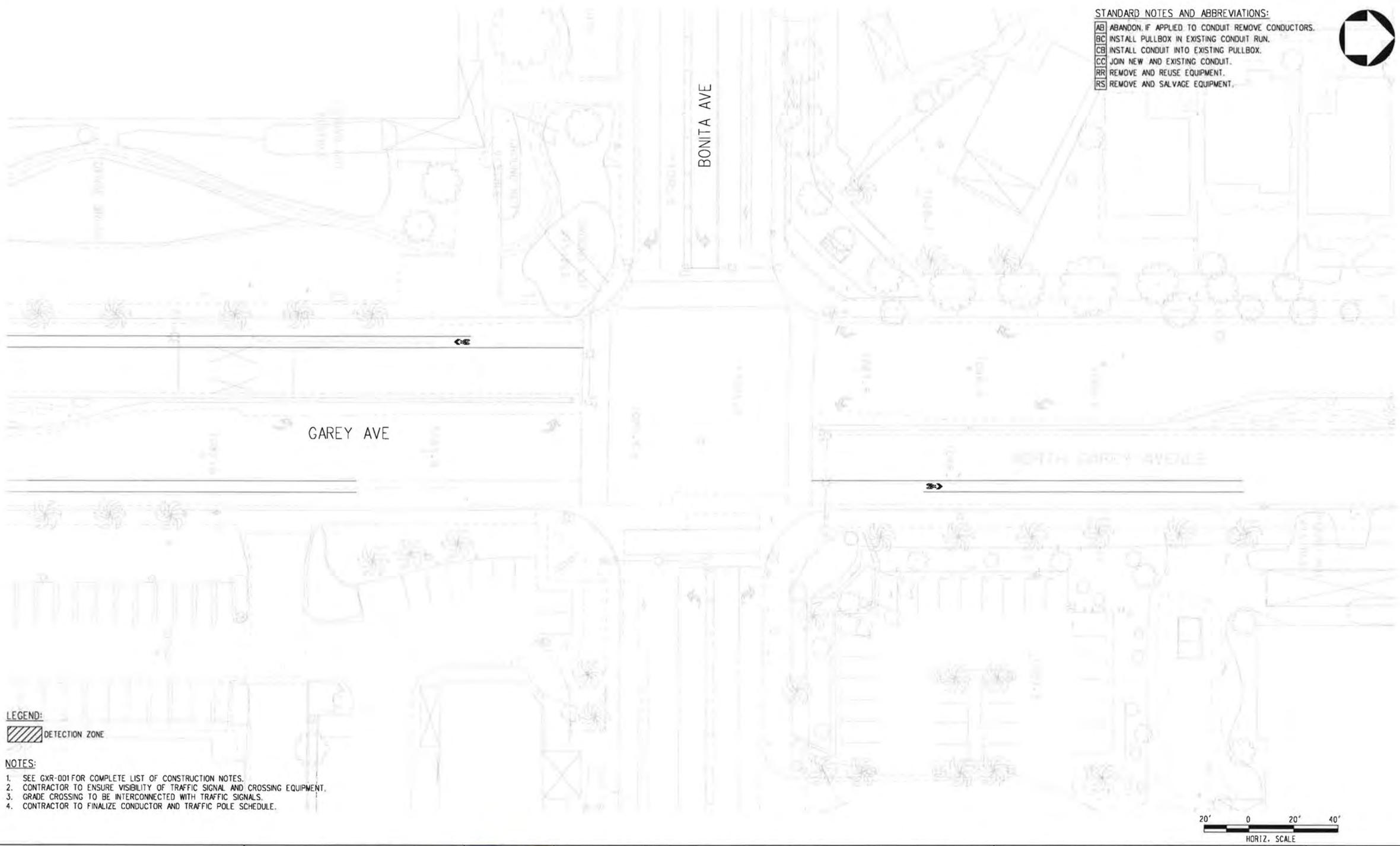
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

SIGNING AND STRIPING
GAREY AVENUE PLAN

DRAWING NO: TF-234.20
REV: A
SHEET NO:

STANDARD NOTES AND ABBREVIATIONS:

AB	ABANDON. IF APPLIED TO CONDUIT REMOVE CONDUCTORS.
BC	INSTALL PULLBOX IN EXISTING CONDUIT RUN.
CB	INSTALL CONDUIT INTO EXISTING PULLBOX.
CC	JOIN NEW AND EXISTING CONDUIT.
RR	REMOVE AND REUSE EQUIPMENT.
RS	REMOVE AND SALVAGE EQUIPMENT.



LEGEND:

DETECTION ZONE

NOTES:

1. SEE GXR-001 FOR COMPLETE LIST OF CONSTRUCTION NOTES.
2. CONTRACTOR TO ENSURE VISIBILITY OF TRAFFIC SIGNAL AND CROSSING EQUIPMENT.
3. GRADE CROSSING TO BE INTERCONNECTED WITH TRAFFIC SIGNALS.
4. CONTRACTOR TO FINALIZE CONDUCTOR AND TRAFFIC POLE SCHEDULE.

20' 0 20' 40'
HORIZ. SCALE

REVISIONS				
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REV.	DATE	DESCRIPTION	DES.	ENG.

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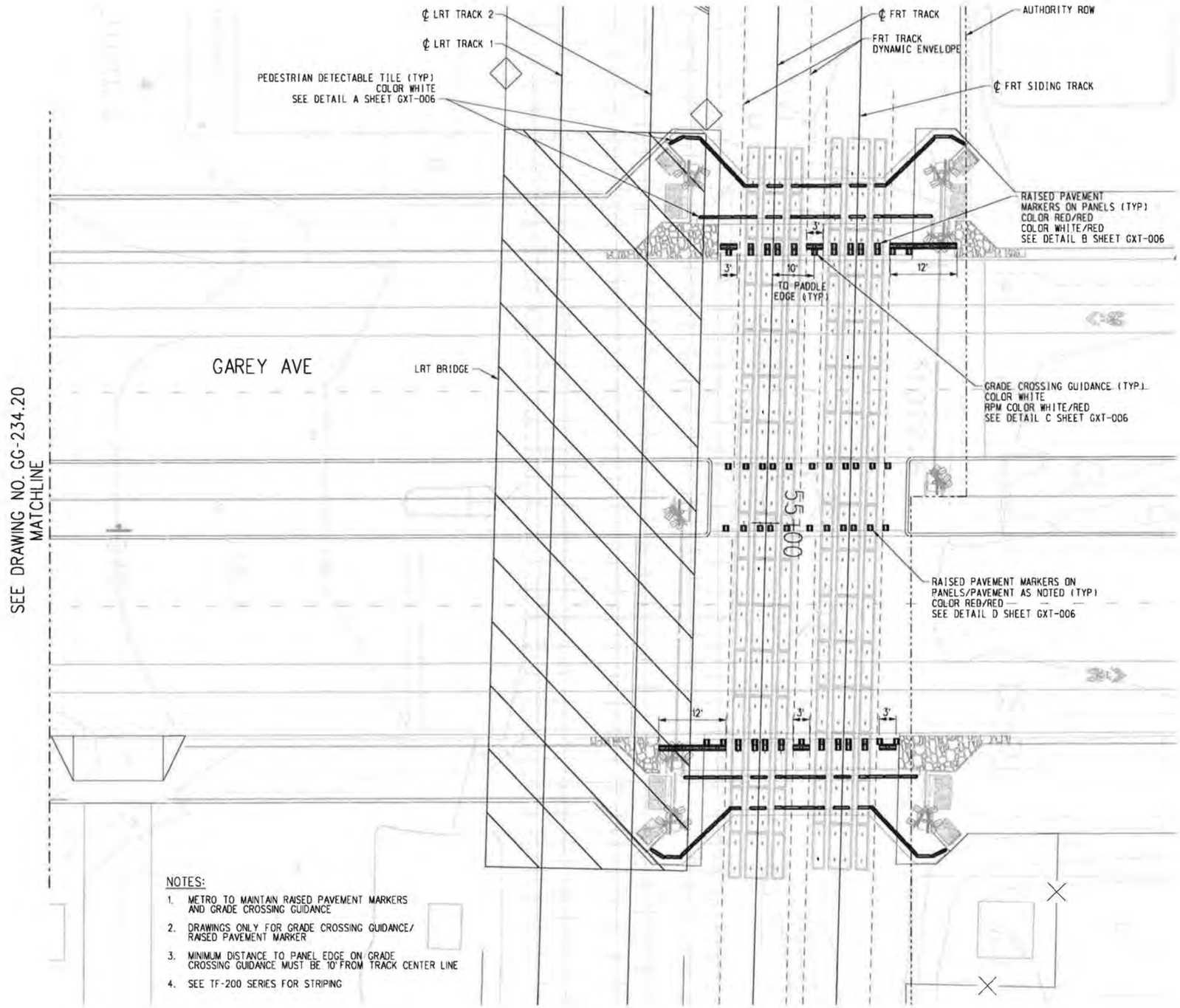
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

TRAFFIC SIGNALS
BONITA AVENUE & GAREY AVENUE

DRAWING NO: TF-334.00
REV: A
SHEET NO:

E:\Projects\1\Phase 1\000 Phase 2B Documents\Engineering Production\00-Traffic Signals\TF-334.00-Bonita-Garey.dgn
6/11/2018



NOTES:

1. METRO TO MAINTAIN RAISED PAVEMENT MARKERS AND GRADE CROSSING GUIDANCE
2. DRAWINGS ONLY FOR GRADE CROSSING GUIDANCE/ RAISED PAVEMENT MARKER
3. MINIMUM DISTANCE TO PANEL EDGE ON GRADE CROSSING GUIDANCE MUST BE 10' FROM TRACK CENTER LINE
4. SEE TF-200 SERIES FOR STRIPING

10' 0 10' 20'
HORIZ. SCALE

REVISIONS			
NOT FOR CONSTRUCTION			
REV.	DATE	DESCRIPTION	DES. ENG.

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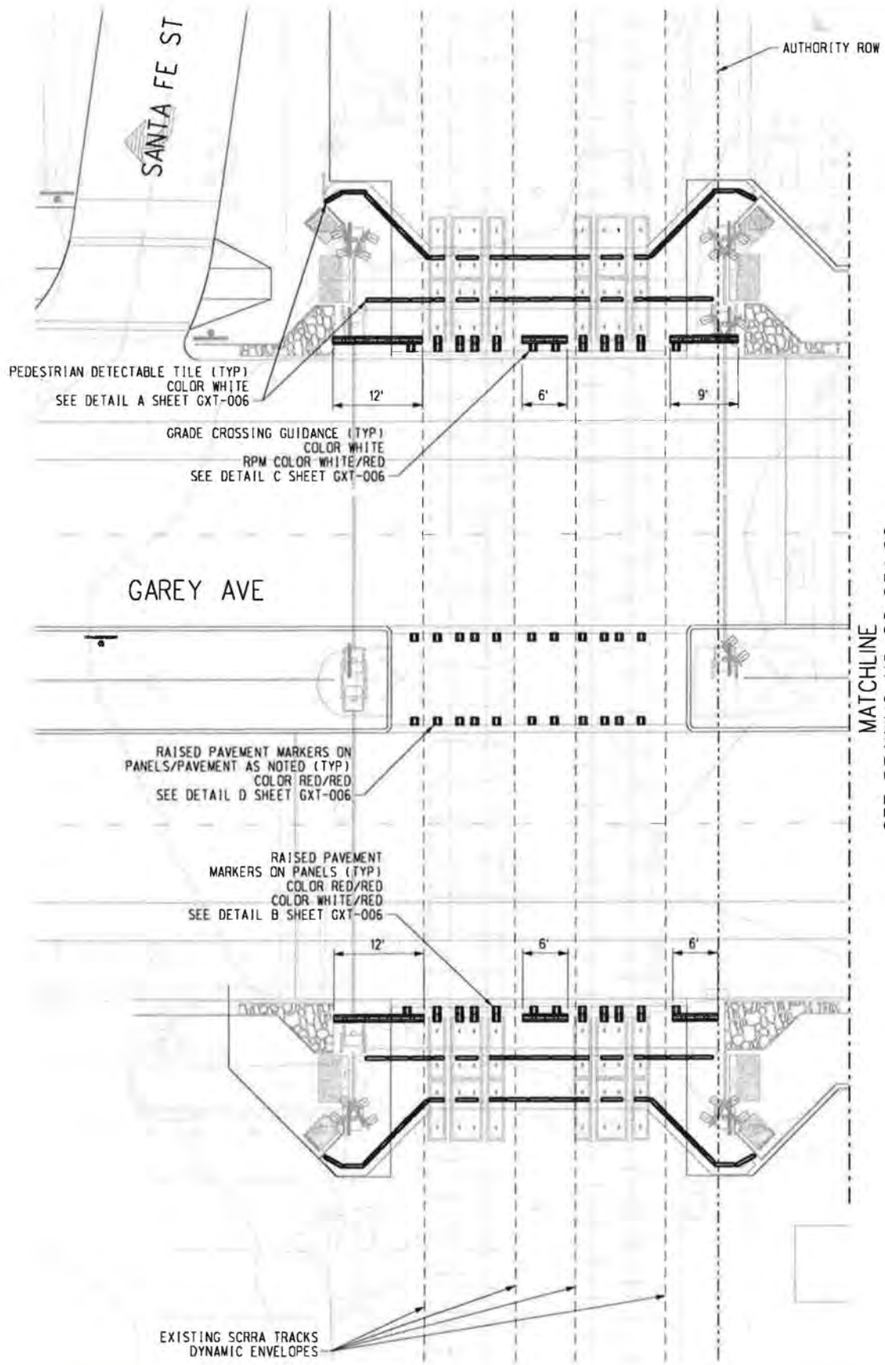
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING GUIDANCE
GAREY AVENUE PLAN

DRAWING NO. GG-234.00 REV. A
SHEET NO.



NOTES:

1. METRO TO MAINTAIN RAISED PAVEMENT MARKERS AND GRADE CROSSING GUIDANCE
2. DRAWINGS ONLY FOR GRADE CROSSING GUIDANCE/ RAISED PAVEMENT MARKER
3. MINIMUM DISTANCE TO PANEL EDGE ON GRADE CROSSING GUIDANCE MUST BE 10' FROM TRACK CENTER LINE
4. SEE TF-200 SERIES FOR STRIPING

10' 0 10' 20'
HORIZ. SCALE

REVISIONS

REV.	DATE	DESCRIPTION	DES.	ENG.

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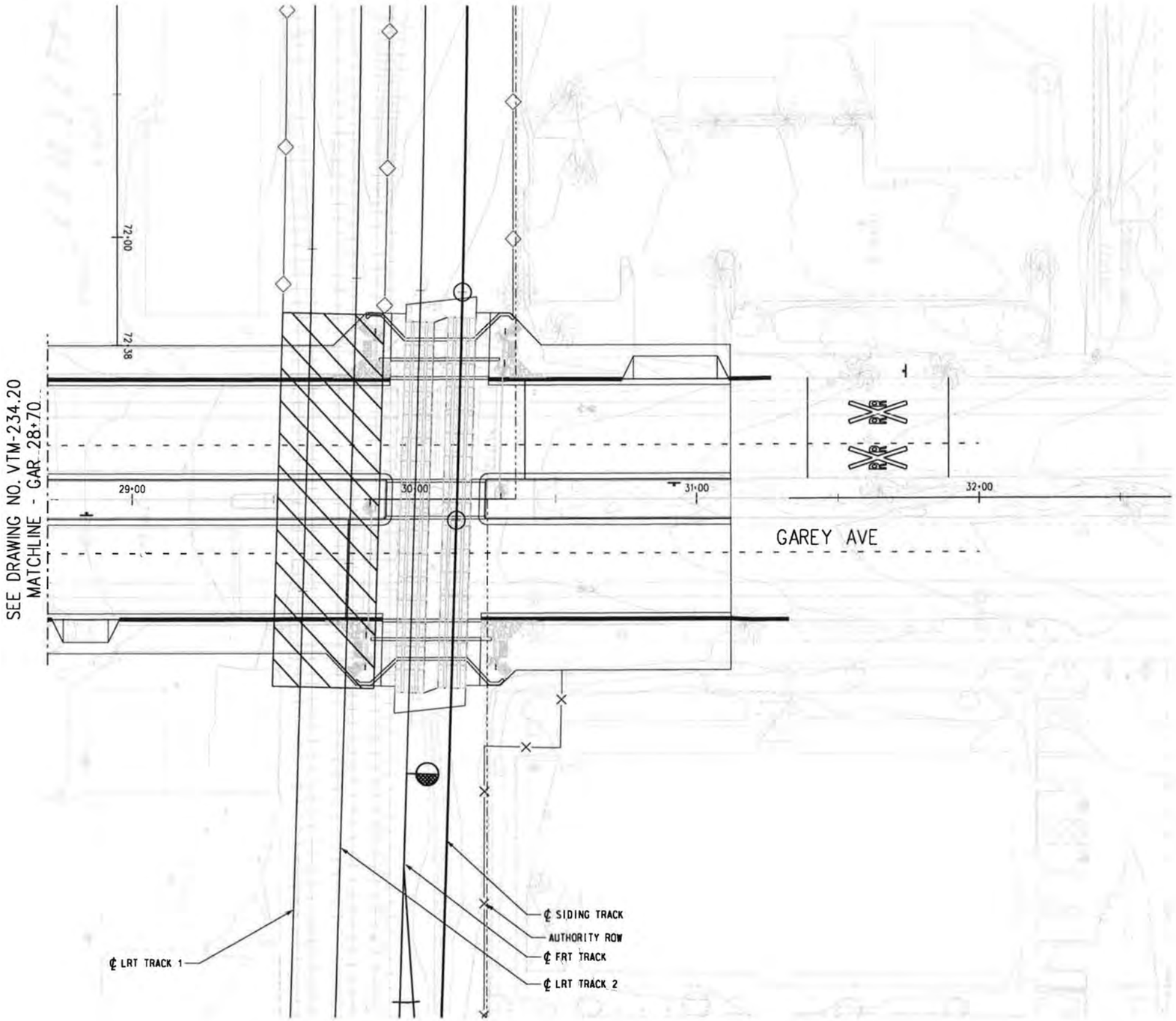
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING GUIDANCE
GAREY AVENUE PLAN

DRAWING NO. GG-234.20 REV. A
SHEET NO.



REVISIONS				
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REV.	DATE	DESCRIPTION	DES.	ENG.

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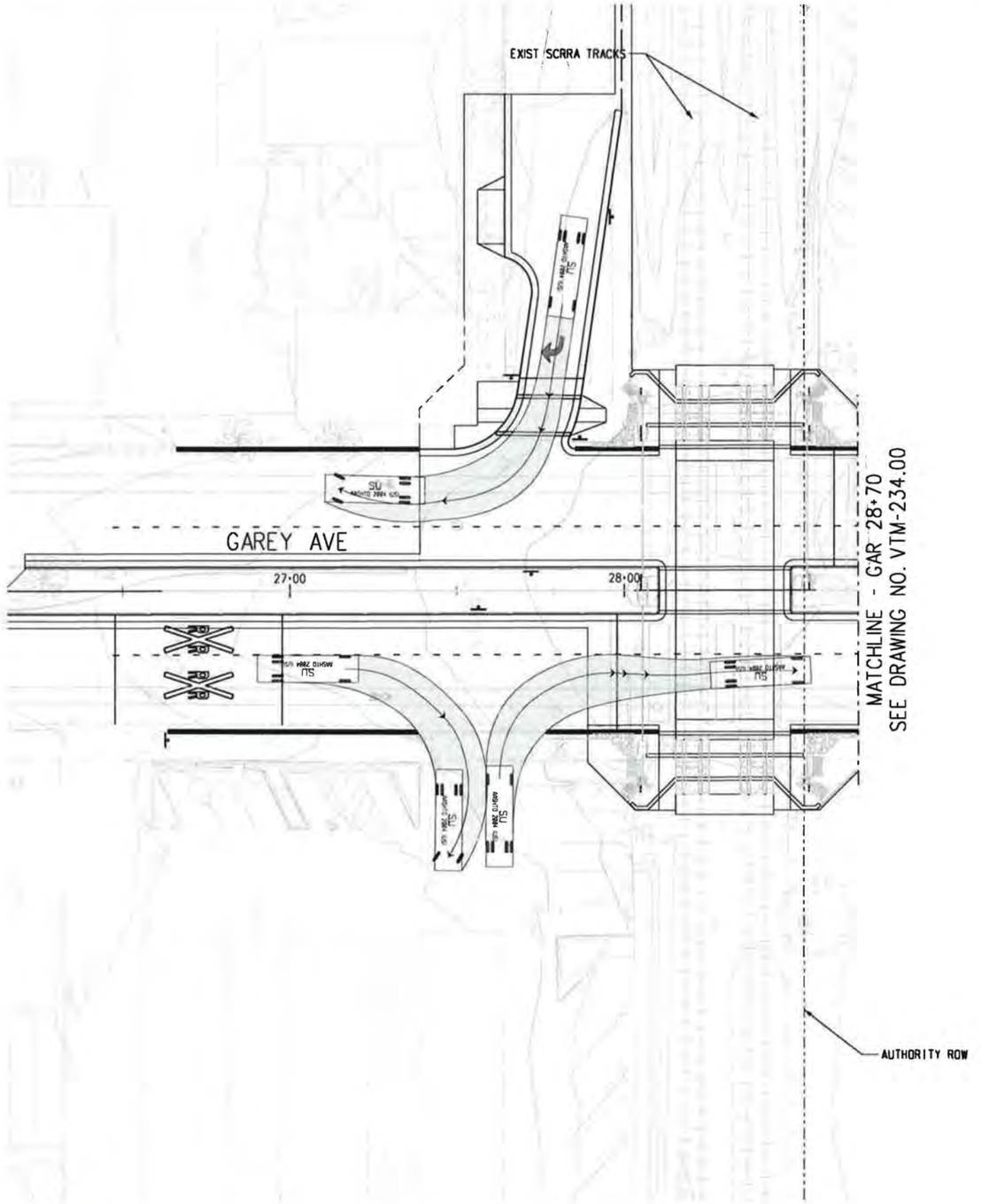
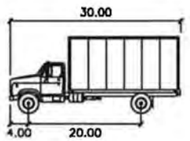
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

VEHICLE TURNING MOVEMENT
GAREY AVENUE PLAN

DRAWING NO. VTM-034.00 REV. A
SHEET NO.





SU	feet
Width	: 8.00
Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.8

20' 10' 0 20' 40'

HORIZ. SCALE

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
MAY 30, 2018

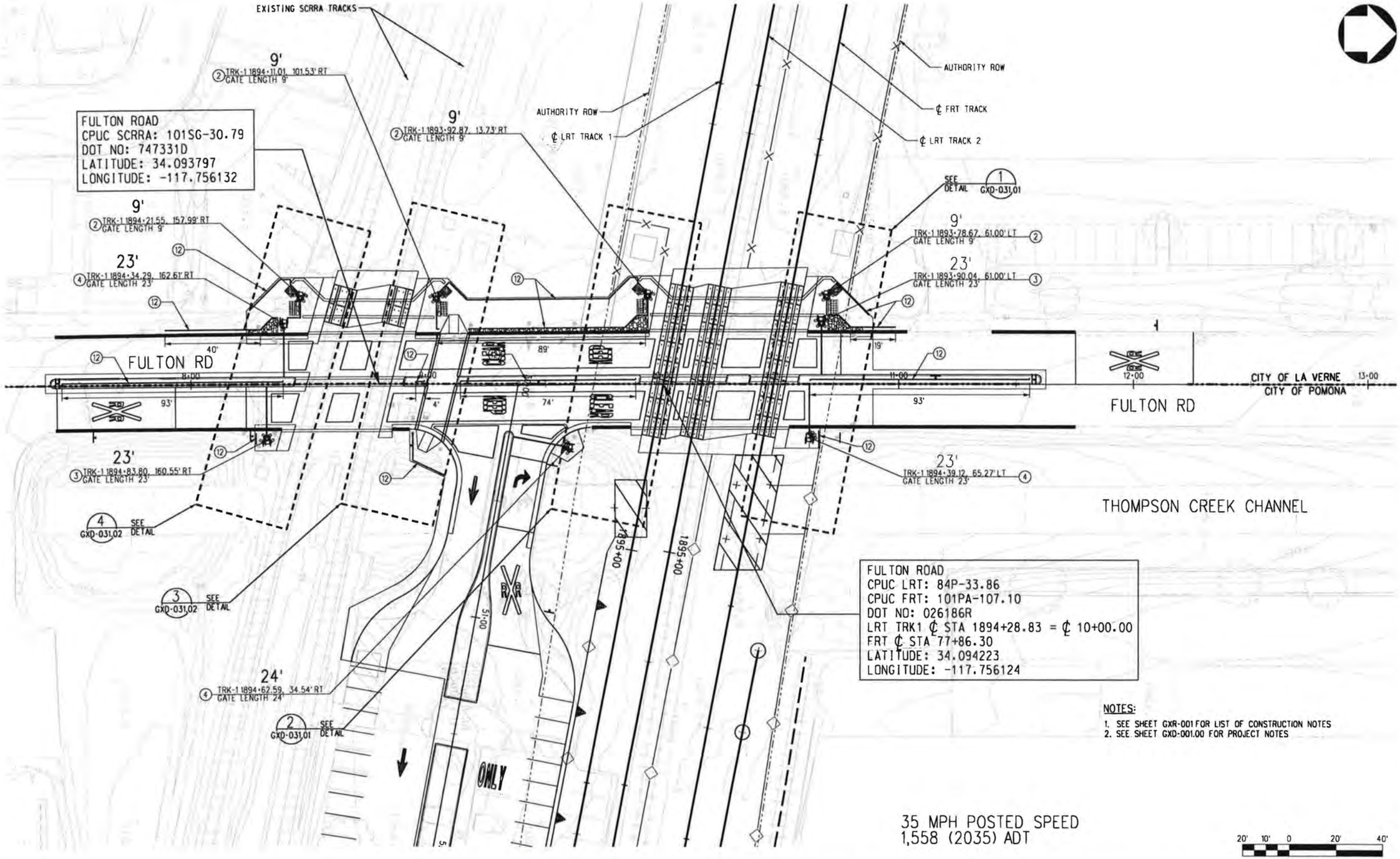
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

VEHICLE TURNING MOVEMENT
GAREY AVENUE PLAN

DRAWING NO: VTM-034.20 | REV: A
SHEET NO:

Exhibit E:

Fulton Road Grade Crossing Drawings



NOTES:

1. SEE SHEET GXR-001 FOR LIST OF CONSTRUCTION NOTES
2. SEE SHEET GXD-001.00 FOR PROJECT NOTES

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
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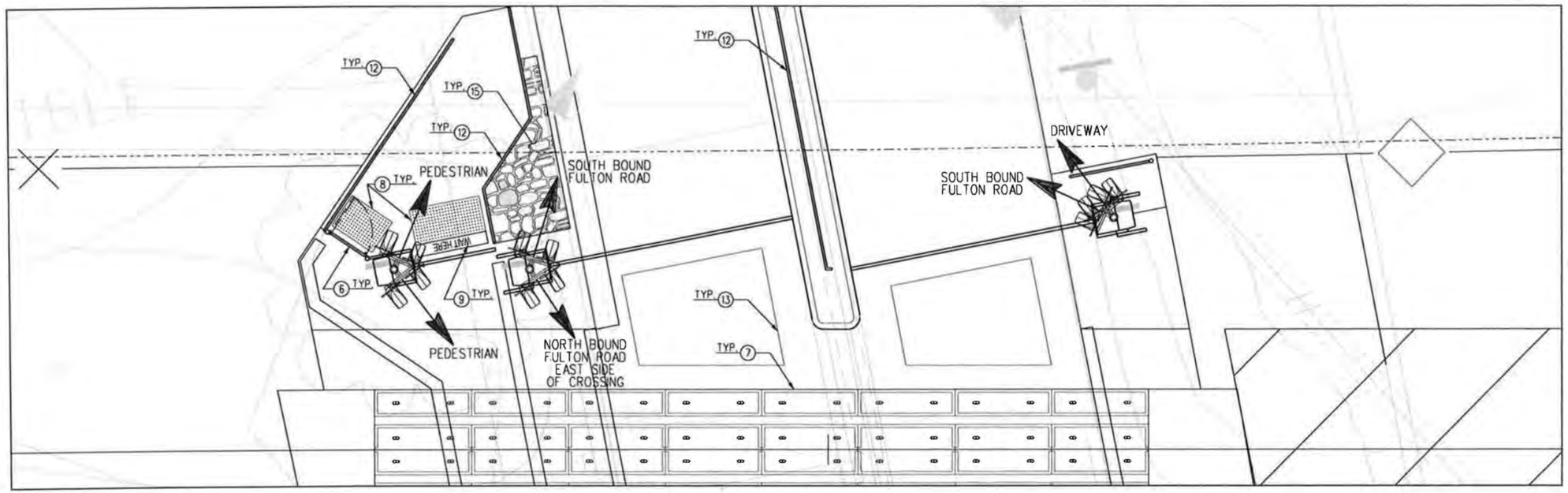
JULY 25, 2018

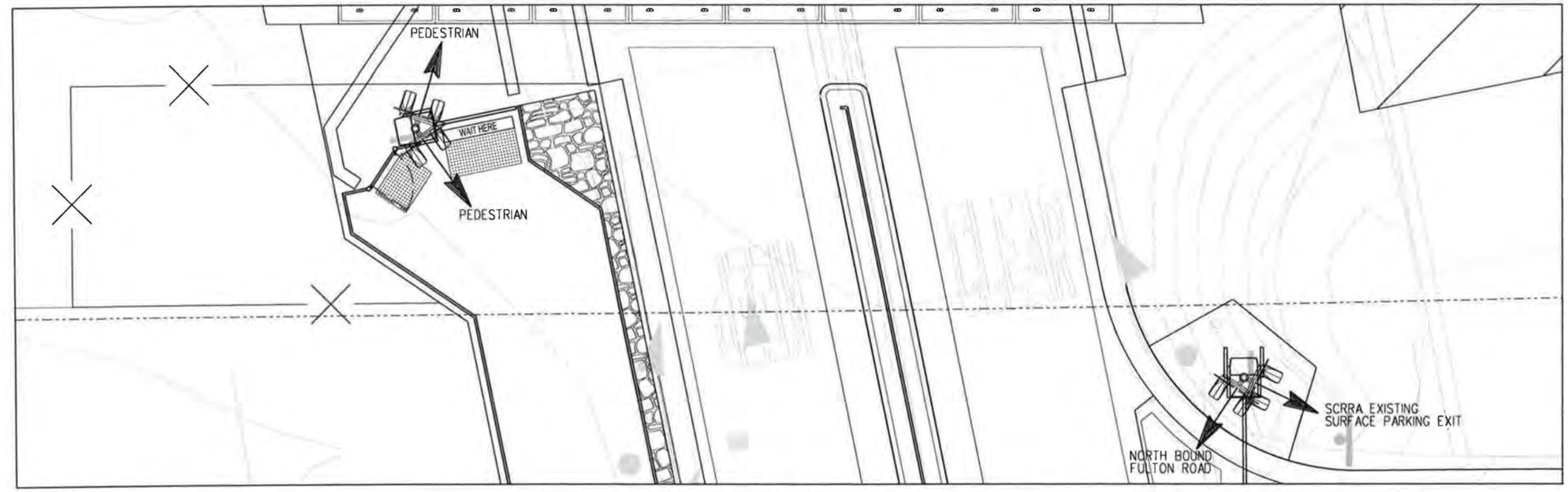
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
FULTON ROAD PLAN

DRAWING NO. GXD-031.00 REV. B
SHEET NO.



1 DETAIL PLAN
GXD-031.01 SCALE: 1" = 5'



2 DETAIL PLAN
GXD-031.01 SCALE: 1" = 5'

NOTES:

1. SEE SHEET GXR-001 FOR LIST OF CONSTRUCTION NOTES
2. SEE SHEET GXD-001.00 FOR PROJECT NOTES

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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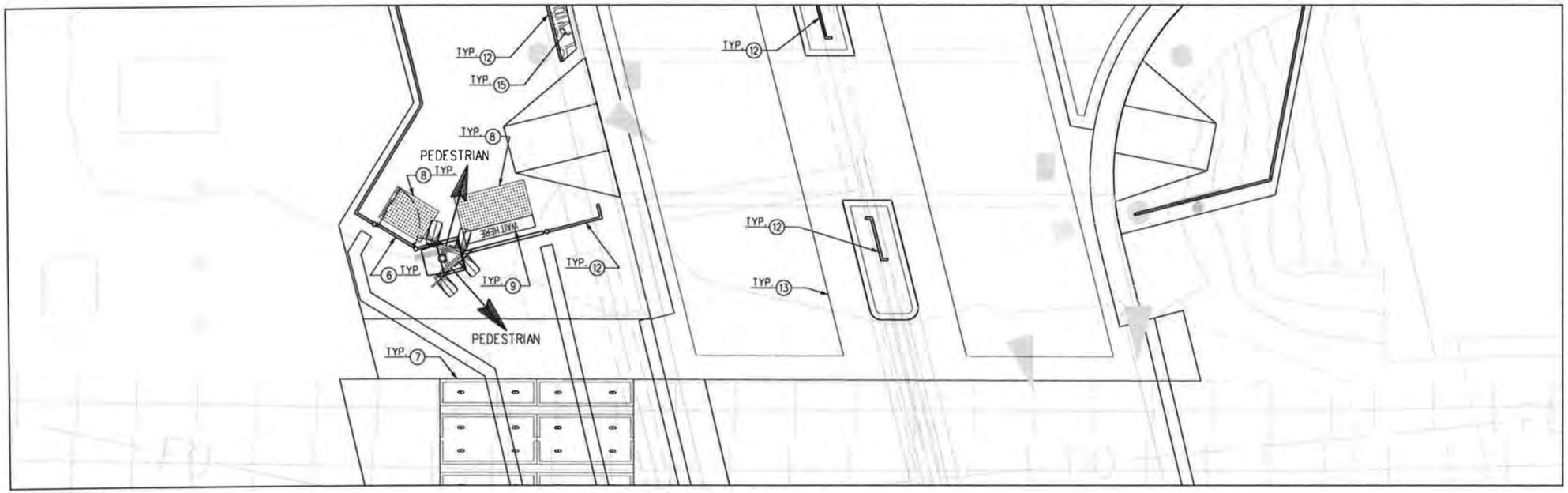
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
JULY 25, 2018

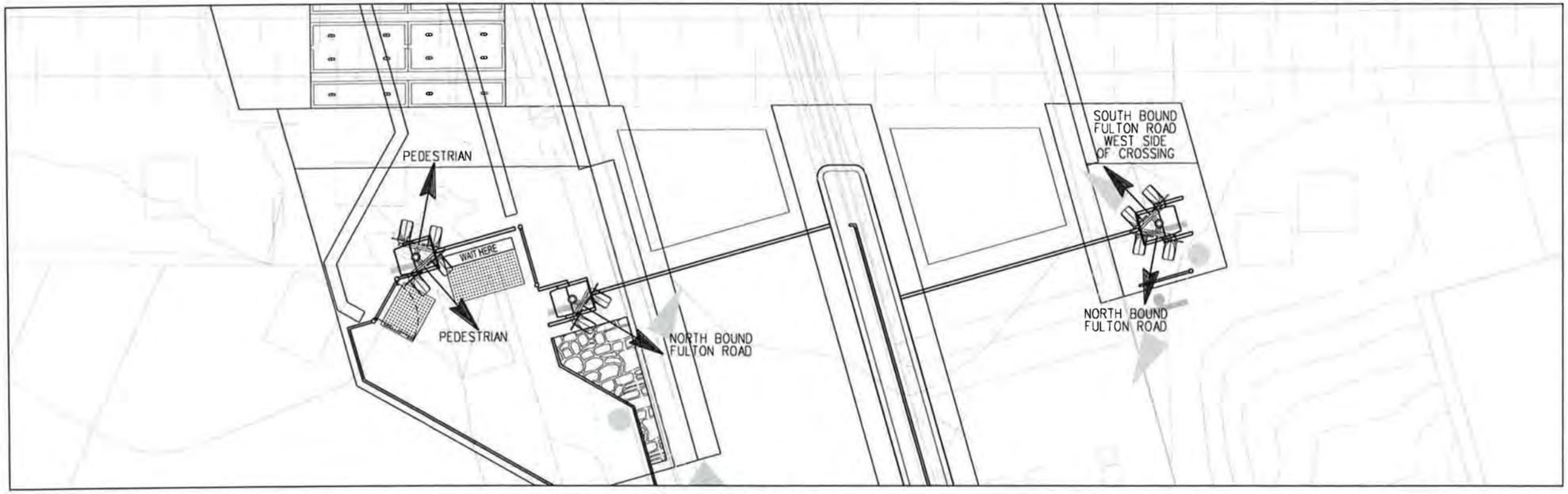
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
FULTON ROAD DETAILS (LRT/FRT)

DRAWING NO. GXD-031.01 REV. B
SHEET NO.



3 DETAIL PLAN
GXD-031.02 SCALE: 1" = 5'



4 DETAIL PLAN
GXD-031.02 SCALE: 1" = 5'

NOTES:

1. SEE SHEET GXR-001 FOR LIST OF CONSTRUCTION NOTES
2. SEE SHEET GXD-001.00 FOR PROJECT NOTES

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

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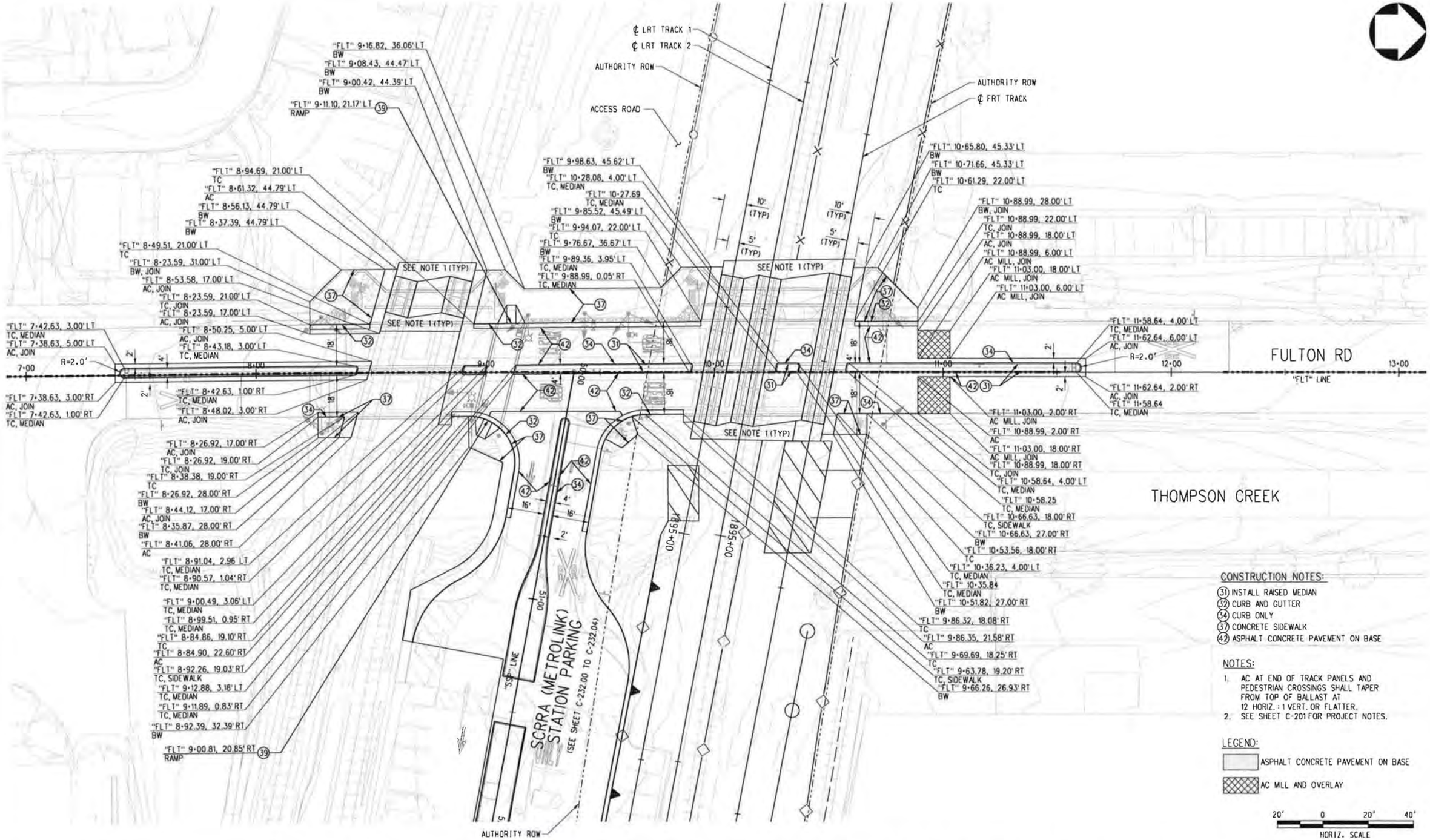
ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING
FULTON ROAD DETAILS (SCRRA)

DRAWING NO. GXD-031.02 REV. B
SHEET NO.



REVISIONS

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REV.	DATE	DESCRIPTION	DES.	ENG.

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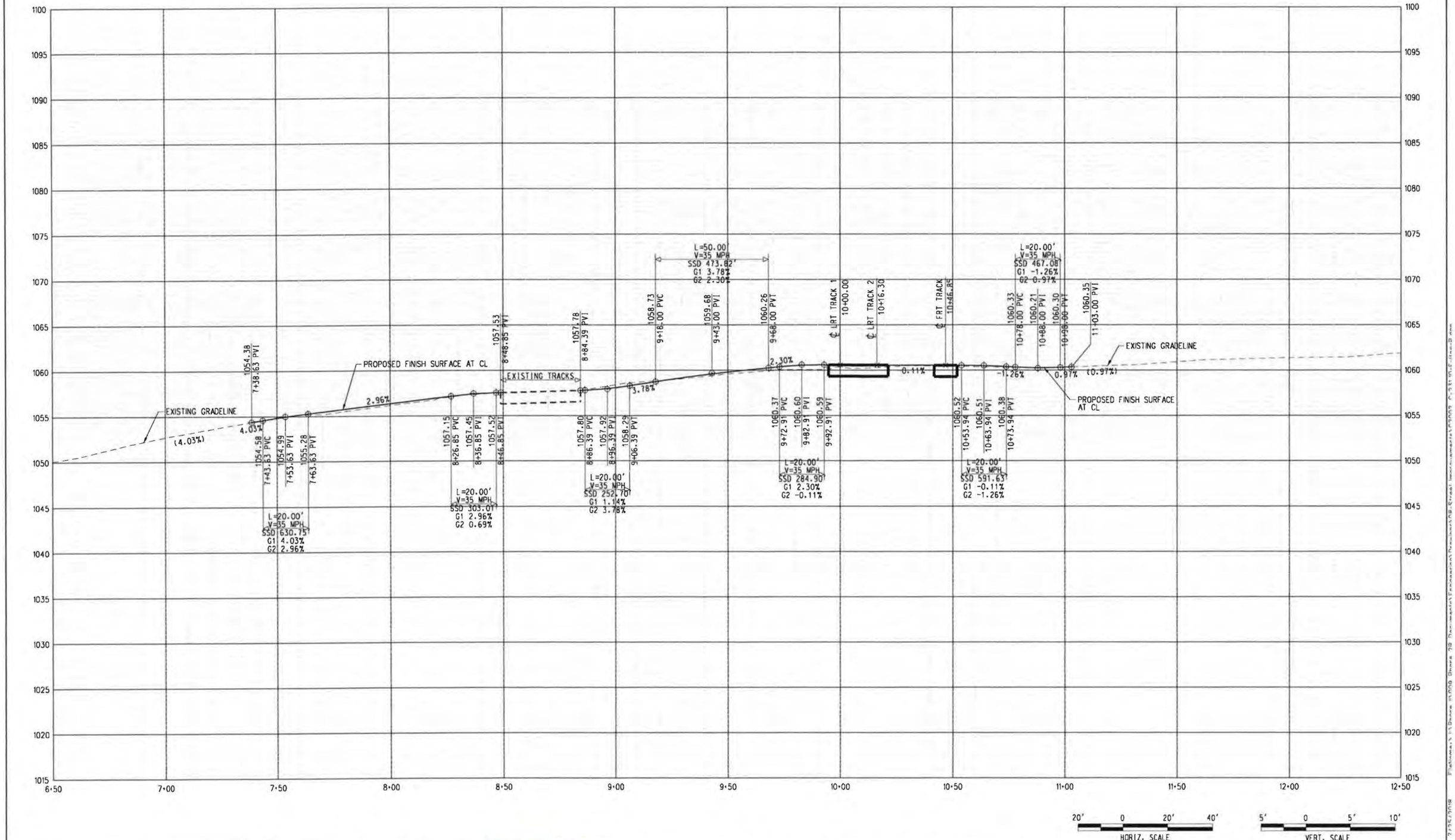
MONROVIA, CA 91016 - 3633

METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
JULY 25, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

STREET IMPROVEMENTS
FULTON ROAD PLAN

DRAWING NO: C-231 REV: B
SHEET NO:



REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

Hill International
406 E. HUNTINGTON, SUITE 202
MONROVIA, CA 91016 - 3633

METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
JULY 25, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

STREET IMPROVEMENTS
FULTON ROAD PROFILE

DRAWING NO: C-231.10 REV: B
SHEET NO:

REPORT EMERGENCY OR PROBLEM TO [illegible] CROSSING [illegible]
(AX) I-13

(A) W10-1 RAILROAD CROSSING (A1) R15-1

(B1) W48 (3) (CA) 3 TRACKS

(B1) W48 (5) (CA) 5 TRACKS

(B2) R15-2P(5) 5 TRACKS

(B2) R15-2P(3) 3 TRACKS

(K) R13A (CA) ON RED

(L) R3-4

(P) R4-7

(Q) R6-1R OR R6-1L ONE WAY ONE WAY

(R) R3-5R ONLY

(Z) R9-3A

(BG) R9-11a L OR R SIDEWALK CLOSED CROSS HERE

CONSTRUCTION NOTES:

(55) PAINTED RED CURB
(56) INSTALL SIGN AND POST
(57) INSTALL SIGN ON POLE
(58) INSTALL RAILROAD CROSSING SYMBOL
(59) INSTALL PAVEMENT MARKING PER CALTRANS STANDARD PLANS A24C, A24D AND A24E
(60) PAINT MEDIAN NOSE - YELLOW
(61) INSTALL 24" LIMIT LINE
(66) INSTALL 12" SOLID WHITE LINE PER CALTRANS STANDARD PLANS
(67) INSTALL TYPE I ARROW PER CALTRANS STANDARD PLANS
(68) INSTALL TYPE IV (L) OR (R) ARROWS PER CALTRANS STANDARD PLANS
(74) INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 28
(81) INSTALL STRIPE PER CALTRANS STANDARD PLANS A20B DETAIL 27B

REMOVAL NOTES:

[52] REMOVE CONFLICTING STRIPING AND RAISED PAVEMENT MARKERS BY WET SANDBLASTING

NOTES:

1. SEE TF-100 FOR COMPLETE LIST OF CONSTRUCTION NOTES.
2. SEE TF-201.00 FOR PROJECT NOTES AND GENERAL NOTES.
3. FINAL DESIGN PER MUTCD (CA) AND CALTRANS STANDARDS.

AUTHORITY ROW
℄ FRT TRACK
℄ LRT TRACK 2
℄ LRT TRACK 1
℄ BNSF TRACK
STA 7+43 JOIN EXIST
STA 12+26 JOIN EXIST
CITY OF LA VERNE
CITY OF POMONA
FULTON RD
THOMPSON CREEK
SCRRA (METROLINK) PARKING
(SEE SHEET TF-232.00 TO TF-232.04)
ONLY
1895+00
20' 0 20' 40'
HORIZ. SCALE

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

HILL
Hill International
406 E. HUNTINGTON, SUITE 202
MONROVIA, CA 91016 - 3633

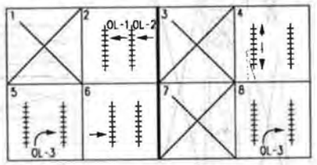
METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
JULY 25, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

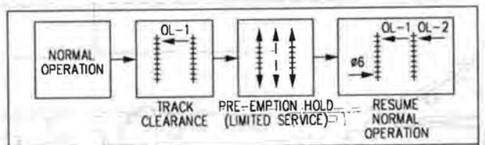
SIGNING AND STRIPING
FULTON ROAD PLAN

DRAWING NO: TF-231.00
REV: B
SHEET NO:

PROPOSED PHASE DIAGRAM



OPERATION:
ø2 AND ø6 ON VEHICLE RECALL
RR TRACK CLEARANCE = OL-1
RR LIMITED SERVICES = ø4 PED
OL-3 = ø5 + ø8



RR PRE-EMPTION SEQUENCE

EXISTING TRACKS

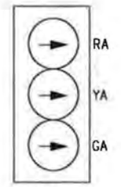
℄ LRT TRACK 2

℄ LRT TRACK 1

AUTHORITY ROW

℄ FRT TRACK

AUTHORITY ROW



DETAIL A

FULTON RD

6J2U

RADAR ZONES OR CUT LOOPS

6J2L

PV OL-1

ø6

ø4P

SEE DETAIL A

OL-3

OL-2

212L

212U

RADAR ZONES OR CUT LOOP

CITY OF LA VERNE

CITY OF POMONA

PPB

SCRRA (METROLINK) PARKING

4 1/6U

1895+00

THOMPSON CREEK

LEGEND:

DETECTION ZONE

NOTES:

1. SEE GXR-001 FOR COMPLETE LIST OF CONSTRUCTION NOTES.
2. CONTRACTOR TO ENSURE VISIBILITY OF TRAFFIC SIGNAL AND CROSSING EQUIPMENT.
3. GRADE CROSSING TO BE INTERCONNECTED WITH TRAFFIC SIGNALS.
4. CONTRACTOR TO FINALIZE CONDUCTOR AND TRAFFIC POLE SCHEDULE.

STANDARD NOTES AND ABBREVIATIONS:

AB	ABANDON. IF APPLIED TO CONDUIT REMOVE CONDUCTORS.
BC	INSTALL PULLBOX IN EXISTING CONDUIT RUN.
CB	INSTALL CONDUIT INTO EXISTING PULLBOX.
CC	JOIN NEW AND EXISTING CONDUIT.
RR	REMOVE AND REUSE EQUIPMENT.
RS	REMOVE AND SALVAGE EQUIPMENT.

20' 0 20' 40'
HORIZ. SCALE

REVISIONS

NOT FOR CONSTRUCTION

REV.	DATE	DESCRIPTION	DES.	ENG.

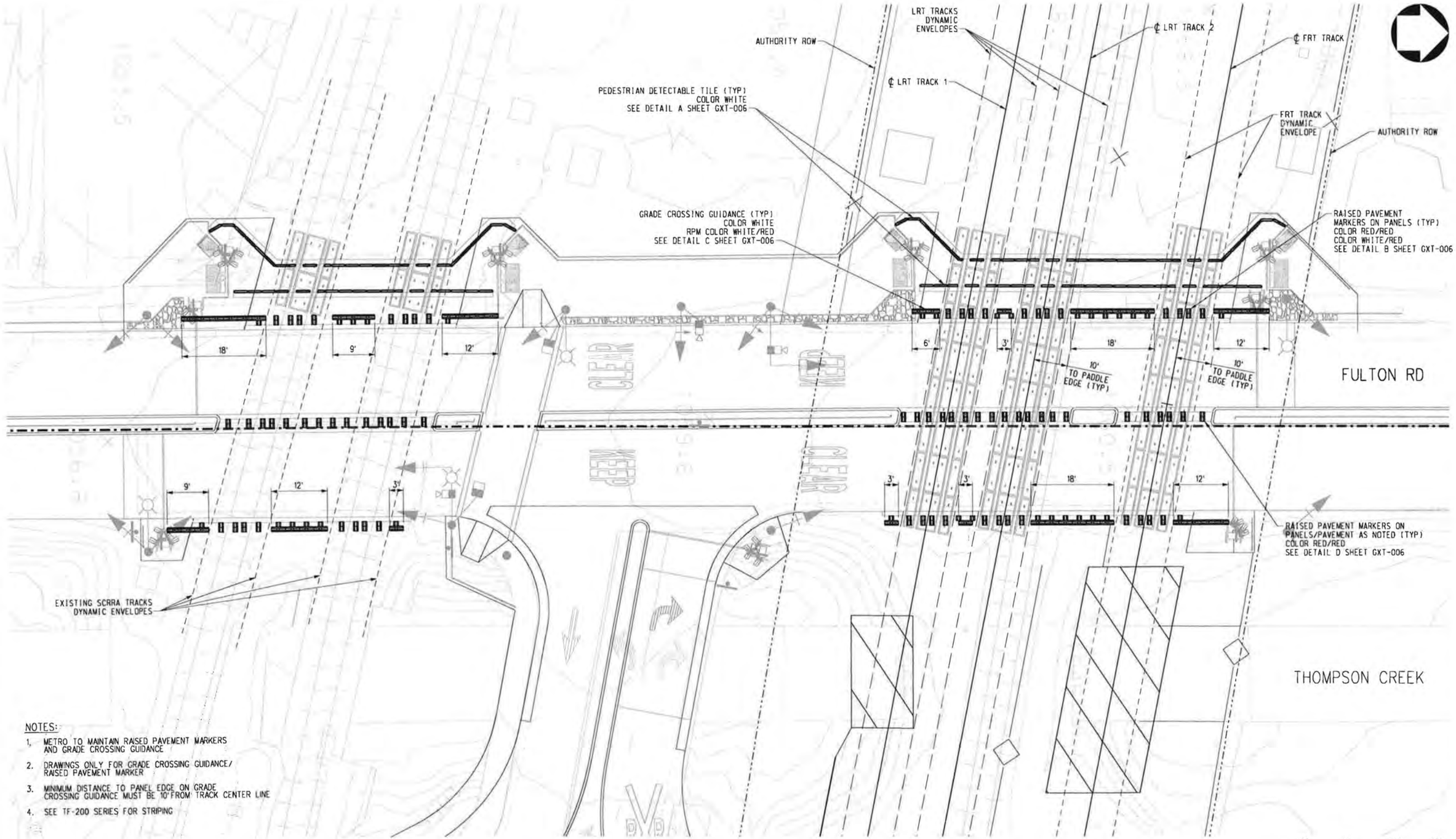
Hill International
406 E. HUNTINGTON, SUITE 202
MONROVIA, CA 91016 - 3633

METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
JULY 25, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

TRAFFIC SIGNALS
FULTON ROAD

DRAWING NO. TF-331.00 REV. B
SHEET NO.



NOTES:

1. METRO TO MAINTAIN RAISED PAVEMENT MARKERS AND GRADE CROSSING GUIDANCE
2. DRAWINGS ONLY FOR GRADE CROSSING GUIDANCE/ RAISED PAVEMENT MARKER
3. MINIMUM DISTANCE TO PANEL EDGE ON GRADE CROSSING GUIDANCE MUST BE 10' FROM TRACK CENTER LINE
4. SEE TF-200 SERIES FOR STRIPING

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

Hill International
406 E. HUNTINGTON, SUITE 202
MONROVIA, CA 91016 - 3633

METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
JULY 25, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

GRADE CROSSING GUIDANCE
FULTON ROAD PLAN

DRAWING NO: GG-231 REV: B
SHEET NO:

EXISTING SCRRA TRACKS

AUTHORITY ROW

℄ LRT TRACK 1

AUTHORITY ROW

℄ FRT TRACK

℄ LRT TRACK 2

FULTON RD

CITY OF LA VERNE

CITY OF POMONA

THOMPSON CREEK CHANNEL

ONLY

30.00

4.00 20.00

SU	feet
Width	: 8.00
Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.8

20' 10' 0 20' 40'

HORIZ. SCALE

REVISIONS				
NOT FOR CONSTRUCTION				
REV.	DATE	DESCRIPTION	DES.	ENG.

Hill International
406 E. HUNTINGTON, SUITE 202
MONROVIA, CA 91016 - 3633

METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AUTHORITY
PHASE 2B ALIGNMENT DESIGN-BUILD PROJECT
REQUEST FOR PROPOSAL (RFP) C2002
JULY 25, 2018

ADVANCED CONCEPTUAL ENGINEERING
GLENDORA TO MONTCLAIR

VEHICLE TURNING MOVEMENT
FULTON ROAD PLAN

DRAWING NO. VTM-031.00 REV B
SHEET NO.

Exhibit F:

Fulton Road Preemption Time Details

Version 6-10-04

Texas Department of Transportation

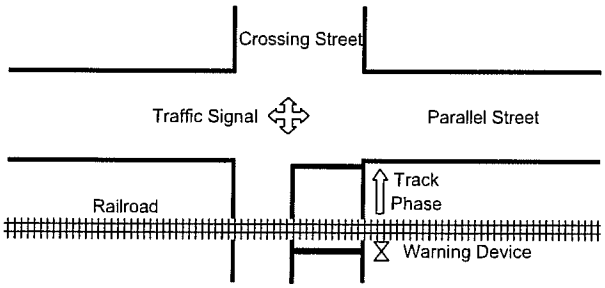
GUIDE FOR DETERMINING TIME REQUIREMENTS FOR TRAFFIC SIGNAL PREEMPTION AT HIGHWAY-RAIL GRADE CROSSINGS

PRELIMINARY

City: City Pomona/La Verne
County: Los Angeles
District: 5

Date: 06/13/18
Completed by: PPP
District Approval:

Show North Arrow



Parallel Street Name: Ped X-ing

Crossing Street Name: Fulton Rd

Railroad:
Crossing DOT#:
Railroad Contact:
Phone:

SECTION 1: RIGHT-OF-WAY TRANSFER TIME CALCULATION

Preempt verification and response time

			Remarks
1. Preempt delay time (seconds)	1.	0.0	
2. Controller response time to preempt (seconds)	2.	0.0	Controller type: 2070 w/ Omni eX
3. Preempt verification and response time (seconds): add lines 1 and 2	3.	0.0	

Worst-case conflicting vehicle time

			Remarks
4. Worst-case conflicting vehicle phase number	4.	2	
5. Minimum green time during right-of-way transfer (seconds)	5.	4.0	
6. Other green time during right-of-way transfer (seconds)	6.	0.0	
7. Yellow change time (seconds)	7.	5.0	
8. Red clearance time (seconds)	8.	2.0	
9. Worst-case conflicting vehicle time (seconds): add lines 5 through 8	9.	11.0	

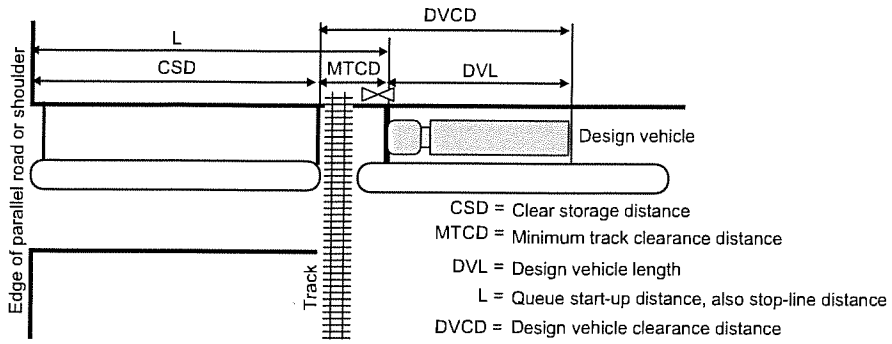
Worst-case conflicting pedestrian time

			Remarks
10. Worst-case conflicting pedestrian phase number	10.	4	
11. Minimum walk time during right-of-way transfer (seconds)	11.	0.0	Walk time truncated.
12. Pedestrian clearance time during right-of-way transfer (seconds)	12.	10.0	Walking speed = 3.5 ft/s
13. Vehicle yellow change time, if not included on line 12 (seconds)	13.	4.0	
14. Vehicle red clearance time, if not included on line 12 (seconds)	14.	1.0	
15. Worst-case conflicting pedestrian time (seconds): add lines 11 through 14	15.	15.0	

Worst-case conflicting vehicle or pedestrian time

16. Worst-case conflicting vehicle or pedestrian time (seconds): maximum of lines 9 and 15	16.	15.0
17. Right-of-way transfer time (seconds): add lines 3 and 16	17.	15.0

SECTION 2: QUEUE CLEARANCE TIME CALCULATION



Remarks

18. Clear storage distance (CSD, feet)	**18.**	0	All measurements from concept
19. Minimum track clearance distance (MTCD, feet)	**19.**	232	traffic signal plan.
20. Design vehicle length (DVL, feet)	**20.**	55	Design vehicle type: WB-50

21. Queue start-up distance, L (feet): add lines 18 and 19	**21.**	232
22. Time required for design vehicle to start moving (seconds): calculate as 2+(L÷20)	**22.**	13.6
23. Design vehicle clearance distance, DVCD (feet): add lines 19 and 20	**23.**	287
24. Time for design vehicle to accelerate through the DVCD (seconds)	**24.**	24.0
25. Queue clearance time (seconds): add lines 22 and 24	**25.**	37.6

Remarks

Read from Figure 2 in Instructions.

SECTION 3: MAXIMUM PREEMPTION TIME CALCULATION

Remarks

26. Right-of-way transfer time (seconds): line 17	**26.**	15.0
27. Queue clearance time (seconds): line 25	**27.**	37.6
28. Desired minimum separation time (seconds)	**28.**	4.0
29. Maximum preemption time (seconds): add lines 26 through 28	**29.**	56.6

SECTION 4: SUFFICIENT WARNING TIME CHECK

Remarks

30. Required minimum time, MT (seconds): per regulations	**30.**	20.0	
31. Clearance time, CT (seconds): get from railroad	**31.**	20.0	
32. Minimum warning time, MWT (seconds): add lines 30 and 31	**32.**	40.0	Excludes buffer time (BT)
33. Advance preemption time, APT, if provided (seconds): get from railroad ..	**33.**	0.0	
34. Warning time provided by the railroad (seconds): add lines 32 and 33	**34.**	40.0	
35. Additional warning time required from railroad (seconds): subtract line 34 from line 29, round up to nearest full second, enter 0 if less than 0	**35.**	17	

If the additional warning time required (line 35) is greater than zero, additional warning time has to be requested from the railroad. Alternatively, the maximum preemption time (line 29) may be decreased after performing an engineering study to investigate the possibility of reducing the values on lines 1, 5, 6, 7, 8, 11, 12, 13 and 14.

Remarks:

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
TRAFFIC AND LIGHTING DIVISION
TRAFFIC SIGNAL TIMING

Omni eX v1.8.2.6232

PRELIMINARY

DATE PREPARED: 7/18/2018 By: HA
DATE IMPLEMENTED: By:

INTERSECTION: Fulton Road @ Ped Xing
T.S.No.: TF331(Pom./La Ve.)

1.1 Operational Mode	254
1.2 Unit Setup	
Auto PED Clr	NO
Red Revert	2.0
Min Yellow Time	3.0
TX Dmd Mode	Disable
TX Dmd Type	4-Phase

1.4 Channel Setup (1-16)

Index	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Type		O	O			P	O	V								
Source (Phase)		1	2			4	3	6								
Alt 1/2 Hz																
Flsh Red		X			X			X								
Flash Yel																

B.3 System Information	
System Id	0000000306
Name	Fulton Rd @ Ped Signal
Location	La Verne / Pomona

5.1 Coordination Constants	
Correction Mode	Shortway
Max Cycles Trans	3
Coord Max Mode	Max Inhibit
Coord Force Mode	Fixed
Perm Strategy	Maximum
Omit Strategy	Minimum
Sync Point	Begin Green
No Early Return	Disable
Sync Ref Time	00:00:00

1.3 Startup		
Start-Up Phases	GRN	-2---6----------
Next Phase		----------
Start Veh Call		-2-4-5-6-----
Startup Ped Call		---4----
Startup Flash		0.0
Startup All Red		6.0

1.4 Channel Setup (17-32)

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Type																
Source																
Alt 1/2 Hz																
Flsh Red																
Flsh Yel																

2.5 Phase Concurrrency

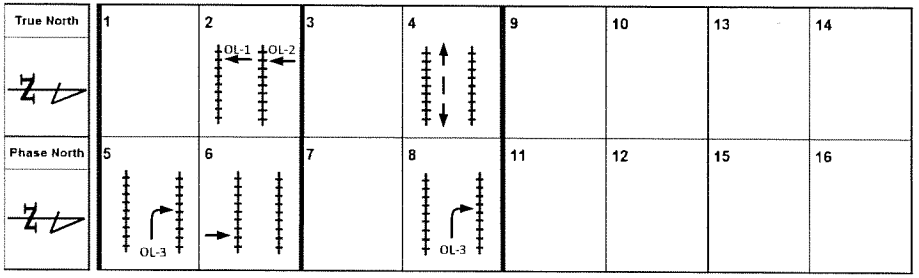
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Phase 1																
Phase 2					X	X										
Phase 3																
Phase 4								X								
Phase 5		X														
Phase 6		X														
Phase 7																
Phase 8				X												
Phase 9																
Phase 10																
Phase 11																
Phase 12																
Phase 13																
Phase 14																
Phase 15																
Phase 16																

NOTES:

2.4 Phase Enable and Rings

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Enabled		X		X	X	X		X								
Ring1		X		X												
Ring2					X	X		X								
Ring3																
Ring4																

Phase Diagram



NOTES:
Ø2 & Ø6 On Vehicle Recall
Ø4 & Ø8 On Double Entry
Track Clearance Phase = OL-1
Limited Service Phase = Ø4 PED

Omni eX v1.8.2.6232

PROGRAM REFERENCE CARD

INTERSECTION: Fulton Road @ Ped Xing Date Prepared: _____ By: HA

T.S. No.: TF331(Pom./La Ve.) Date Implemented: _____ By: _____

DETECTOR ASSIGNMENT SUMMARY WORKSHEET

(INFORMATION ONLY WORKSHEET)

App	Lanes	Description	Designation	Detector Number	Assigned Phases	Delay Time	Extend Time	Queue Limit Time	Comments
E	RT	FIRST VEHICLE*	5I1U	1	5				
			I1L						
N	1	ADVANCE	2I2U	2	2				
N	1	QUEUE CLEARING *	2I2L	3	2		2.0	25	
			I3U	4					
			I3L	5					
			I4U	6					
			I4L						
			I5U	7					
			I5L						
			I6U	8					
			I6L	9					
			I7U	10					
			I7L	11					
			I8U	12					
			I8L						
			I9U	13					
			I9L	14					

App	Lanes	Description	Designation	Detector Number	Assigned Phases	Delay Time	Extend Time	Queue Limit Time	Comments
			J1U	15					
			J1L						
S	1	ADVANCE	6J2U	16	6				
S	1	QUEUE CLEARING *	6J2L	17	6		2.0	25	
			J3U	18					
			I3L	19					
			J4U	20					
			J4L						
			J5U	21					
			J5L						
			J6U	22					
			J6L	23					
			J7U	24					
			J7L	25					
			J8U	26					
			J8L						
			J9U	27					
			J9L	28					

Comments:

* = VIDEO DETECTION

Exhibit G:
Fulton Road At-Grade Safety Report

GRADE CROSSING ANALYSIS REPORT

Fulton Road

Prepared for

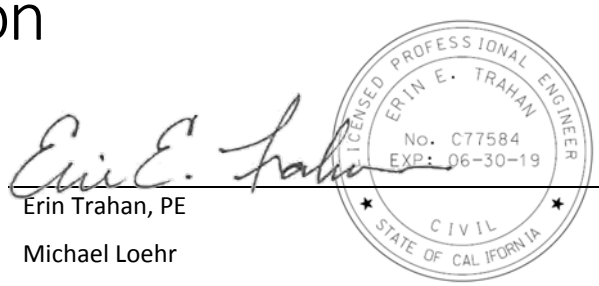
Metro Gold Line Foothill Extension Construction Authority

March 2018

ch2m
SM
1770 Iowa Ave
Suite 200
Riverside, CA 92507

Authorization

Prepared by:



Erin Trahan, PE

Michael Loehr

Reviewed by:

Sam Daleo, PE

Approved by:

Hany Haroun, PE

Revision	Purpose of Submittal	Date (MM/DD/YYYY)	Comments
0	Draft Submission	07/31/2017	
1	Draft Final Submission	01/12/2018	
2	Final Submission	3/30/2018	Incorporated Metrolink Comments

Executive Summary

The Analysis Team was charged with the analysis of six grade crossings in the Gold Line extension from Glendora to Montclair; White Ave., Fulton, Rd., Cambridge Ave., Indian Hill Blvd., College Ave., and Claremont Blvd. Each crossing has an individual Grade Crossing Analysis Report to provide a complete standalone study for each crossing. The reports are organized following the analysis process starting with the collection of data and ending with the study conclusions.

The two rail corridors within the project are the Gold Line Rail Corridor which includes freight (FRT) operations (the Pasadena Sub for FRA reporting purposes), and the joint FRT and Metrolink San Bernardino Line (the San Gabriel Sub for FRA reporting purposes). The two lines have differing milepost designations and directions, and merge at CP Cambridge, just west of Cambridge Ave. For the purposes of this report, all of the mile posts are reported based on the San Gabriel Sub numbering to provide a continuous milepost sequence through the study area. The stationing of the Gold Line is used to reference specific locations where detailed distances are required. The analysis graphs use the Gold Line stationing to provide a continuous baseline through the study area. The crossings all are active crossings in the Federal Railroad Administration's (FRA) Grade Crossing Inventory.

Fulton Rd. Grade Crossing Data

The Fulton Rd. grade crossing is located at milepost 30.80 of the San Gabriel Sub at Station 1894+30 of the Gold Line Foothill Extension. The crossing is currently two separate crossings. Each crossing activates independently from the other crossing. Figure ES-1 shows the existing conditions at the Fulton Rd. crossing.

Figure ES-1 - Google Earth Aerial View of Fulton Rd.

The proposed improvements contained in the Advanced Concept Plans are shown in Figure ES - 2.

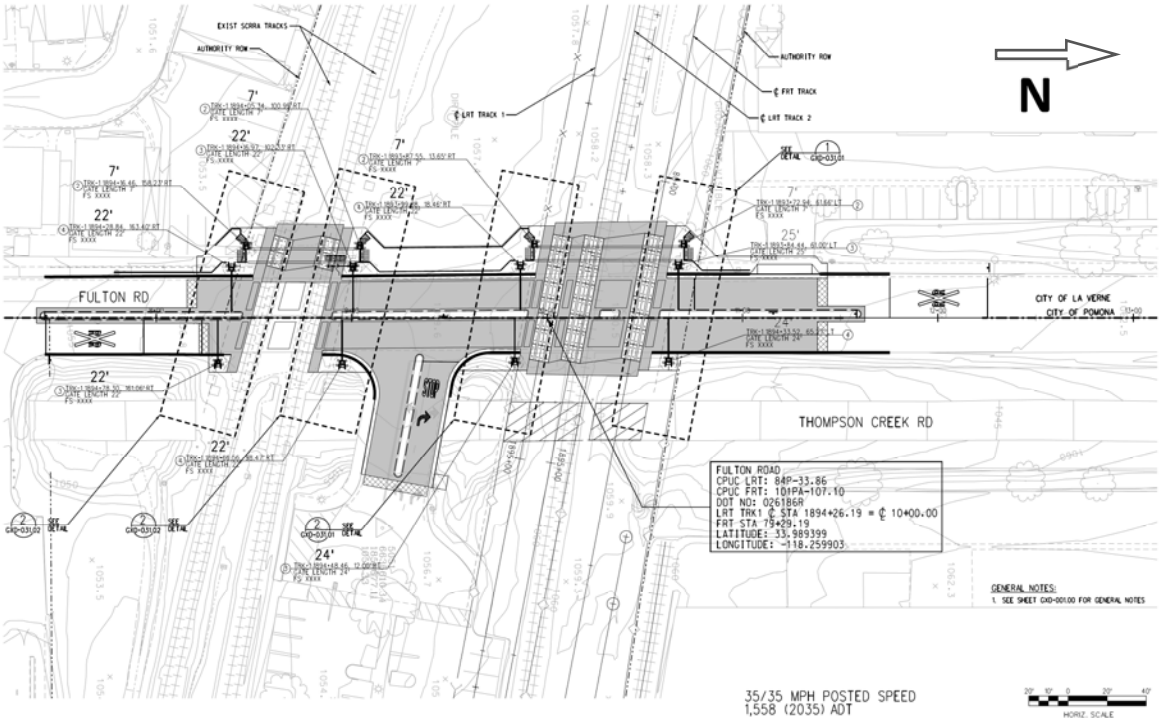


Figure ES-2 – Fulton Rd. Improvements

Methodology

The Analysis Team was tasked to perform a series of analyses as part of the review. Our analysis was informed by multiple standards, recommended practices, and guidance produced by the stakeholders involved at the crossing. Ultimately, the regulations of the CPUC and FRA were considered the minimum acceptable standards since these two agencies have the regulatory authority. The MTA Grade Crossing Policy for Light Rail Transit is used for the overall methodology and improvements with specific factors, timings, and criteria taken from the SCRRA Design Criteria Manual.

The data collected, developed, or sourced for these analyses is described below.

a. Future Year 2035 train count data (LRT, FRT, SCRRA) – full day and peak hour.
b. Projected train lengths (LRT = 3-car, FRT = 14-car, SCRRA = 7-car)
c. The results from the following studies:
    - Metrolink San Bernardino Line Infrastructure Improvement Strategic Study
    - Metrolink 10-Year Strategic Plan 2015-2025
d. Future traffic (2035) ADT generally for the project's design year as provided in existing studies.
e. Known developments, including access to project's parking structures.

The MTA Grade Crossing Policy utilizes a series of calculations to determine the applicability of the crossing to be an at-grade crossing. The calculations focus on the highway and rail traffic flows through the crossing and ultimately determine the amount of time that the crossing gates are down, and the highway traffic queues.

For Fulton Road, the analysis considers both the San Gabriel and Pasadena subdivision crossings to be a single roadway crossing.

Warning Time

To operate safely, the grade crossing warning devices must provide adequate warning time for both pedestrians and vehicles to move off (clear) the crossing before the train arrives at the crossing. The minimum warning time is regulated by the FRA and the CPUC at 20 seconds. Metrolink designs their crossings to provide an additional buffer time of ten seconds to the FRA and the CPUC minimum. Metrolink uses automated devices to provide this minimum warning time regardless of the approaching train's speed (constant warning time). MTA uses conventional circuitry with timers to provide the minimum warning time at maximum speed. For the six at-grade crossing analysis we have assumed constant warning time at all locations. In the majority of cases the difference between the two would be minimal.

The clearance time for the pedestrian and vehicles is based on the physical dimensions of the crossing according to a defined set of calculations. For pedestrians, the distance between the entrance and exit gates divided by the walking speed provides the pedestrian clearance time. For the vehicles, the minimum 20 seconds warning time included the time needed for a vehicle to clear a 35 foot wide crossing. For wider crossings, one second is added for every ten feet of width, or portion there of after 35-feet, with 28 seconds as the minimum warning time per MTA standards. The crossing analysis conservatively used a consistent 30 seconds minimum warning time for all trains and adjusted the minimum warning time upward to address any additional clearance time required. Fulton Rd. is proposed to be 239' wide to the vehicle stop bars, so the total vehicle clearance time is 51 seconds.

The total warning time is the greater of 1) the calculated clearance time, or 2) the minimum warning time making the total warning time at Fulton Rd. 51 seconds.

Gate Down Time

Gate Down Time, as used in this document, is the time from the start of gate flashers turning on to the time that the gates are rising and are in a mostly vertical position after the train has passed through the crossing, when pedestrian, bicycle and vehicular traffic can safely cross the railroad crossing.

At Fulton Rd., the warning time does vary due to the deceleration and acceleration of the Metrolink and Gold Line trains after the crossing circuits have been activated, which affects the gate down time. To address this phenomenon, we performed a simplified train performance calculation where the train performance was based on a fixed rate of acceleration and/or deceleration. Figure ES - 3 depicts the speed distance curve of an outbound commuter train. The solid line is the leading locomotive, while the dotted line represents the end of the last car in the train. The timings included in the calculations are labelled on the speed / distance graph.

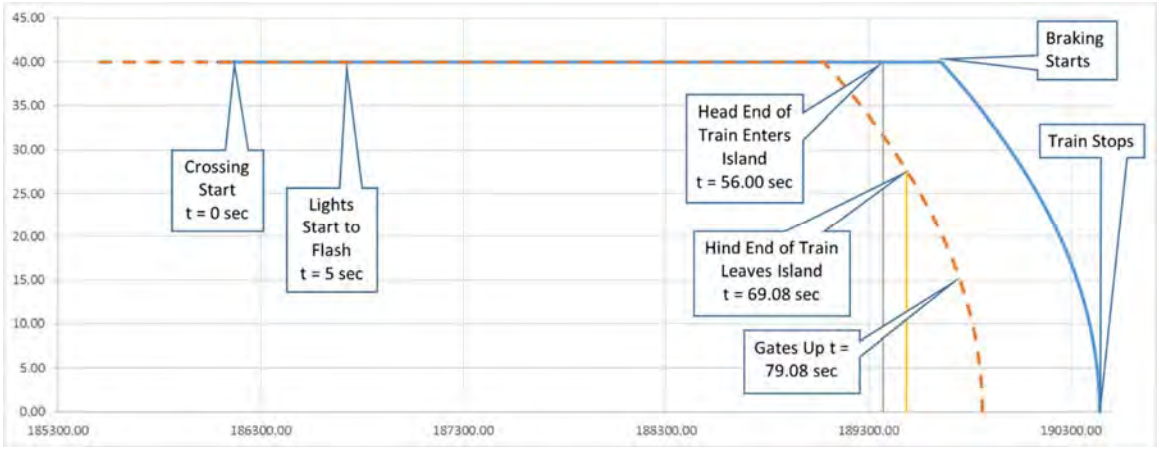


Figure ES-3 - Outbound Metrolink Train Speed/Distance Curve

Speed/Distance curves were calculated for each of the train types. The grade crossing warning devices were modelled on the curves by using the 40 mph crossing start for a through outbound commuter train and 79 mph crossing start for a through inbound commuter train, adding five seconds for equipment activation, plus an offset due to the constant warning time to indicate when the lights start flashing. The time that the head end of the train enters the island circuit was calculated to include the minimum warning time plus the necessary additional clearance time and checked to verify that the gates are down at least 30 seconds before the head end of the train enters the crossing. The gate release was modelled by allowing ten seconds for the gates to raise after the train has left the island circuit.

The Speed/Distance curve provides the length of time that the gates are down at the crossing and includes all the data needed for a single train

Multiple Trains at Crossings

Calculating the gate down time for a single train is instructional, but it does not reflect the reality of the operations in the real world. Trains can arrive at a crossing sequentially, simultaneously, or in random patterns. To determine how the trains would operate at the crossings, we took the proposed headways and schedules for the proposed Gold Line (five minute headways at peak hours), the Metrolink headways discussed in SCRRA's 2025 plan, and the worst-case schedule of the freight train in the PM peak.

The multiple train gate down times are based on schedule assumptions and normal operating procedures. This analysis does not account for emergency or unplanned situations that occur as a part of regular train operations.

The schedules were converted into stringlines graphs. A stringline is a time distance graph of a train schedule. The grade crossings were located on the stringline graph and typical locations where train arrivals would lead to longer gate down times.

Figure ES - 4 depicts the PM peak combined schedules for the Gold Line and the Metrolink trains. The freight train was scheduled in to run in a slot between the outbound Metrolink Train during the Peak Hour, as worst-case scenario. The labelled ovals are typical schedule locations where multiple trains operated over the crossings at closely spaced times and indicate the various cases where the gate down times were calculated in order to determine the maximum time expected.

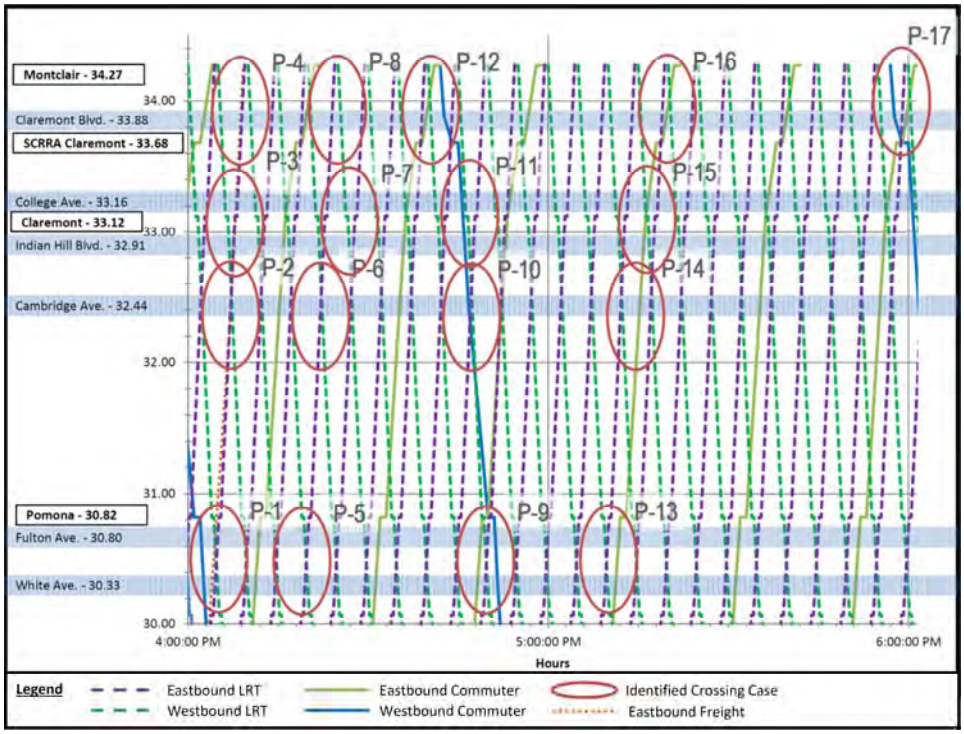


Figure ES-4 - PM Peak Stringlines with Study Cases

Table ES - 1 lists the PM Peak Hour cases at Fulton Rd. and the corresponding schedule times.

Table ES – 1 PM Peak Study Cases

Case	Crossing	Train	Type	Direction	Schedule	Description
P1	Fulton Rd.	1305	LRT	In	4:04:18 PM	3 Simultaneous with Station Stop
	Fulton Rd.	1252	LRT	Out	4:05:06 PM	
	Fulton Rd.	FRT	FRT	Out	4:04:43 PM	
P5	Fulton Rd.	1311	LRT	In	4:19:18 PM	2 Simultaneous
	Fulton Rd.	1258	LRT	Out	4:20:06 PM	
P9	Fulton Rd.	331	CRT	In	4:51:01 PM	4 Simultaneous with Station Stop
	Fulton Rd.	1323	LRT	In	4:49:18 PM	
	Fulton Rd.	1270	LRT	Out	4:50:06 PM	
	Fulton Rd.	318	CRT	Out	4:48:58 PM	
P13	Fulton Rd.	1331	LRT	In	5:09:18 PM	2 Simultaneous and 1 Sequential with Station Stop
	Fulton Rd.	1278	LRT	Out	5:10:06 PM	
	Fulton Rd.	386	CRT	Out	5:11:58 PM	

To evaluate the gate down times, a train activation versus time graphic was created. Figure ES - 5 depicts the train activation vs. time graph and shows the timings of the grade crossing warning devices taken from the train speed/distance graphs.

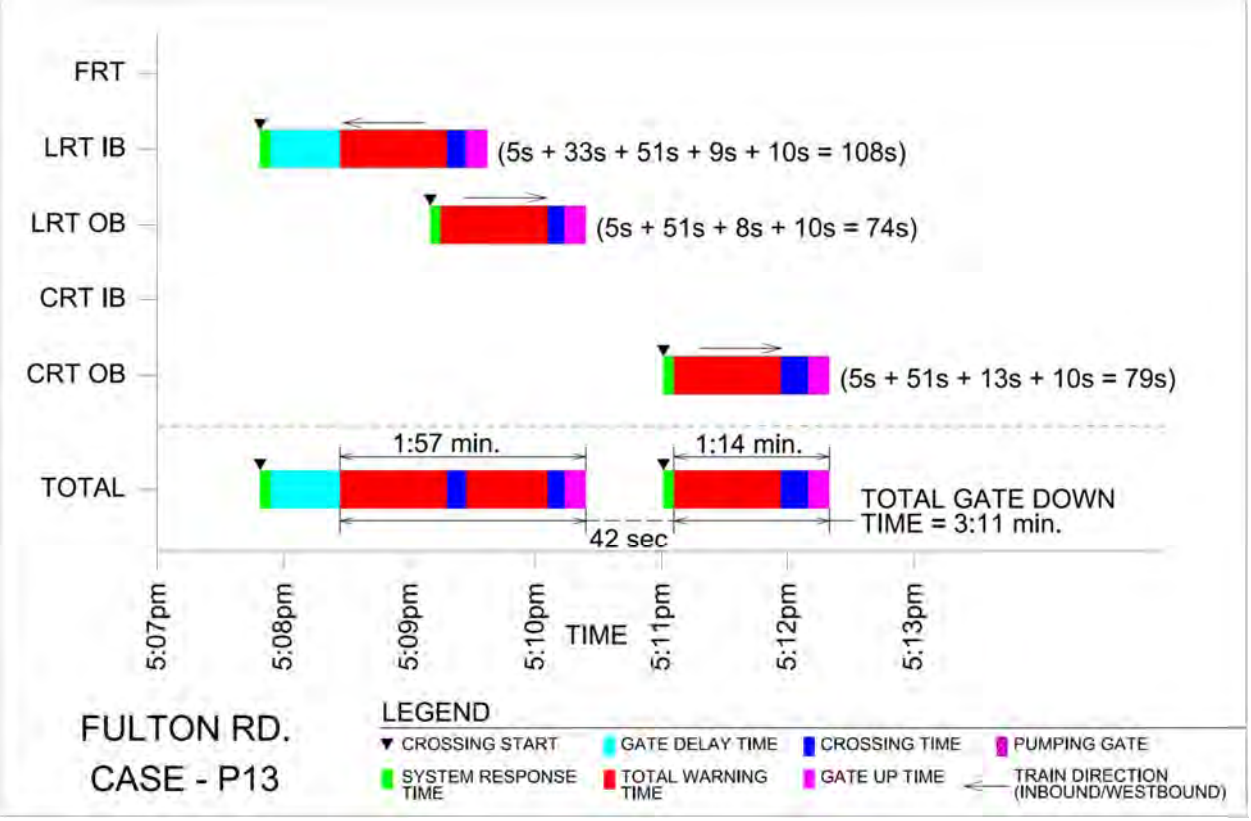


Figure ES – 5 Train Activation vs. Time Graph

The total line in the graphic shows what conditions are present at the warning device controller. The two blue bars on the left side indicate that the crossing island circuit is released between the trains, but the intervening red indicates that the approach circuit is occupied and would hold the gates in the down position until they are released after the second train. The total gate down time is then determined. For this case, it is three minutes, 11 seconds, but there is a short gap where the gates raise.

FEIR Gate Down Times

The calculated gate down times in this study are longer than those in the FEIR. The reason behind this difference is that the FEIR analysis used single trains and did not account for the interaction of multiple trains and second train logic on the gate down time.

Traffic Queue Lengths

Once the gate down times were determined, the longest gate down times could be used to determine the traffic queuing conditions at the crossing. The MTA crossing policy looks at two queue conditions; the back up queue location from adjacent intersections (the influence queue), and the queue at the crossing itself. If the length of either queue individually is longer than the available storage space, additional pre-emption studies are required. Additionally, if the total length of the influence queue plus the crossing queue is longer than the storage space for that travel direction, additional pre-emption studies are required. The pre-emption is required to provide adequate space to clear the crossing upon the approach of the train, and to prevent queues that do not empty from one gate down cycle and subsequently using space required for the next gate cycle. The analysis of Fulton Rd. did not indicate that any pre-emption was required.

Crossing Features

Pavement markings, signage, delineators, bollards, sidewalk widening and similar improvements are planned at this crossing. These improvements are consistent with the Gold Line Phase 2A crossing features employed for the extension in Azusa that were approved by CPUC and have had no FRA reportable incidents since their installation.

Conclusions

Based on the analysis of the data and the proposed improvements at the Fulton Rd. crossing the designed warning devices will function as required by both the MTA and CPUC.

The Analysis Team has recommended minor adjustments to the crossing based on our review of the site and the N. Pomona Station driveway. Although there are internal gates provided, making the crossing appear to be two separate crossings, we propose that this crossing will be operated as a single crossing because the current design's clearance distance between the center gates is not adequate for a design semi trailer. The interior gates are required to prevent traffic exiting the station from the driveway from entering the tracks during activation. This includes additional illumination of the crossing be provided, and a possible change to the layout of the crossing gates if the driveway is not closed.

Contents

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Acronyms and Abbreviations

AADT – Annual Average Daily Traffic

ADA – Americans with Disability Act

ADAAG - ADA Accessibility Guidelines

ADT – Average Daily Traffic

ANSI – American National Standards Institute

APM – Accident Prediction Model

AREMA – American Railway Engineering and Maintenance of Way Association

BT - Buffer Time

CA MUTCD – California Manual of Uniform Traffic Control Devices

CP – Railroad Control Point

CPUC – California Public Utilities Commission

CRT – Commuter Rail Train

CT – Clearance Time

CWT – Constant Warning Time

DCM – Design Criteria Manual

DMU – Diesel Multiple Unit

DOT – Department of Transportation

Dynamic EGOM - Dynamic Exit Gate Operating Mode

ES – Engineering Standard

ETT – Employee Timetable

FEIR – Final Environmental Impact Report for Metro Gold Line Foothill Extension from Azusa to Montclair Project

FHWA - Federal Highway Administration

FRA Federal Railroad Administration

FRT – Freight Rail Train

GO 75 – CPUC General Order 75

HSR – High Speed Rail

IESNA - Illuminating Engineering Society of North America

LABSL - City of Los Angeles Department of Public Works Bureau of Street Lighting Design

LOS – Level of Service

LRT – Light Rail Transit

LRV – Light Rail Vehicle

MAS – Maximum Authorized Speed

Metrolink - Southern California Regional Rail Authority

MP – Milepost

MT – Main Track

MTA/Metro – Los Angeles County Metropolitan Transportation Authority

MUTCD - Manual of Uniform Traffic Control Devices

MWT – Minimum Warning Time

NB – Northbound

NCHRP - National Cooperative Highway Research Program

PF – Peaking Factor

PTC – Positive Train Control

RP – Recommended Practice

SB - Southbound

SCRRA - Southern California Regional Rail Authority

TWT – Total Warning Time

USDOT – United States Department of Transportation

WT – Warning Time

WBAPS – Web Based Accident Prediction Systems

SECTION 1

Project Overview

1.1 Overview of Grade Crossing Engineering Review

The analysis will review six proposed at-grade crossings on the proposed Foothill Gold Line between Glendora and Montclair as depicted in Figure 1-1. The crossings in the study are generally where two existing commuter rail tracks and two proposed light rail tracks occupy the same crossing area. The purpose of the analysis is to determine if it is appropriate to keep these crossings at-grade or to grade separate the future light rail tracks. The conceptual design of the grade crossing warning equipment is generally considered to be sufficient. The primary objectives of this analysis are to determine if the four tracks (five tracks at Fulton and White) at the proposed at-grade crossings can be safely navigated by pedestrians and motor vehicles along with the local traffic impacts that result from the added rail service. Appendix A provides the analysis team biographies.

Figure 1-1. Gold Line Extension Project Map

The two rail corridors within the project are the Gold Line Rail Corridor which includes the freight (FRT) operations (the Pasadena Sub for FRA reporting purposes), and the joint FRT and Metrolink San Bernardino Line (the San Gabriel Sub for FRA reporting purposes). The two lines have differing milepost designations and directions, and merge at CP Cambridge, just west of Cambridge Ave. For the purposes of this report, all the mile posts are reported based on the San Gabriel Sub numbering to provide a continuous milepost sequence through the study area. The stationing of the Gold Line is used to reference specific locations where detailed distances are required. The analysis graphs use the Gold Line stationing to provide a continuous baseline through the study area.

The crossings all are active crossings in the Federal Railroad Administration's (FRA) Grade Crossing Inventory. Table 1-1 contains the DOT Crossing Numbers. We have downloaded the current inventory forms and have included them in Appendix C.

Table 1-1 DOT Grade Crossing Numbers

City	Crossing Name	Pasadena Sub Crossing DOT #	San Gabriel Sub Crossing DOT #
La Verne	White Avenue*	026187X	747330W
Pomona	Fulton Road*	026186R	747331D
Claremont	Cambridge Avenue	n/a	026730Y
	Indian Hill Boulevard	n/a	026180A
	College Avenue	n/a	026179F
	Claremont Boulevard	n/a	026178Y
* Indicates crossing over both Pasadena and San Gabriel sub divisions.			

1.2 Key Data Inputs

The Review Team was tasked to perform a series of analyses as part of the review. The data collected, developed, or sourced for these analyses is described below:

a. Future Year 2035 train count data (LRT, FRT, SCRRA) – full day and peak hour.
b. Known train lengths (LRT = 3-car, FRT = 14-car, SCRRA 7-car)
c. The results from the following studies:
   - Metrolink San Bernardino Line Infrastructure Improvement Strategic Study
   - Metrolink 10-Year Strategic Plan 2015-2025
d. Future traffic (2035) ADT generally for the project's design year as provided in existing studies.
e. Known developments, including access to project's parking structures.

1.3 Report Organization

Each crossing has an individual Grade Crossing Analysis Report to provide a complete standalone study for each crossing. The reports are organized following the analysis process starting with the collection of data and ending with the study conclusions.

SECTION 2

Fulton Rd. Grade Crossing Data

2.1 Physical Layout

The Fulton Rd. grade crossing is located at milepost 30.80 of the San Gabriel Sub at Station 1894+30 of the Gold Line Foothill Extension. Figure 2-1 shows the existing conditions at the Fulton Rd. crossing.

The crossing is currently two separate crossings. Each crossing activates independently from the other crossing. Both crossings have an approximate skew angle of 75 degrees. The north and south approaches of Fulton Rd. are tangent. Gates are provided on both the northbound and southbound approaches to each crossing for warning.

Sidewalks are present only on the west side of Fulton Ave, but do not exist between the crossings. There is a large drainageway located along the east side of Fulton Rd.

On-street parking is allowed in the northwest, northeast, and southwest quadrants.

The west entrance to the Pomona Station parking lot is located on the east side of Fulton Rd. between the crossings. An access road to the railroad right of way is located on the west side of Fulton Rd., across from the parking lot entrance.

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Figure 2-1 Google Earth Aerial View of Fulton Rd.

Figure 2-2 depicts the configuration proposed in the Advanced Conceptual Engineering drawings dated June 15, 2017.

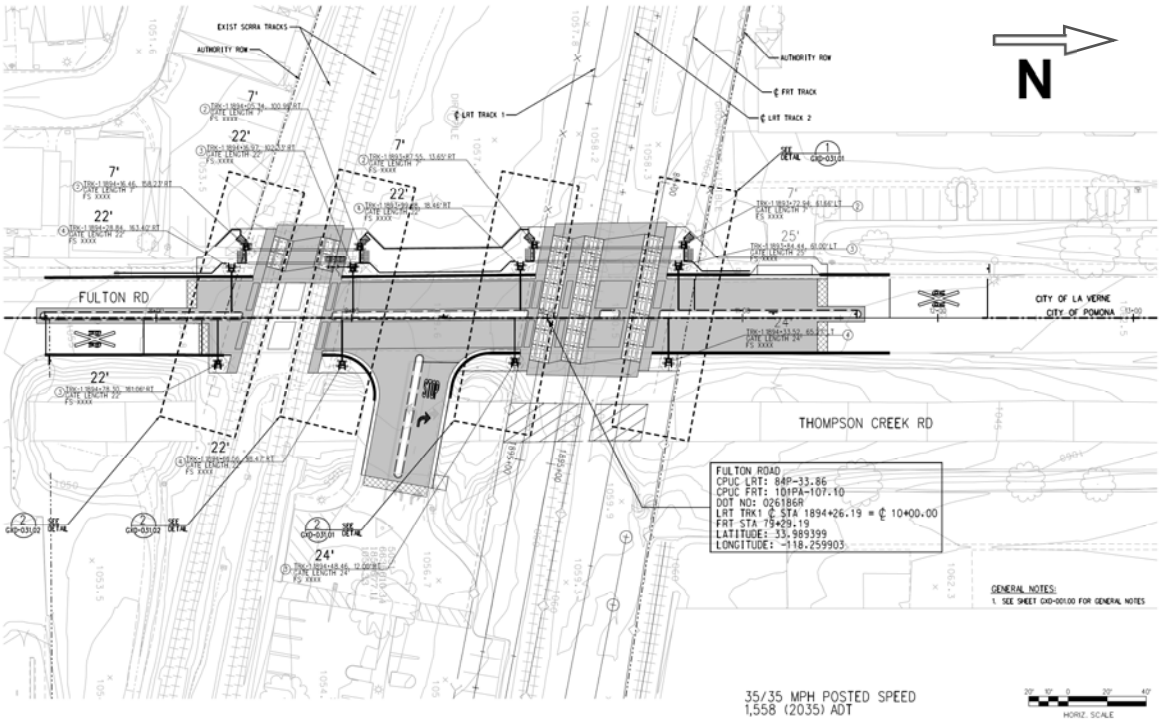

Figure 2-2 Proposed Fulton Rd.

2.1.1 Geometric Configuration of Fulton Rd.

Tables 2-1 and 2-2 present the key dimensions and data for both the existing and proposed crossing.

Table 2-1 Fulton Rd. Tracks

	Trk-1	Centerline Distance	Trk-2	Centerline Distance	Trk-3	Centerline Distance	Trk-4	Centerline Distance	Trk-5
Existing	FRT 1	140'	SCRRA MT1	23' to 25.9'	SCRRA MT2	---	---	---	---
Proposed	FRT 1	30.00'	LRT 2	16.00'	LRT 1	115' to 118.5'	SCRRA MT1	23' to 25.9'	SCRRA MT2
Note: Tracks listed and numbered from North to South.									

Table 2-2 Fulton Rd. Roadway

	Sidewalk	# Lanes	Total Pavement Width	Median	Width	# Lanes	Total Pavement Width	Sidewalk	Total Xing (Length of Track)
Exist. North of Tracks	n/a	1	20.0'	no	n/a	1	20.0'	n/a	40.0'
Between Xings	n/a	1	20.0'	no	n/a	1	20.0'	n/a	40.0'
Exist. South of Tracks	4.90'	1	20.0'	no	n/a	1	20.0'	n/a	44.90'
Prop. North of Tracks	9.0'	1	18.0'	yes	4.0'	1	18.0'	n/a	49.0'
Between Xings	14.84'	1	17.95'	yes	4.0'	1	17.50'	n/a	54.29'
Prop. South of Tracks	10.0'	1	18.0'	yes	4.0'	1	18.0'	n/a	50.0'
Note: Lanes listed and numbered from West to East and measured perpendicularly to roadway centerline.									

2.1.2 Visibility of Warning Devices

The approaches to the crossing are both tangent with generally good visibility to the warning devices. Several trees in the northwest quadrant may require trimming to improve the visibility.

2.1.3 Nighttime Illumination

The desirable nighttime illumination levels required are not specifically enumerated in the MTA or SCRRA crossing manuals, however the California MUTCD references ANSI/IESNA RP-8-14 Roadway Lighting. The most detailed local practice is contained in the City of Los Angeles Department of Public Works Bureau of Street Lighting Design (LABSL) Standards and Guidelines. The LABSL guidelines go on to refer to the requirements of ANSI/IESNA RP-8-14 Roadway Lighting. The LABSL modifies RP-8 for grade crossings as follows;

> *Lighting on roadway of track crossing area, starting 30 meters before the crossing and ending 30 meters beyond the crossing, should be 1.5 times the roadway illuminance value for a continuous lit roadway, but never less than illuminance of .9 footcandles. This requirement shall extend to full length of roadways and sidewalks along non-separated/unguarded railroad tracks. Uniformity and veiling luminance criteria shall be in accordance with Table D1.*

Based on the LABSL and RP-8 criteria the analysis team observed that the existing crossing area does not comply for both illumination levels and uniformity ratios. The observed illumination levels varied dramatically across the crossings and into the 100 feet approach areas with readings as low as 0.1 footcandles.

2.1.4 Distance between the crossing and existing traffic signals

Table 2-3 presents the distances between the crossing and adjacent existing traffic signals.

Table 2-3 Fulton Rd. Adjacent Existing Traffic Signals

Intersection	Traffic Control	Distance	Notes
North - E. Bonita Ave	Stop Sign	1,247'	gate to stop bar
South - W. Arrow Hwy	Stop Sign	1,325'	gate to stop bar

2.2 Train Movements

2.2.1 General

The northernmost existing track through the Fulton Rd. crossing is on SCRRA's Pasadena Sub. The southern crossing (two tracks) of the Fulton Rd. crossing is on SCRRA's San Gabriel Sub.

Currently, only Metrolink trains and local freight trains operate through the Fulton Rd. crossing. There are nearby freight sidings on both the San Gabriel and Pasadena subs where switching movements would require the local freight to occupy or make multiple freight movements across the crossing. The freight siding is lightly used, generally during non-peak/non-revenue hours, and its effects are limited. The adjacent North Pomona Station is located on the east side of the crossing and affects the speed of the Metrolink trains over the Fulton Rd crossing. The proposed Gold Line station will be co-located with the existing N. Pomona Metrolink Station and will affect the speed of the Gold Line trains over the Fulton Rd crossing.

2.2.2 Existing Track Chart and Time Tables

The SCRRA Metrolink Timetable No. 11 is the current employee timetable (ETT) in effect. ETT No. 11 covers both the Pasadena and San Gabriel Subs. Figure 2-3 is adapted from ETT No. 11 to show the Pasadena Sub. Table 2-4 presents the Maximum Authorized Speed (MAS) on the Pasadena Sub.

WESTWARD→	SIDING LENGTH	TRACK DIAGRAM	Radio Channel 087-087 **PASADENA SUBDIVISION**	METHOD OF OP.	RULE 4.3	MILEPOST	EASTWARD→
			CP CAMBRIDGE (Jct. San Gabriel Sub)	CTC	J	32.3	
			1.08			**105.64	
	3079		**NORTH POMONA**			**106.7**	
			1.2				
			LA VERNE			**107.9**	
			2.3				
			SAN DIMAS	TWC ABS		**110.2**	
			4.2				
	2820		**GLENDORA**			**114.4**	
			2.5				
			AZUSA			**116.9**	
			1.3				
			IRWINDALE			**118.2**	
			1.1	*6.28		*118.4	
			END OF TRACK			**119.3**	
	(13.66 miles)						
	*Rule 6.28 milepost limits **milepost end of subdivision						

Figure 2-3 Pasadena Sub Track Chart

Table 2-4 Pasadena Sub. MAS

ITEM 1. MAXIMUM AUTHORIZED SPEED FOR TRAINS

MP LOCATION BETWEEN	Psgr.	Frt.
105.64 and 118.4	40	40
118.4 and 119.3	10	10

ITEM 2. OTHER MAXIMUM SPEEDS

MP LOCATION BETWEEN	Psgr.	Frt.
THROUGH SIDINGS AND TURNOUTS:		
NORTH POMONA	10	10
GLENDORA	10	10
ALL OTHER TRACKS, CROSSOVERS AND TURNOUTS	10	10

Figure 2-4 is adapted from ETT No. 11 to show the San Gabriel Sub.

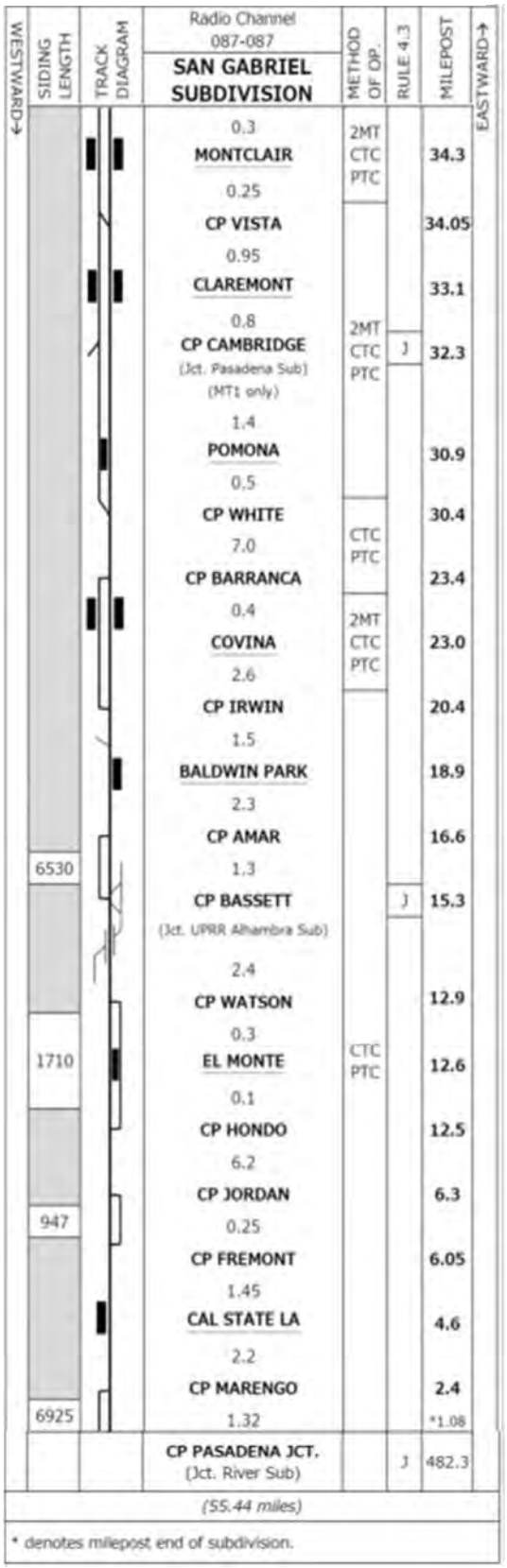

Figure 2-4 San Gabriel Sub. Track Chart

Table 2-5 was adapted from the ETT No. 11, and presents the Maximum Authorized Speed (MAS) on the San Gabriel Sub. through the study area.

Table 2-5 San Gabriel Sub. MAS

ITEM 1. MAXIMUM AUTHORIZED SPEED FOR TRAINS

BETWEEN CP VERNON AND CP PASADENA JCT.						
MP LOCATION BETWEEN:	MAIN		MT 1		MT 2	
	P	F	P	F	P	F
57.66 and 56.43			25	10	25	10
56.43 and 56.25**			25	10	25	10
56.25 and 55.27**	45#	15				
55.27 and 55.07	45#*2	30				
55.07 and 47.54	79	55				
47.54 and 44.67			79	55	79	55
44.67 and 34.6	79	55				
34.6 and 32.45			79	55	79	55
32.45 and 31.12			79#	30	79#	30
31.12 and 30.36			40#*1	30	40#*1	30
30.36 and 29.85	40 *2	30				
* Protected by IIATS						
*1 – Protected by IIATS Westward only						
*2 – Protected by IIATS Eastward only						
** All equipment operated between MP 56.4 and MP 55.3 must have operative air brakes, train line connected and cut into all cars.						
#: Refer to System Special Instructions Section S - Speed for Equipment and Wind Restrictions.						

ITEM 2. OTHER MAXIMUM SPEEDS

LOCATION	P	F
CP CAMBRIDGE: THROUGH TURNOUT	30	20
CP WHITE: THROUGH TURNOUT	40	30

Metrolink currently has plans to improve the speeds on the San Gabriel Sub and will be adding a second track west of CP White near the North Pomona Station. The Foothills Gold Line Advanced Conceptual Engineering plans indicate that CP Cambridge and the San Gabriel Sub tracks will be reconfigured through the Fulton Rd. crossing, but it is expected that the speeds will not increase due to those changes.

Table 2-6 lists the train movement data for Fulton Rd.

Table 2-6 Fulton Rd. Train Movements

	Freight FRT		**Metrolink CRT**		**Gold Line LRT**	
	Existing	**2035**	**Existing**	**2035[1]**	**Existing[5]**	**2035[2]**
Max Authorized Speed	40	40	40	40	55	55
Hours of Operation	11:00 to 18:00	11:00 to 18:00	04:00 to 23:00	04:00 to 23:00	04:00 to 01:00	03:00 to 01:00
Off Peak Headways	n/a	n/a	45-60	45-60	14 to 40	7 to 20
Peak Headways	n/a	n/a	20-30	20-30	7	5
Single Train Gate Down Time[4]	0:80	0:80	2:59[6]	2:59[3]	n/a	1:10

Notes:

1 - Assumed Schedule based on Planned Headways and Service Levels

2 – Assumed Schedule based on Planned Headways

3 – Worst case based on deceleration and acceleration times

4 – Assumed 14-car freight train (average; 20 car max)

5 – Existing Gold Line reflects current service on Phase 2A

6 – Existing Metrolink Single Train Gate Down Time was calculated using a TPC curve based on current schedule, timetable and vehicle characteristics.

SECTION 3

Analysis

3.1 General

Our hazard analysis was informed by multiple standards, recommended practices, and guidance produced by the stakeholders involved at the crossing. Ultimately, the regulations of the CPUC and FRA were considered the minimum acceptable standards since these two agencies have the regulatory authority. The MTA Grade Crossing Policy for Light Rail Transit is used for the overall methodology and improvements with specific factors, timings, and criteria taken from the SCRRA Design Criteria Manual.

The factors taken from the SCRRA Design Criteria Manual include the use of the 30 second warning time, and variable walking speeds used to determine pedestrian clearance time. Deviations from the SCRRA Design Criteria Manual include the pedestrian gate placement and the use of the MTA Grade Crossing Policy.

The Analysis Team used the following criteria to determine where grade separations should be considered by the Design Team. If these parameters are met, grade separation is not recommended:

a. The crossing falls within the “at grade operation should be feasible” section of the MTA Grade Separation nomograph
b. The queues empty between activations
c. The per vehicle delay results in a level of service (LOS) D or greater
d. The accidents predicted are lower than existing

For the Fulton Rd. crossing the analysis considers both the San Gabriel and Pasadena subdivision crossings to be a single roadway crossing.

3.1.1 Grade Separation Criteria

3.1.1.1 MTA Policy on Grade Crossing for Light Rail Transit

The original FEIR used the MTA Policy on Grade Crossing for Light Rail Transit to make the initial determinations. The nomograph contained in the MTA policy is based on a similar nomograph created by the Institute of Transportation Engineers, but it reduces the threshold criteria, making the MTA policy more conservative. Figure 3-1 presents the data for the Fulton Rd. crossing. The indication from the nomograph is that “at grade operation should be feasible” and does not indicate a need for further analysis.

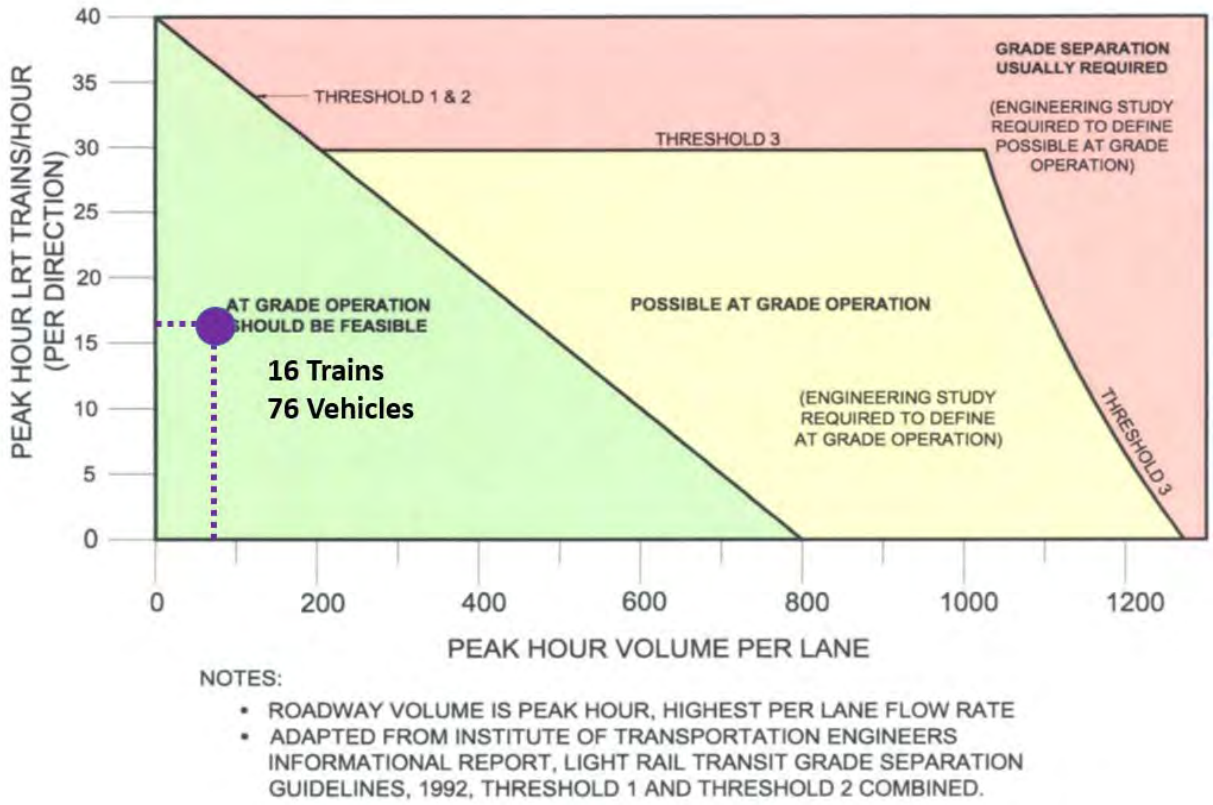

Figure 3-1 MTA Grade Separation Nomograph

3.1.1.2 FHWA Grade Crossing Handbook

The FHWA Grade Crossing Handbook contains a series of criteria that should be considered when deciding when to grade separate. The consideration chart has two sections with similar considerations, the major difference being that the first section has no economic component. Because this report is focused on safety and operations, the economic considerations will not be reviewed. The section applicable to this report states that highway-rail grade crossings should be considered for grade separation or otherwise eliminated across the railroad right of way whenever one or more of the conditions listed in Table 3-1 exist.

Table 3-1 FHWA Grade Separation Considerations

Consideration	Fulton Rd. Data	Threshold Met
A.Non-Economic Related Criteria		
i. The highway is a part of the designated Interstate Highway System.	No	No
ii. The highway is otherwise designed to have full controlled access.	No	No
iii. The posted highway speed equals or exceeds 113 km/hr. (70 mph).	35 mph	No

iv. AADT exceeds 100,000 in urban areas or 50,000 in rural areas.	1,558 (2035)	No
v. Maximum authorized train speed exceeds 177 km/hr. (110 mph).	79 mph	No
vi. An average of 150 or more trains per day or 300 million gross tons per year.	420 trains/day	Yes
vii. An average of 75 or more passenger trains per day in urban areas or 30 or more passenger trains per day in rural areas.	Urban, 418 trains	Yes
viii. Crossing exposure (the product of the number of trains per day and AADT) exceeds 1 million in urban areas or 250,000 in rural areas; or	654,360	No
ix. Passenger train crossing exposure (the product of the number of passenger trains per day and AADT) exceeds 800,000 in urban areas or 200,000 in rural areas.	651,244	No
x. The expected accident frequency for active devices with gates, as calculated by the U.S. DOT Accident Prediction Formula including five-year accident history, exceeds 0.5.	0.024	No
xi. Vehicle delay exceeds 40 vehicle hours per day.	~18 hrs[1]	No

[1] Based on average delay per vehicle x AADT

In addition to the items in the preceding table, the FHWA guidance includes an LRT specific data table reproduced here as Table 3-2;

Table 3-2 FHWA LRT Specific Grade Separation Considerations

LRT Grade Separation	
Trains per hour	Peak-hour volume (vehicles per lane)
40	900
30	1000
20	1100
10	1180
5	1200

A review of the considerations that Fulton Rd. satisfies shows that they are mostly related to the volume of trains over the crossing. Comparing those items to the grade separation table is interesting, because, although Fulton Rd. meets certain considerations, it does not meet the FHWA LRT table since there are only 16 trains (per direction) in the peak hour and the Peak Hour Lane volume of 76 automobiles per lane is lower than the traffic levels on the chart.

The FHWA grade crossing handbook provides evaluation criteria to determine if a grade separation should be considered. Chapter 5, Section A states the evaluation criteria "is intended to provide guidance to assist engineers in the selection of traffic control devices or other measures at highway-rail grade crossings. It is not to be interpreted as policy or standards and is not mandatory." Once the crossing is noted for grade separation consideration, further engineering analysis is required to finalize the recommendation. As such, the FHWA evaluation was not used as criteria for determining the need for the grade separation.

Perhaps the most important consideration is the accident prediction levels. The accident prediction derivation is discussed later in this report, however the predicted accidents for the crossing are only 21%

of the 0.5 threshold in the consideration, indicating that the level of warning devices proposed results in a very safe crossing.

This outcome is consistent with the outcome of applying the MTA Policy.

3.1.1.3 CPUC Section 190 Criteria

The CPUC Section 190 Criteria were reviewed to determine its applicability to these crossings. The CPUC criteria are established as a financial ranking methodology, not a decision tool to determine if a grade separation is required. The numerator contains technical parameters, but the score of those parameters is then divided by the percentage of state funding. This means that, mathematically, a crossing whose technical rating was lower than another, could receive a higher ranking if it used adequate local funds. The CPUC Section 190 Criteria was removed from consideration in this evaluation.

3.2 Gate Down Times

Gate Down Time, as used in this document, is the time from the start of gate flashers turning on to the time that the gates are rising and are in a mostly vertical position after the train has passed through the crossing, when pedestrian, bicycle and vehicular traffic can safely cross the railroad crossing.

Gate down times could be viewed as a simple exercise of calculating distance and time based on speed, but would understate the actual times that are likely to be experienced by the roadway users. The Analysis Team realized that the longer gate down times would result from several factors. The trains operate in a complex environment of civil speed limits based on track configurations, and their required acceleration into and out of scheduled station stops. Furthermore, the operating schedules of the three train types could result in multiple trains operating through the crossing at nearly the same time causing the gate down times to be longer than those for single trains.

More formally the gate down time includes;

- Minimum Warning Time (MWT)
- Buffer Time (BT)
- Clearance Time (CT) – additional above base included in MWT
- Island Time - The time it takes the train to traverse the island circuit through the crossing from head end to hind end of the train.
- Release Time – The time for the circuit to detect that the train is off of the island circuit and the time for the gates to raise.

Metrolink sets the Warning Time (WT) at 30 seconds to accommodate accelerating trains. WT = MWT + BT + CT (if needed). The Gold Line uses the CPUC minimum warning time of 20 seconds and add the required clearance times with a minimum of 28 seconds of warning time.

3.2.1 Clearance Times

Clearance times for vehicles at grade crossings are well defined, and the specific guidance used in California is based on the Minimum Warning Time (MWT) of 20 seconds, which allows any vehicle to cross a distance of 35 feet, a typical width for a two-track crossing. The SCRRA Grade Crossing Guidelines, MUTCD and AREMA address cases for crossings that are wider either from having more tracks, greater track centers, or a combination of both, by adding an additional second of clearance time for every additional 10 feet of width or portion thereof. The minimum warning time of 28 seconds for LRT movements and 30 seconds for the freight/SCRRA movements. The crossing analysis consistently

used 30 seconds minimum warning time for all trains and adjusted the minimum warning time upward to address any additional clearance time required.

There is not definitive guidance or regulation on determining the clearance time for pedestrians. The Analysis Team researched applicable guidelines for pedestrian walking speed at highway-rail grade crossings as shown in Appendix F. A walking speed of 3.5 feet per second (FPS) was selected based on the CPUC, CAMUTCD and SCRRA published guidelines. The distance used to calculate pedestrian clearance time was from the "wait here" marker to the other "wait here" marker on the outside of the pedestrian crossing gates. This is a more conservative distance for calculations and prevents persons from being at 8' 6" from track centerline, but not outside of pedestrian gates.

Table 3-3 Fulton Rd. Clearance Times

	Location	Distance	Walking Speed	Total Time to Clear Crossing
Pedestrian.	West – LRT & FRT	62'	3.5 f/s	18 s
	West - CRT	80'	3.5 f/s	23 s
Vehicles	East	239'	n/a	51 s
	West	237’	n/a	51 s
			Required CT	**51 s**

The vehicular CT is the minimum clearance time for the entire width of the two existing crossings. Due to the proposed changes, the crossing will operate as a single crossing to avoid trapping long design vehicles between the tracks. The pedestrian crossing time is based on having refuge areas between the Metrolink crossing and the combined Gold Line and freight crossing that reduce the distance. The vehicle CT is greater than the pedestrian CT at a pedestrian walking speed of 3.5 fps.

3.2.2 Constant Warning Time

Constant Warning Time (CWT) equipment is used at crossings to standardize the warning times experience by the roadway users, regardless of train operations that have trains operating at different speeds. This situation exists most often when faster passenger trains share the tracks with slower freight trains, but can exist when local passenger trains are making station stops while express trains continue past the stations.

The CWT equipment detects the speed and location of an approaching train, and based on those criteria, delays (offsets) the activation of the crossing until the train is going fast enough and is close enough to the crossing to meet the criteria for starting the warning time. When trains are decelerating, the CWT equipment does an activation that results in a conservative (longer) warning time. If the train is accelerating, the CWT activates the crossing at the proper time for the speed and distance at the time it passes the crossing start, however the train continues to accelerate and arrives at the crossing slightly earlier than the WT but later than the MWT. This is a known condition, and various agencies add different amounts of BT to the MWT to ensure that the MWT is never violated.

Metrolink adds 10 seconds of BT to the 20 second MWT to set the WT at a minimum of 30 seconds.

At Fulton Rd., the Metrolink trains are accelerating towards the crossing going westward and decelerating going eastward. The Gold Line trains are also accelerating towards the crossing going westward and decelerating going eastward.

3.2.3 Single Train Gate Down Times

To develop the single train down times, the Analysis Team modeled theoretical performance characteristics of each train type at each crossing. The modeling included acceleration characteristics of the train, the proposed physical dimensions of the new crossings, adjacent station stops, and the required clearance times for vehicles and pedestrians.

3.2.3.1 Freight Train

The calculations for the freight train at Fulton Rd. were based on a consist length of 970 feet. The train consist length was developed based on various anecdotal accounts about the typical consist and YouTube videos of the freight train operating in the area. The theoretical consist has four 85' locomotives, six 65' covered hoppers, and four 60' tank cars. The maximum consist length is 22 cars, but 14 is used as an average consist. The acceleration and deceleration characteristics of the freight train was assumed to be 1 mphps.

The gate down times for the freight are for a through movement only. Switching movements will activate the gates for longer periods, but switching is typically performed outside of the peak hours.

Speed/Distance (S/D) curves for both the eastward and westward trains were developed. Figure 3-2 depicts the eastward S/D curve at Fulton Rd. for the freight train. The crossing start location was assumed to be set for 40 mph with a 5 second equipment response time. The CWT equipment detects a 40-mph train approaching and does not delay the activation. The lights are flashing from 5.0 seconds to 84.49 seconds for a total single train gate down time of 80 seconds. The solid line is the leading locomotive, while the dotted line represents the end of the last car in the train. The timings included in the calculations are labelled on the speed / distance graph.

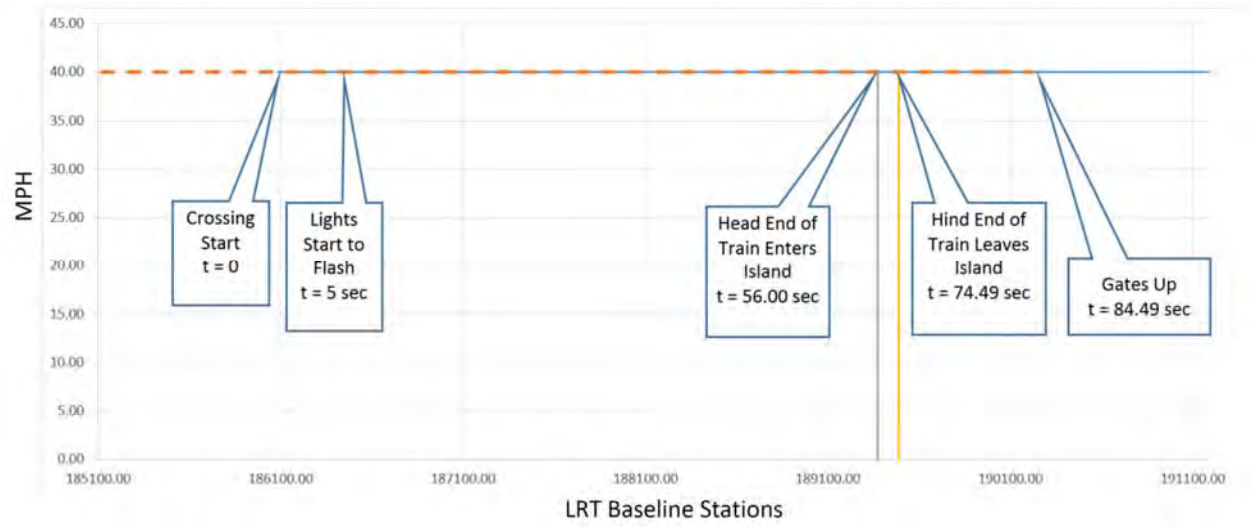

Figure 3-2 Fulton Rd. Eastward Freight

Figure 3-3 depicts the westward S/D curve. The crossing start location was set for 40 mph with a 5 second equipment response time. The CWT equipment detects a 40-mph train approaching and does not delay the activation. The lights are flashing from 5.0 seconds to 84.48 seconds for a total single train gate down time of 80 seconds. The solid line is the leading locomotive, while the dotted line represents

the end of the last car in the train. The timings included in the calculations are labelled on the speed / distance graph.

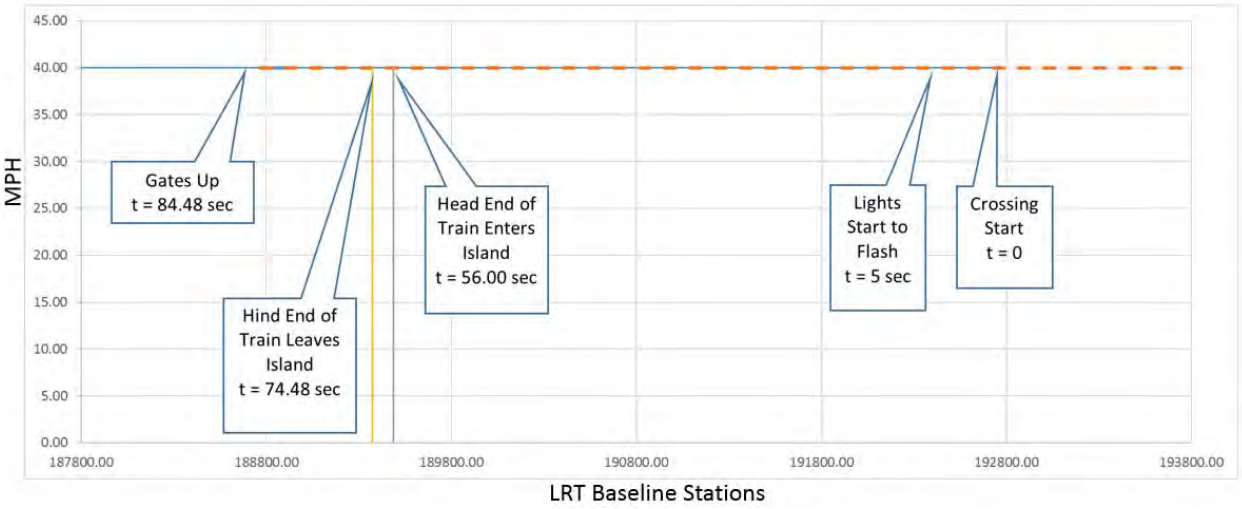

Figure 3-3 Fulton Rd. Westward Freight

3.2.3.2 Commuter Train

The calculations for the commuter train at Fulton Rd. were based on a consist length of 578 feet. The consist length was developed based on the longest consist currently operating. We have not used longer train lengths since they would require rebuilding station platforms to accommodate the longer trains and the Metrolink 2025 plan did not include that work. The theoretical consist has one 68' locomotive, two 85' Rotem bi-levels, three 85' Bombardier bi-levels, and an 85' Rotem Cab car. The acceleration (1.25 mphps) and deceleration (1.50 mphps) characteristics of the commuter train were based on the values used in the MTA's DMU study that compared DMU and locomotive hauled technologies. These values are lower than values used for both SunRail and TriRail systems in Florida (2.0 mphps for both). The deceleration values used do match the specifications for the Bombardier bi-level cars.

S/D curves for both the eastward and westward trains were developed. Figure 3-4 depicts the eastward curve at Fulton Rd. The crossing start location was set for 40 mph with a 5 second equipment response time. The CWT equipment detects a 40-mph train approaching and activates the crossing. The lights are flashing from 5.0 seconds to 79.08 seconds for a total single train gate down time of 74 seconds.

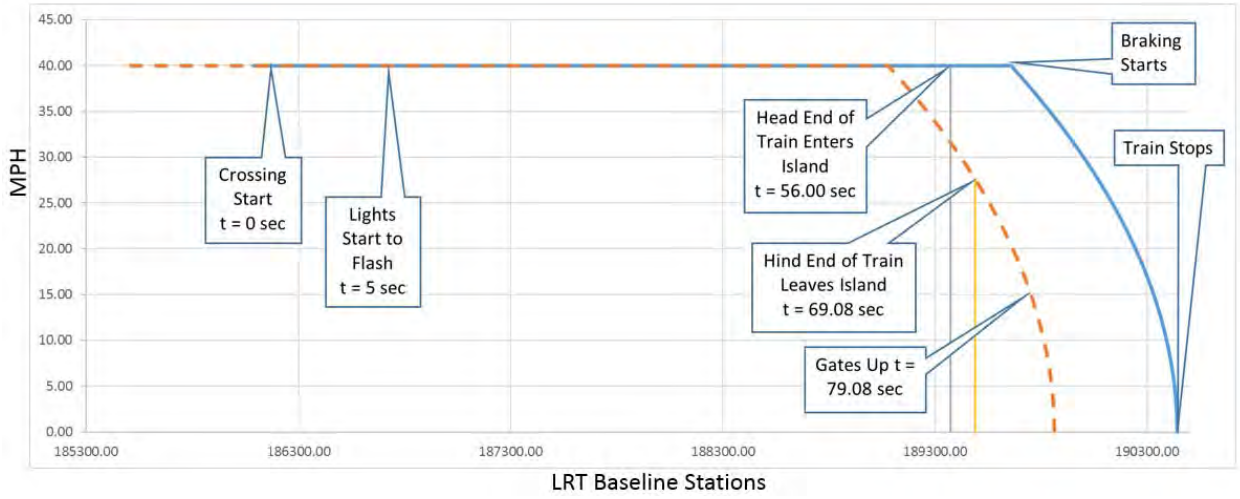

Figure 3-4 Fulton Rd. Eastward Commuter

Figure 3-5 depicts the westward Time/Distance curve. The crossing start location was set for 79 mph with a 5 second equipment response time. The CWT equipment detects a 79-mph train approaching and does not delay the activation. The lights are flashing from 5.00 seconds to 184.18 seconds for a total single train gate down time of 179 seconds. The deceleration of the train lengthened the WT.

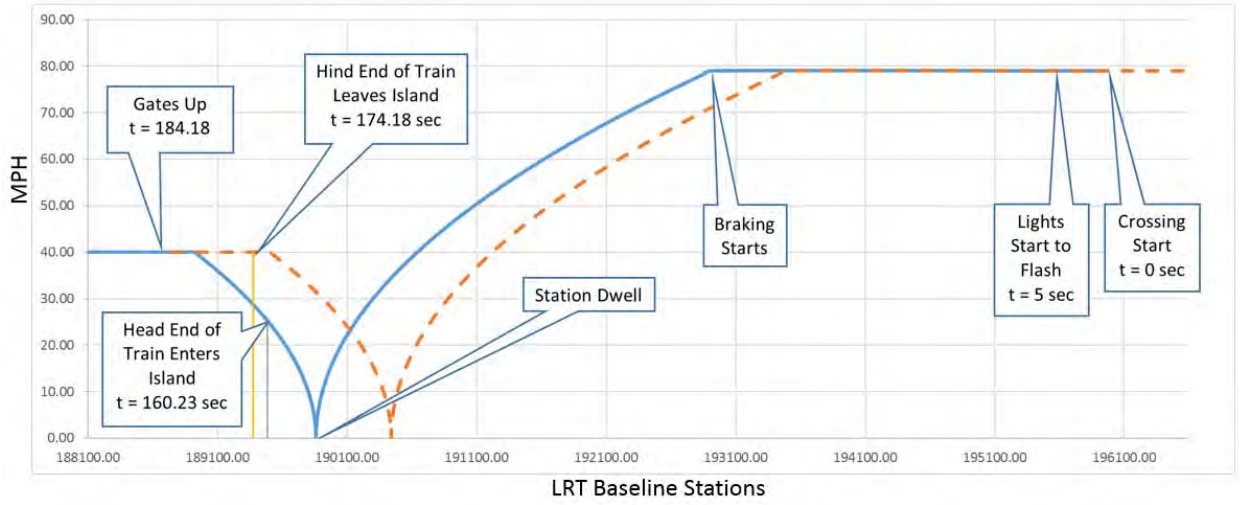

Figure 3-5 Fulton Rd. Westward Commuter

3.2.3.3 Gold Line Train

The calculations for the Gold Line train at Fulton Rd. were based on a consist length of 267 feet. The consist length was developed based on the design criteria. The theoretical consist has three 89' AnsoldoBreda LRV. The acceleration (3.0 mphps) and deceleration (3.0 mphps) characteristics of the LRV were obtained from the design criteria as well.

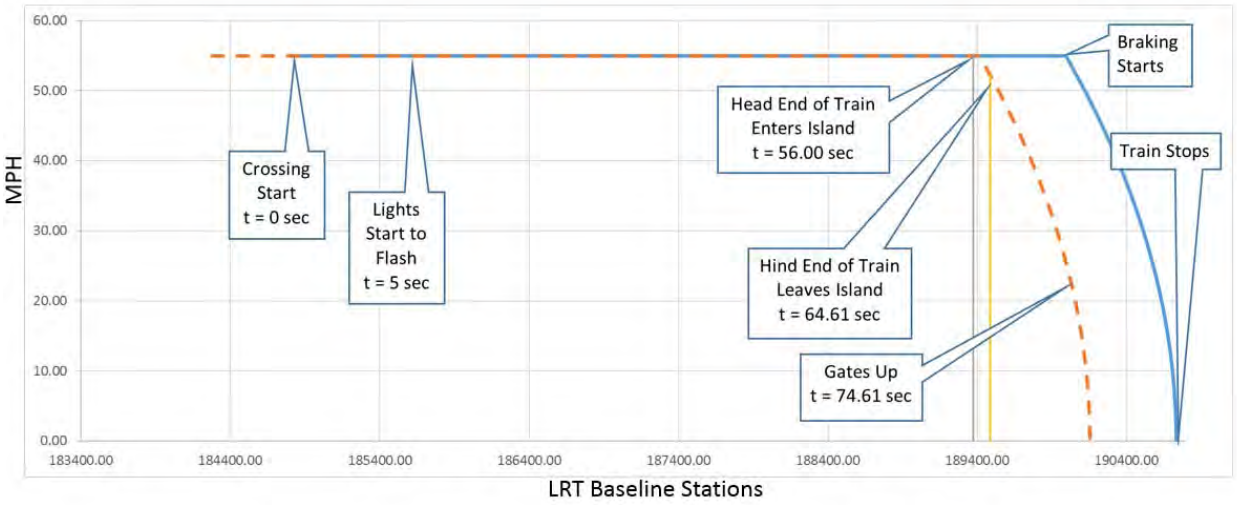

Figure 3-6 Fulton Rd. Eastward LRT

Figure 3-6 depicts the eastward S/D curve. The crossing start location was set for 55 mph with a 5 second equipment response time. MTA uses standard crossing circuits with timers to set the TWT. The track circuit detects a train approaching and activates the timer. The lights are flashing from 5.00 seconds to 74.61 seconds for a total single train gate down time of 70 seconds.

Figure 3-7 depicts the westward S/D curve. The crossing start location was set for 55 mph with a 5 second equipment response time. MTA uses standard crossing circuits with timers to set the TWT. The track circuit detects a train approaching and activates the timer. The lights are flashing from 37.60 seconds to 107.18 seconds for a total single train gate down time of 70 seconds.

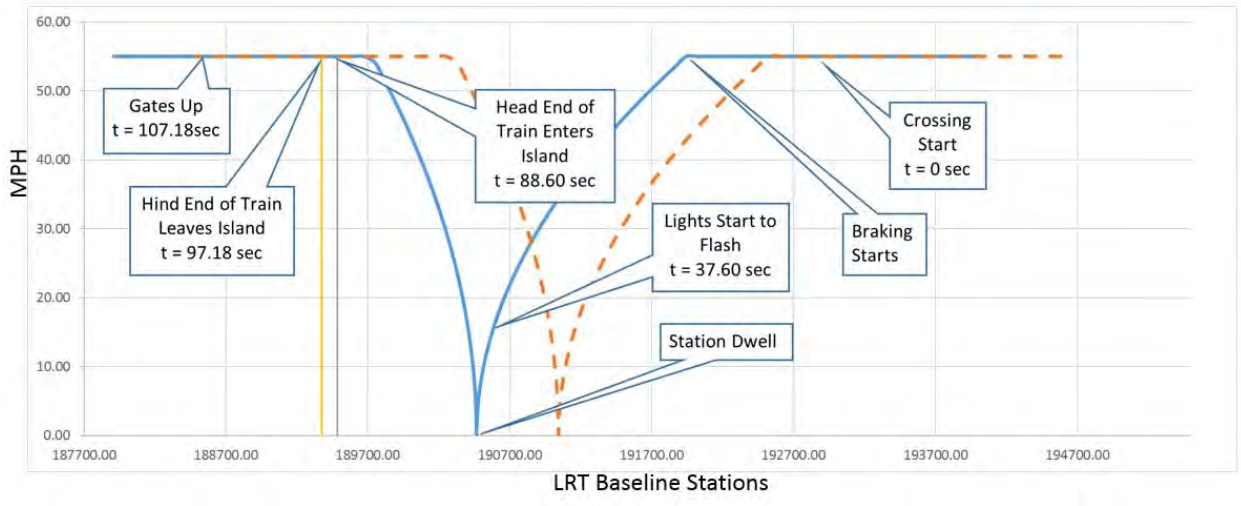

Figure 3-7 Fulton Rd. Westward LRT

3.2.4 Multiple Train Gate Down Times

To develop the gate down times, the Analysis Team developed a theoretical schedule for each of the train types and used them to determine when multiple trains were simultaneously or sequentially at the Fulton Rd. crossing during the Peak AM and PM times.

The single train gate down times developed above will be assigned to each crossing gate down time case to determine the cumulative effect of the trains and to generate a case by case timing scenario for the crossings. Some cases have time between the activations internal to the case.

Using the overall length of the case (from first gate activation to last gate up) overstates the gate down time. To address this issue, the analysis team used the minimum green values recommended in NCHRP REPORT 812, Signal Timing Manual Second Edition for local roads. The longest recommended time for the minimum green was selected (10 secs.). The criteria for the minimum green time is based on driver expectations, so it should be applicable to the situation at a railroad grade crossing. The gate down time was then determined to be the total length of the case minus the total of green intervals with lengths greater than 10 seconds.

Second train logic, consisting of the standard practice of holding the gates down when a train is on the crossing approach, is incorporated into the analysis. The analysis did not adjust the crossing starts to provide additional warning time to address the potential of gates releasing and quickly starting back down (pumping) if the second train is seconds away from activating the crossing approach. This should be considered in the detailed design and during the field reviews during the integrated testing phase of the grade crossing certification. The analysis did include the short pumping times in the total gate down time.

3.2.4.1 Schedules

The schedules were based on the existing schedules, but include changes to the headways and train counts. The Freight schedule is based on anecdotal information about the typical operational times. The exact time is not critical since there is only the one freight train forecasted out to 2035. The repetitive and consistent passenger headways throughout the day, means that whenever the freight train is slotted between the commuter trains on the line, the conditions are replicated.

The Commuter schedule adjusted the existing train times to provide slots for the new trains presented in the report as increased numbers and reduced headways in the SCRRA 2025 planning document.

The Gold Line trains were treated similarly to the commuter trains. The five-minute peak hour headways anticipated for the 2035 operating plan were accommodated by extending the existing trains, and shifting them as need to provide the new headways and slots for new trains.

The tabular schedules that the Analysis Team developed for this analysis are provided in Appendix D. The schedules are presented in the following section as stringline (Distance/Time) graphs.

The multiple train gate down times are based on schedule assumptions and normal operating procedures. This analysis does not account for emergency or unplanned situations that occur as a part of regular train operations.

Simultaneous and sequential scenarios are considered for both AM and PM cases. Simultaneous is considered a case in which there is more than one train in the crossing at a time. Simultaneous is used to describe a case in which the gates do not rise between two trains. Sequential is used to describe a scenario in which the gates rise for a short time between trains but may not allow the traffic queue to clear. In the scenarios where there is a short gate raise (less than 10 seconds), thegate down time is considered to be continuous.

3.2.4.2 AM Peak String Lines

Figure 3-8 depicts the peak AM stringlines for the study area. There are two sets of trains of interest at Fulton Rd. Cases A-1 and A-4 represent the worst-case cases for gate down time at the crossing.

Information about the two scenarios is presented in Table 3-4.

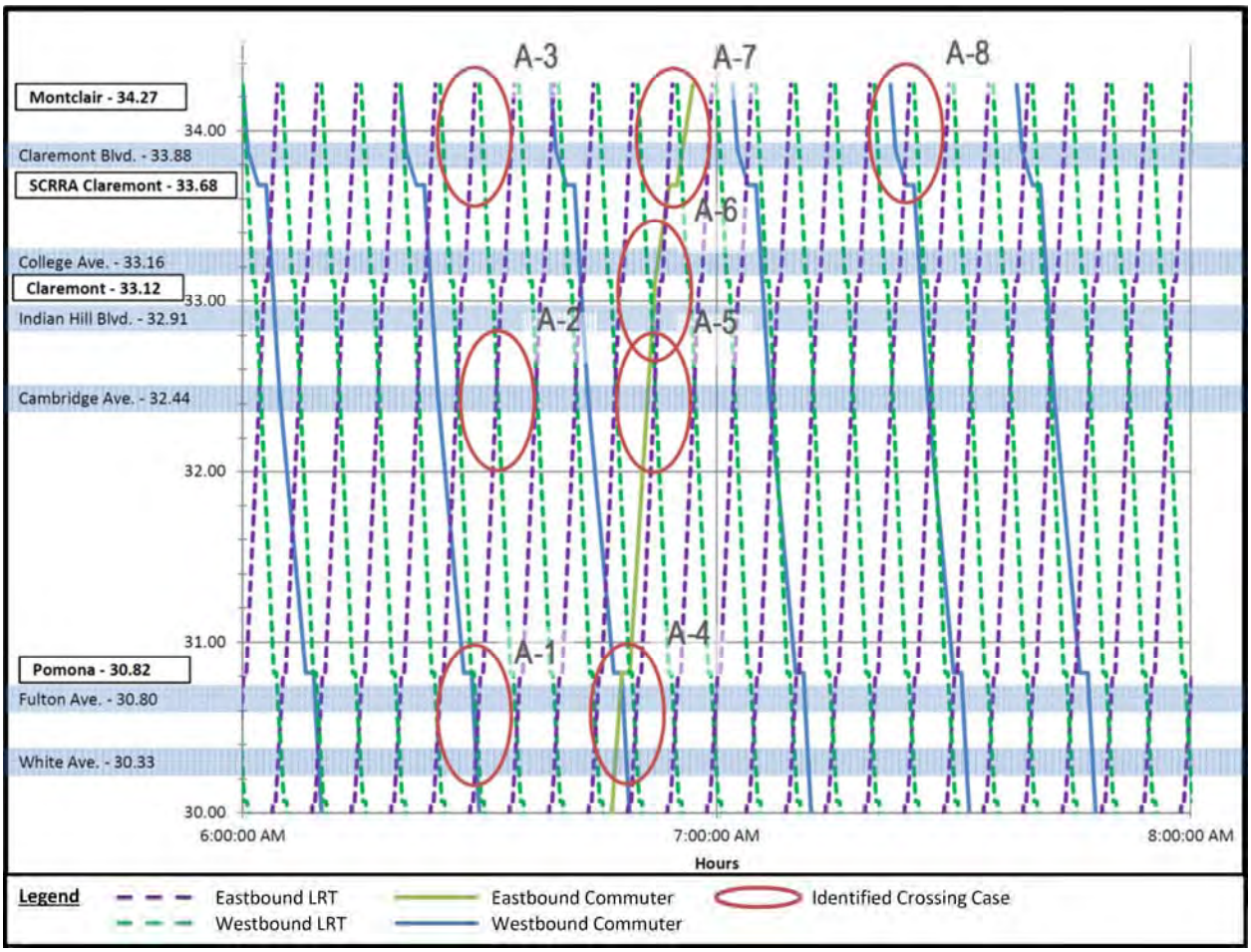

Figure 3-8 AM Peak Stringlines

Table 3-4 Fulton Rd. AM Cases

Case	Crossing	Train	Type	Direction	Schedule	Description
A1	Fulton Rd.	1075	LRT	In	6:29:18 AM	3 Simultaneous with Station Stop
	Fulton Rd.	1022	LRT	Out	6:30:06 AM	
	Fulton Rd.	369	CRT	IN	6:29:01 AM	
A4	Fulton Rd.	311	CRT	In	6:48:01 AM	4 Simultaneous with Station Stop
	Fulton Rd.	1083	LRT	In	6:49:18 AM	
	Fulton Rd.	1030	LRT	Out	6:50:06 AM	
	Fulton Rd.	300	CRT	Out	6:47:58 AM	

Case A1

The resulting gate down time for Case A1 is 239 seconds (3:59 min) compared to the 70 seconds needed for a single LRT.

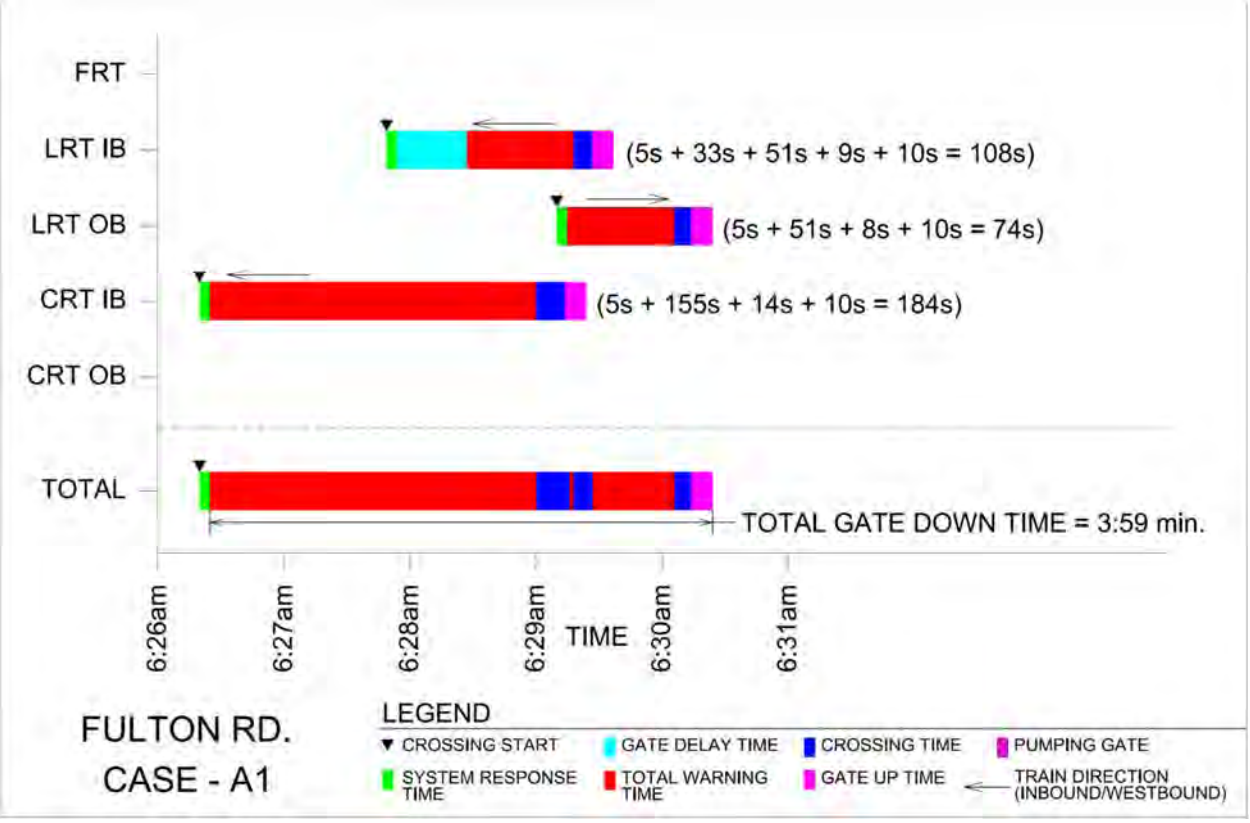

Figure 3-9 Fulton Rd. Gate Down Time Case A1

Case A4

The resulting gate down time for Case A4 is 299 seconds (4:59 min) compared to the 70 seconds needed for a single LRT, or 179 seconds for a single CRT.

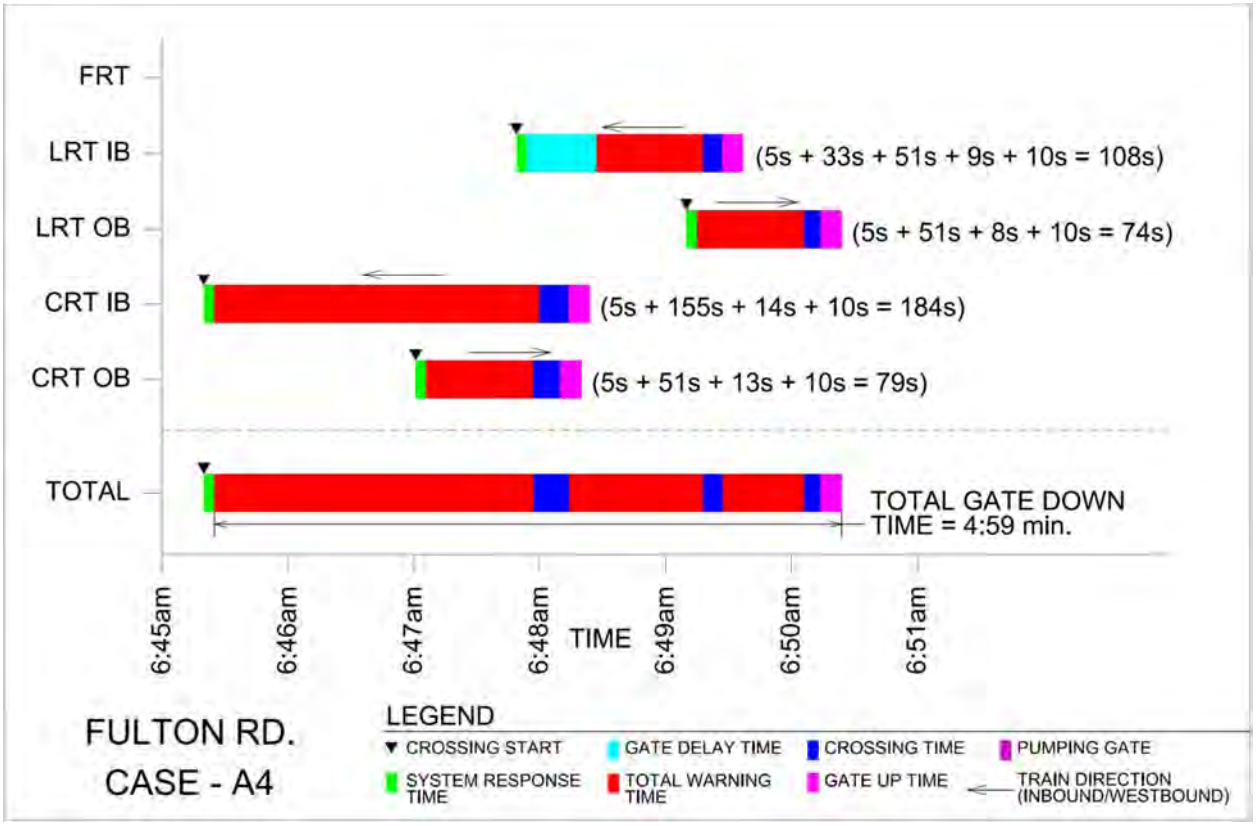

Figure 3-10 Fulton Rd. Gate Down Time Case A4

3.2.4.3 PM Peak String Lines

Figure 3-11 depicts the peak PM stringlines for the study area. There are four sets of trains of interest at Fulton Rd. Cases P-1, P-5, P-9, and P-13 represent the worst-case scenarios for gate down time at the crossing.

Information about the four cases is presented in Table 3-5.

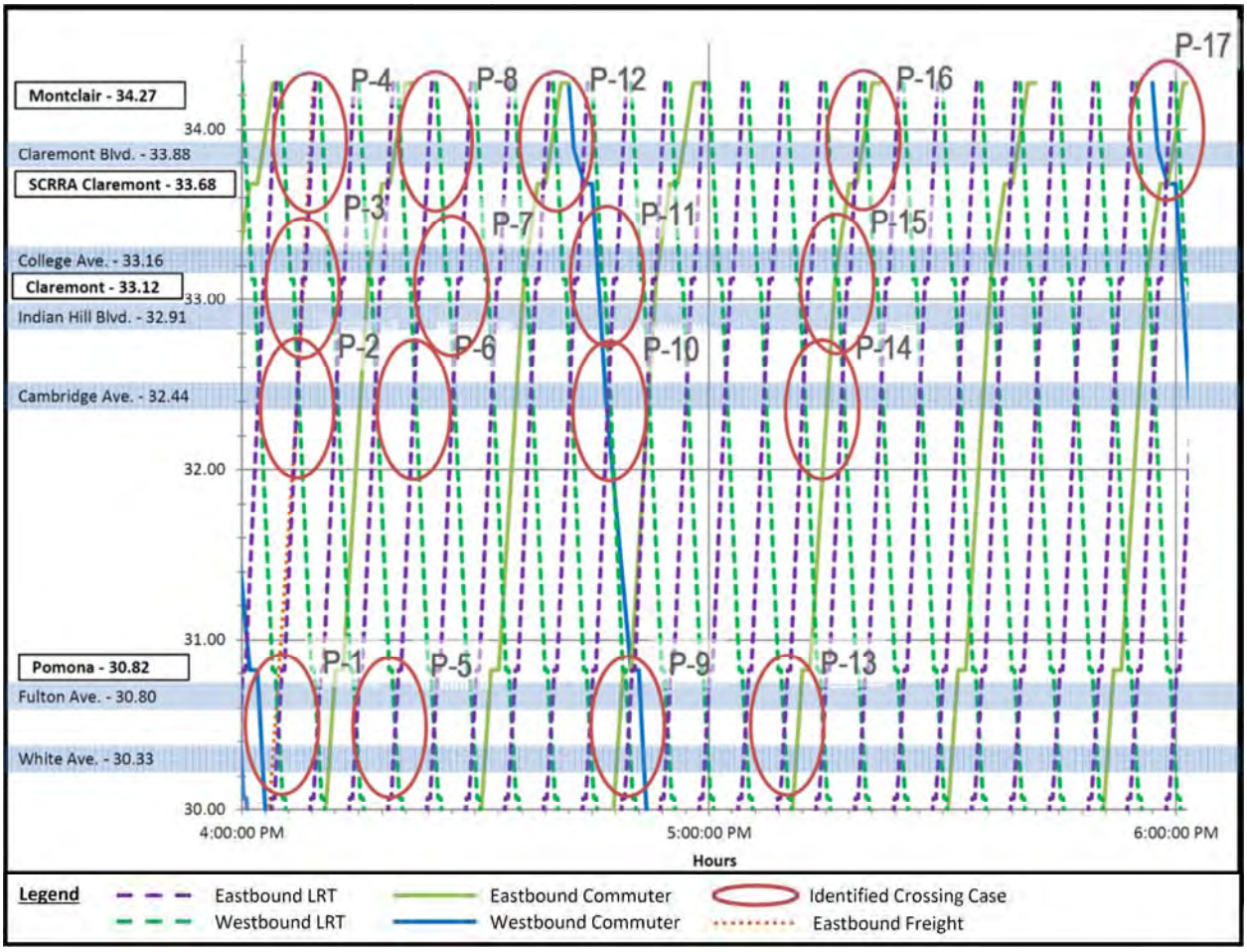

Figure 3-11 PM Peak Stringlines

Table 3-5 Fulton Rd. PM Cases

Case	Crossing	Train	Type	Direction	Schedule	Description
P1	Fulton Rd.	1305	LRT	In	4:04:18 PM	3 Simultaneous with Station Stop
	Fulton Rd.	1252	LRT	Out	4:05:06 PM	
	Fulton Rd.	FRT	FRT	Out	4:04:43 PM	
P5	Fulton Rd.	1311	LRT	In	4:19:18 PM	2 Simultaneous
	Fulton Rd.	1258	LRT	Out	4:20:06 PM	
P9	Fulton Rd.	331	CRT	In	4:51:01 PM	4 Simultaneous with Station Stop
	Fulton Rd.	1323	LRT	In	4:49:18 PM	
	Fulton Rd.	1270	LRT	Out	4:50:06 PM	
	Fulton Rd.	318	CRT	Out	4:48:58 PM	
P13	Fulton Rd.	1331	LRT	In	5:09:18 PM	2 Simultaneous trains and 1 Sequential with Station Stop
	Fulton Rd.	1278	LRT	Out	5:10:06 PM	
	Fulton Rd.	386	CRT	Out	5:11:58 PM	

Case P1

The resulting gate down time for Case P1 is 117 seconds (1:57 min) compared to the 70 seconds needed for a single LRT.

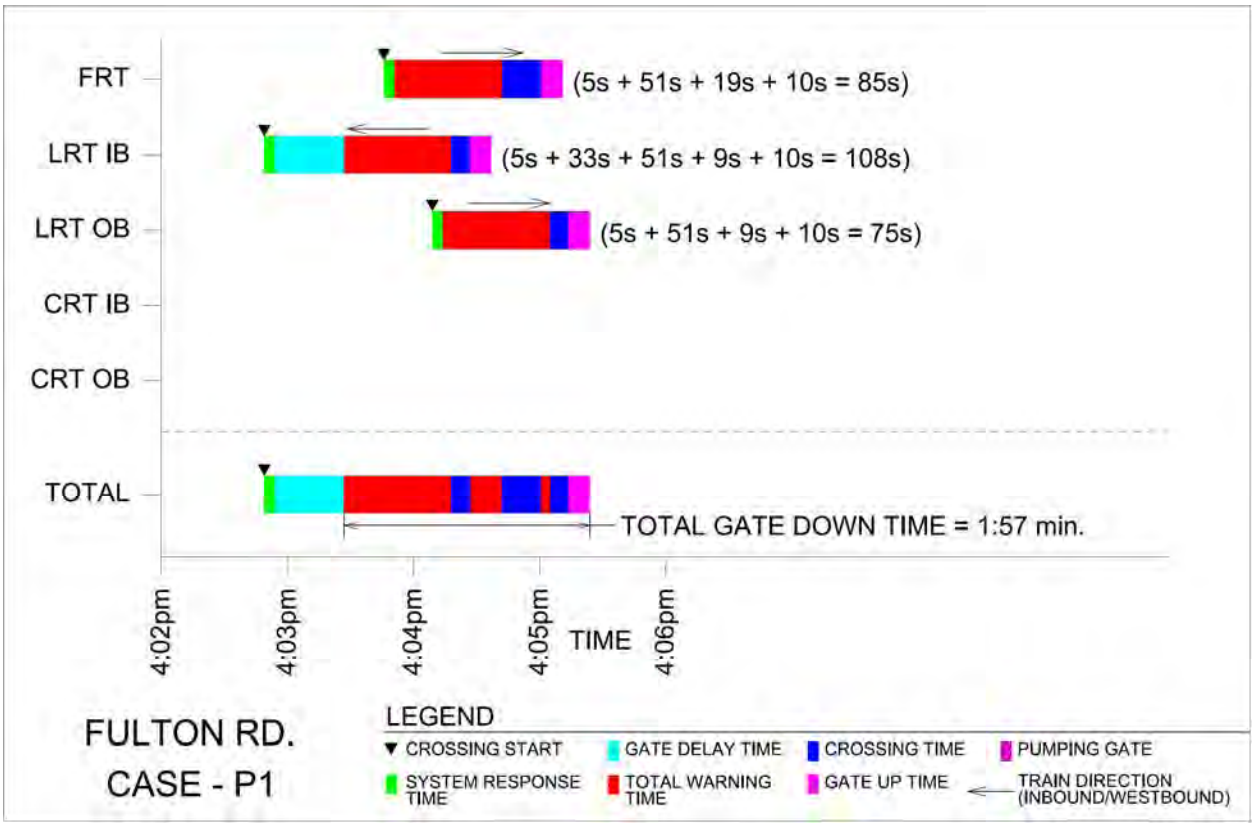

Figure 3-12 Fulton Rd. Gate Down Time Case P1

Case P5

The resulting gate down time for Case P5 is 117 seconds (1:57 min) compared to the 70 seconds needed for a single LRT.

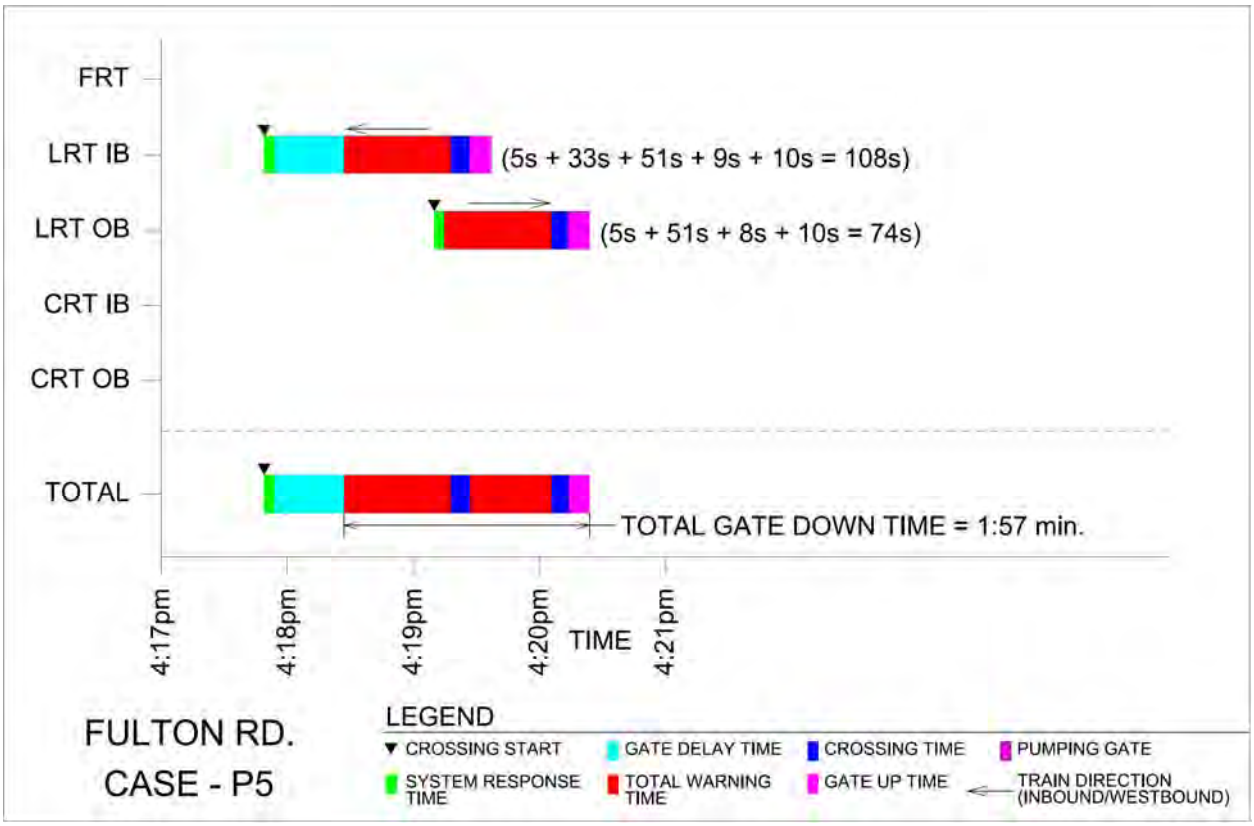

Figure 3-13 Fulton Rd. Gate Down Time Case P5

Case P9

The resulting gate down time for Case P9 is 198 seconds (3:18 min) compared to the 70 seconds needed for a single LRT and 179 seconds for a single CRT.

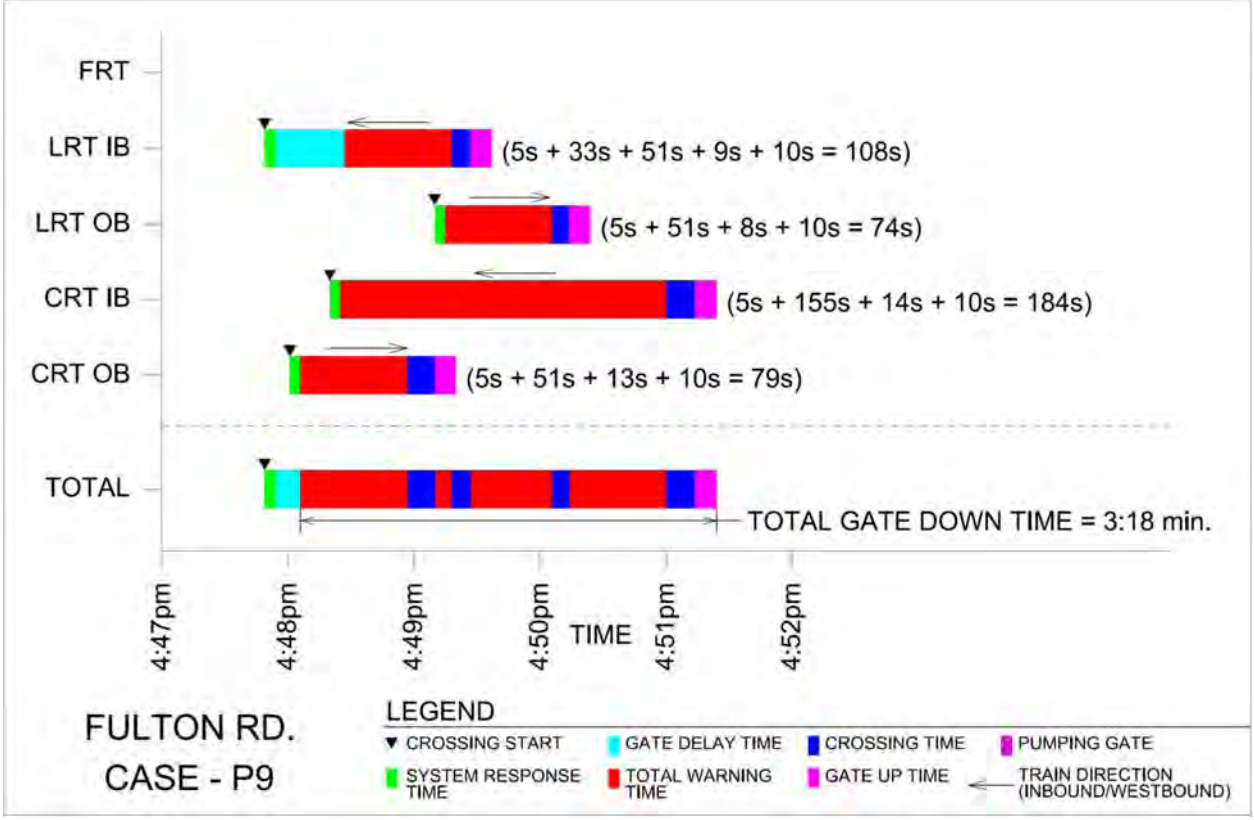

Figure 3-14 Fulton Rd. Gate Down Time Case P9

Case P13

The resulting gate down time for Case P13 is 191 seconds (3:11 min) of the 233 seconds (3:53 min) cycle length compared to the 70 seconds needed for a single LRT and 74 seconds needed for a single CRT.

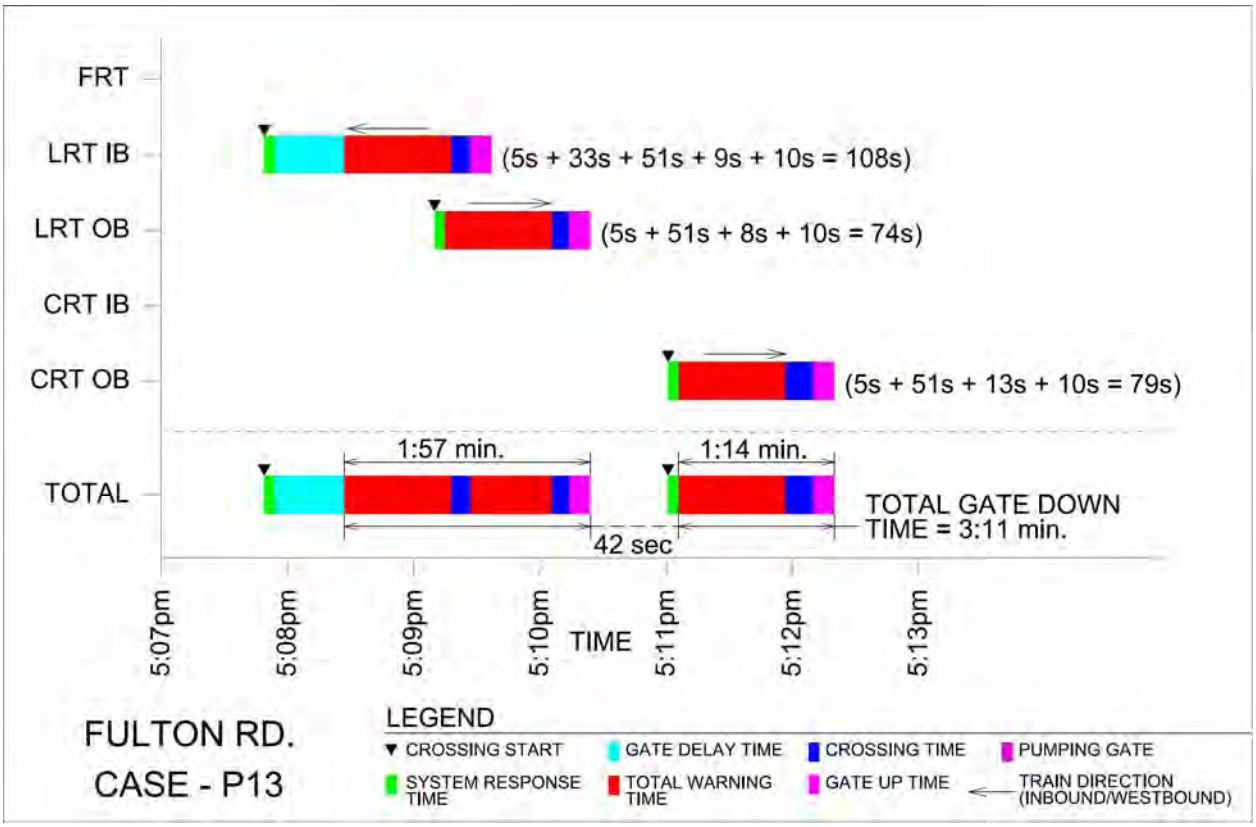

Figure 3-15 Fulton Rd. Gate Down Time Case P13

3.2.4.4 Multiple Activation Discussion

The peak hour multiple train activations are a concern due to their potential effect on the traffic. Long gate down times often leads to driver and pedestrian stress, which leads to undesired behaviors. The use of four quadrant gates, pedestrian gates and other measures limit the type and number of undesirable behaviors.

Unlike other crossings in the study area, the AM peak gate down times at Fulton Rd. are longer than the PM peak gate down times. The two cases are both longer than 3:00 minutes at 3:59 and 4:59. The AM peak are manageable due to the location of the crossing providing queuing space and the low arrival rates. The AM times are longer than the PM times primarily due to more sequential operations with less overlap.

For Fulton Rd., the gate down times in the PM peak are manageable with only three of the twelve activations exceeding 3:00 minutes. Case P13 is listed with a gate down time totaling 3:11, but that total time is split into what would appear to the motorists to be two different activations. The time between the two activations is 43 seconds. The gap would allow several cars to move across the crossing, reducing some of the driver and pedestrian stress.

3.2.4.5 Total Peak Hour Gate Down Time

For the existing conditions, the greatest number of activations (five) occur in the PM peak hour due to the assumed freight train schedule. The activations are spaced out such that they behave as individual trains at Fulton Rd. The gates are down a total of 8:00 minutes out of 60:00 minutes, or 13% of the hour.

Table 3-6 Fulton Rd. PM Peak Hour Activations (Existing)

Activation Time	Train ID	Gate Down Time
4:00 PM	CRT (314)	1:14 mins.
4:05 PM	FRT	1:19 mins.
4:30 PM	CRT (316)	1:14 mins.
4:42 PM	CRT (331)	2:59 mins.
4:52 PM	CRT (318)	1:14 mins.
Total PM Peak Hour Gate Down Time =		8:00 mins

For the LRT No-Build future conditions, we have assumed that the increased service described in the SCRRA 2025 service plan will be instituted. The 2025 plan adds trains to increase the length of the peak service, however due to the existing density between 4:00 PM and 5:00 PM, there are no additional trains introduced into the peak hour based on our presumptive schedule.

Table 3-7 Fulton Rd. PM Peak Hour Activations (LRT No-Build, SCRRA 2025)

Activation Time	Train Type	Gate Down Time
3:55 PM	CRT (310)	1:14 mins.
4:05 PM	FRT	1:19 mins.
4:11 PM	CRT (374)	1:14 mins.
4:31 PM	CRT (376)	1:14 mins.
4:48 PM	CRT (318)	1:14 mins.
Total PM Peak Hour Gate Down Time =		6:15 mins

For the 2035 full build scenario, AM peak hour between 6:00 AM and 7:00 AM at Fulton Rd., the gates are down a total of 30:30 minutes out of 60:00 minutes, or approximately 51% of the time.

Table 3-8 Fulton Rd. AM Peak Hour Activations (2035)

Activation Time	Case	Gate Down Time
6:04 AM	P5[1]	1:57 mins.
6:09 AM	A1	3:59 mins.
6:14 AM	P5	1:57 mins.
6:19 AM	P5	1:57 mins.
6:24 AM	P5	1:57 mins.
6:29 AM	A1	3:59 mins.
6:34 AM	P5	1:57 mins.
6:39 AM	P5	1:57 mins.
6:44 AM	P5	1:57 mins.
6:47 PM	A4	4:59 mins.
6:54 AM	P5	1:57 mins.
6:59 AM	P5	1:57 mins.
Total AM Peak Hour Gate Down Time =		30:30 mins
[1] Case P5 is representative of a crossing scenario that occurs in both the AM and PM peak hours.		

For the 2035 full build scenario, PM peak hour between 4:00 PM and 5:00 PM at Fulton Rd., the gates are down a total of 27:13 minutes out of 60:00 minutes, or approximately 45% of the time. The primary reason for the difference in the AM and PM down times seems to be that in the PM there are more multiple crossings with three trains or more.

Table 3-9 Fulton Rd. PM Peak Hour Activations (2035)

Activation Time	Case	Gate Down Time
4:02 PM	P1	1:57 mins.
4:09 PM	P13	3:11 mins.
4:14 PM	P5	1:57 mins.
4:19 PM	P5	1:57 mins.
4:24 PM	P5	1:57 mins.
4:29 PM	P13	3:11 mins.
4:34 PM	P5	1:57 mins.
4:39 PM	P5	1:57 mins.
4:44 PM	P5	1:57 mins.
4:49 PM	P9	3:18 mins.
4:54 PM	P5	1:57 mins.
4:59 PM	P5	1:57 mins.
Total PM Peak Hour Gate Down Time =		27:13 mins

3.3 Traffic Data

The speed limit on Fulton Rd. is 35 mph. Per the FRA grade crossing inventory data, this crossing is not regularly used by school buses. It is unknown if hazardous material transporters use the crossing regularly, however there are no signs prohibiting those uses.

There are no bus routes serving Fulton Rd. in the area of the crossing.

3.3.1 Traffic Volume/ Truck Percentages/Queues

The existing and proposed traffic data for the Fulton Rd. grade crossing is presented in tables 3-10 and 3-11. The traffic data and projections came from multiple sources, including the FRA Grade Crossing Inventory. The analysis team has included the FRA values because they are the data used by the FRA to predict collisions at the crossing.

The N. Pomona Station driveway on the east side of Fulton Rd. currently allow turns in both directions onto the crossings. Likewise, the access roadway on the west side allows turning movements onto the crossings.

Table 3-10 Fulton Rd. Traffic Counts

	FRA Crossing Inventory	FEIR	FEIR Forecasted
Year	1988	2010	2035
AADT	2,000	1,345	1,558
Trucks %	7.5%	n/a	n/a

Table 3-11 Fulton Rd. Forecasted Crossings Peak Hour

2035 (from FEIR)	AM NB	AM SB	PM NB	PM SB
Fulton Rd.	76	62	57	74

3.3.2 Traffic Queues

The traffic queues were calculated using the data contained in the October 24, 2016 Metro Gold Line Foothill Extension – Grade Crossing Sensitivity Analysis technical memo. The new train schedules and gate down times developed for this analysis were used in the calculation.

Table 3-12 Grade Crossing Traffic Data

Crossing	Direction of Travel	# of Lanes	Total Number of Lanes	Future (2035) Volumes Crossing the LRT Tracks		Future (2035) Lane Volumes Crossing the LRT Tracks		Maximum Peak Hour Volume per Lane	Trains per Hour per Direction
				AM	PM	AM	PM		
White Ave	NB	2	4	583	998	292	499	499	16
	SB	2		770	639	385	320	385	
Fulton Rd	NB	1	2	76	57	76	57	76	16
	SB	1		62	74	62	74	74	
Cambridge Ave	NB	1	2	386	301	386	301	386	16
	SB	1		343	321	343	321	343	
Indian Hill Blvd	NB	2	4	739	886	370	443	443	16
	SB	2		735	869	368	435	435	
College Ave	NB	1	2	388	266	388	266	388	16
	SB	1		230	385	230	385	385	
Claremont Blvd.	NB	2	4	500	374	250	187	250	16
	SB	2		364	494	182	247	247	

Table 3-13 presents the results of the analysis performed at Fulton Rd.

The peak design crossing spillback queues were calculated using the Webster formula from the FHWA Grade Crossing Handbook that was also used in the Grade Crossing Sensitivity Analysis technical memo:

$$N = q*R$$

N = Number of vehicles in queue (peak design queue)
q = Peak hour vehicle arrival rate (vehicles/minute)
R = Gate down time in minutes

The Estimated Influence Zone is the queue extending towards the crossing from the adjacent intersection. It was calculated using the formula in the MTA Grade Crossing Policy. The following formula adds the Peaking Factor (PF) as noted in the guidance MTA Policy:

$$N = PF * (q*(R/2 + d)$$

$$25*N = length$$

N = Number of vehicles in queue
PF = Peaking Factor (a factor of 2 was used)
q = Peak hour vehicle arrival rate (vehicles/minute)
R = Red Time (minutes)
d = Average Delay (minutes)
25 = The Average Queue Length per Vehicle as used in the Grade Crossing Sensitivity Analysis technical memo

The Red Time was calculated by using Webster's Formula for the Optimum Cycle Length as detailed on the FHWA website at https://ops.fhwa.dot.gov/publications/signal_timing/03.htm to determine the assumed cycle length and by usingTable 2-4 in the Caltrans' Traffic Signal Operations Manual to determine the Maximum Green Time for the cross street which equates to the Red Time on the street with the queue.

The Average Delay was determined using the intersection Level of Service and taking the average value in the corresponding range from Table A-1 of the MTA Grade Crossing Policy.

Table 3-13 Fulton Rd. Projected 2035 queues

Crossing	Direction of Travel	# of Lanes	Total Number of Lanes	Calculated Queues			Available Storage Length (ft)	Min Gate Up After Max Gate Down (min.)	Queue Clears prior to next Gate Down
				Max Crossing Queue (ft)	Estimated Influence Zone (ft)	Maximum Expected Down-stream Queue (ft)			
Fulton Rd	NB	1	2	125	150	275	1325	2.41	Yes
	SB	1		125	100	225	1347	2.41	Yes
Note: see Appendix G for additional calculation information.									

The screening analysis for Fulton Rd. indicates that there is not a significant change to the original determination of the acceptability of an at-grade crossing due to the longer gate down times.

3.3.3 Traffic Delays and LOS at Crossings

The FEIR provided both the Volume to Capacity Ratios (V/c) and the LOS values for the existing conditions and includes the crossings in the study area. Table 3-14 summarizes the information for the crossings.

Table 3-14 Existing Volume Ratios and LOS at Crossings

Crossing Name	V/c	LOS (2010)
Fulton Rd.	0.10	A

Although LOS is an industry standard for intersection operations, calculating LOS specific to crossings is not a common measurement. LOS at the crossing was calculated to help demonstrate safe flow through the crossing. To determine the LOS of the proposed crossing at Fulton Rd., we have used the delay formulas for signalized intersections (from the ITE Highway Capacity Manual) and adjusted the crossing gate down parameters to fit within the methodology. The delay calculations consist of three distinct calculations, d_1 through d_3 representing the delay calculated assuming uniform arrivals (d_1), delay due to random arrivals (d_2), and delay due to initial queue at start of analysis time period (d_3).

The equation for determining the delay calculated assuming uniform arrivals (d_1) is shown below:

$$d_1 = \frac{0.5C\left(1-\frac{g}{C}\right)^2}{1-\left[\min(1,X)\frac{g}{C}\right]}$$

d_1 = delay due to uniform arrivals (s/veh)

C = cycle length (seconds)

G = effective green time for lane group (seconds)

X = v/c ratio for lane group

The analysis is designed around traffic signal controllers that typically have a constant set of timings that are progressed through in response to certain actuations to control the intersection. Railroad grade crossings are different in that the timings vary and are only displayed in response to an activation and deactivation. Because we are interested in the average delay per vehicle, we have taken the total gate down time in the peak hour as equivalent to the red interval and subtracted that from the hour to get to the green interval. We then took the number of activations and subtracted a set period (four seconds) from the green interval for each activation to account for motorist response time, producing an equivalent effective green time for the full hour. The formula uses the factor (g/C) as a ratio of the effective green time to the cycle length. Because this is a ratio, we were able to calculate the equivalent ratio by using the effective green for the entire hour divided by the number of seconds in the hour. Because the formula also uses C as a variable by itself, we have assigned it to the headway, which is also representative of the average cycle time for the activations.

The equation for determining the delay due to random arrivals (d_2) is shown below:

$$d_2 = 900T\left[(X-1)+\sqrt{(X-1)^2+\frac{8kIX}{cT}}\right]$$

d2 = delay due to random arrivals (s/veh)

T = duration of analysis period (hours). If the analysis is based on the peak 15-min. flow then T = 0.25 hrs.

k = delay adjustment factor that is dependent on signal controller mode. For pretimed intersections k = 0.5. For more efficient intersections k < 0.5.

I = upstream filtering/metering adjustment factor. Adjusts for the effect of an upstream signal on the randomness of the arrival pattern. I = 1.0 for completely random. I < 1.0 for reduced variance.

c = lane group capacity (veh/hr)

X = v/c ratio for lane group

There were no adjustments required for this equation; the values were used in standard ways. The value of T was set to 1.0, k was set to 0.5, c was set to 1800, and I was set to 1.0.

For Fulton Rd. d_3 is assumed to be 0 seconds because the queues clear between activations.

To confirm our methodology, the tabulated v/c for existing conditions in the FEIR were utilized in the above described equations. The resulting LOS matched that which was provided in the FEIR for existing conditions. This validated the methodology. The equations were then used to calculate the LOS for the 2035 condition with the calculated gate down times. Table 3-15 lists the results.

Table 3-15 Vehicle Delay and LOS for the 2035 Crossing Conditions – Peak Hour

Crossing Name	Average Delay secs. per Vehicle (2035)	LOS (2035)	Existing LOS (FEIR 2010)
Fulton Rd.	41.7	D	A
Note: see Appendix G for additional calculation information.			

The delay results indicate that the increased gate down times do have a negative impact on traffic at Fulton Rd., but the resulting average delay being a LOS of D is within the design criteria for local roads where the design LOS is often considered to be LOS D.

The average delay calculations for the peak hour do not fully describe the delays that will be experienced during the longest gate down times, and neither do they show the time when the gates are not down. To capture the issues with the longest gate down times, the operation of the queues are being used as the indicator as discussed throughout this report.

3.3.4 Proximity to Key Associated Facilities

There are two key associated facilities adjacent to the crossing. An apartment complex parking lot has an entrance approximately 90 feet north of the crossing.

The second facility is a manufacturing/distribution facility in the southeast quadrant with a parking lot entrance approximately 140 feet south of the crossing.

3.4 Pedestrians/Bicycle

3.4.1 Pedestrian and Bicyclist Volume

At the Fulton Rd. crossings, the existing pedestrian and bicycle activity is low, with under 65 pedestrians and 30 bicyclists crossing during the hours covered by the table below.

Table 3-16 Fulton Rd. Pedestrian and Bicycle Counts

	7 AM-11 AM				11 AM-3 PM				3 PM-6 PM			
Weekday (09/21/2016)	**East Leg**		**West Leg**		**East Leg**		**West Leg**		**East Leg**		**West Leg**	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
Pedestrians	3	11	2	2	1	5	11	2	4	2	8	11
Bikes	1	0	3	5	3	0	1	4	4	0	2	6

3.4.2 Pedestrian Improvements

Consistent with MTA and SCRRA design criteria, the proposed pedestrian treatments will include automatic pedestrian gates, flashers, fencing, signs, pavement markings and channelization. The Advanced Concept Engineering Plans propose pedestrian gates and barriers for this crossing. The plans also provide a pedestrian refuge area on the west side of the crossing. The existing sidewalks are

Figure 3-16 Typical Gold Line Phase 2 Pedestrian Treatment (Google Earth)

expanded to lead pedestrians to the pedestrian gates and barriers. The increased crossing protection for pedestrians is an industry best practice and consistent with the existing Gold Line crossing equipment.

The Pedestrian Clearance time calculated in the Analysis section is short enough to allow pedestrians to clear into the refuge area from either part of the crossing after the flashing lights and gates are activated.

Figure 3-16 shows the typical Gold Line pedestrian treatment installed in Phase 2 at the North Azusa Avenue crossing. The crossing has a station entrance to the left, two LRT tracks and a single freight track.

The Pedestrian Clearance time calculated in the Analysis section is short enough to allow pedestrians to clear the crossing after the flashing lights and gates are activated, therefore no refuge areas are needed.

3.4.3 Bicycle Improvements

Based on the lack of signage and pavement markings, Fulton Rd. is not a designated bicycle route. The roadway crosses the tracks at approximately right angles and includes flangeway gap filler. Typical signage warning about flangeway gap will be evaluated for the crossing, but no other bicycle specific improvements are required.

3.5 Hazard Analysis

WBAPS is a standard tool that implements the USDOT Accident Prediction Model. When the USDOT Accident Prediction Model was developed, the number of grade crossing accidents were significantly higher. As safety improvements have been implemented, the number of grade crossing accidents at crossings have generally been reduced to a point where the variability of the data exceeds the values being predicted. The Indian Hill Blvd. crossing is a good example of this since it has had only one accident in the past five years and because of that it rates nearly twice as high as its nearest ranked counterpart.

3.5.1 FRA Grade Crossing Accident History

Railroads are required to report grade crossings accidents to the FRA. The FRA maintains a data base of the accidents as part of their Grade Crossing Inventory system

The Analysis Team has down loaded and reviewed the accident data records for the crossings in the study area. The FRA grade crossing accident reports are included in Appendix C.

No accidents have occurred at the Fulton Rd. grade crossing according to the FRA grade crossing database.

3.5.2 Hazard Index Calculations

3.5.2.1 FRA Web Based Accident Prediction Systems (WBAPS)

The FRA's WBAPS analysis was performed for the study area and the report is included in Appendix C. Table 3-17 summarizes the results of the WBAPS analysis for all of the crossings in the study area. WBAPS can only predict collisions based on the existing conditions and historic data.

The historic data used comes directly from the FRA Grade Crossing Inventory data set. Reviewing the data shows that some of the AADT numbers are markedly different from the AADT numbers used in the FEIR. The higher AADT increases the risk and drives up the projected number of collisions.

The predicted collisions reflect the percent chance of an accident per year. For Fulton Rd., there is a 2.7% chance that an accident will occur in any year. The rank is produced from the WBAPS data for all

the crossings within the model corridor. The lower the rank number the more likely for an accident to occur.

Table 3-17 WBAPS Predicted Collisions – Existing Conditions

Crossing	DOT #	MP	Sub-Division	Rank	Predicted Collisions
White Ave.	026187X	107.51	Pasadena	18	0.015869
	747331D	30.33	San Gabriel	11	0.027440
Fulton Rd.	026186R	107.05	Pasadena	23	0.007757
	747331D	30.80	San Gabriel	10	0.027785
Cambridge Ave.	026730Y	32.44	San Gabriel	12	0.027394
Indian Hill Blvd.	026180A	32.91	San Gabriel	1	0.112067
College Ave.	026179F	33.16	San Gabriel	7	0.036295
Claremont Blvd.	026178Y	33.68	San Gabriel	4	0.050953

3.5.2.2 US DOT Accident Prediction Model (APM) – Proposed Conditions

The APM model is used in the WBAPS system to predict the collision rate for the existing conditions.

The APM is also used by CPUC in determining where grade crossing safety funding is applied, therefore it is useful in this study as a California methodology.

The FHWA guidance on the APM provides two different methods for determining the inputs to the model, a tabular and a mathematical method. The tabular method is limited to high train and vehicle volumes. The mathematical method, as presented in the FHWA Handbook, contains several typesetting errors, specifically there are missing parenthesis that would raise the entire value calculated to a power instead of just one of the variables. This was corrected in the team's implementation of the spreadsheet APM model. The calculations for the existing conditions at the four eastern crossings include the tabular inputs for verification.

By using the APM directly, the Analysis Team was able to develop accident prediction numbers for the proposed conditions. This allows the direct comparison of the existing condition prediction and the proposed condition prediction. The APM utilizes a factor to adjust the projections to reflect recent data. The last published adjustment factor of 0.4614 was from 2010.

The APM was run for the existing conditions to determine the current adjustment factor in use. For the four eastern most crossings, the current adjustment factor varied, but an average value of 0.4251 brought the output in line with the WBAPS predictions.

Using the APM for the proposed conditions does have an additional issue. In the APM, four-quadrant gates are calculated to have the same effect as simple flashing lights and gates, so the only data that affects the projection is the 2035 number of trains and the number of vehicles. The FHWA Grade Crossing Handbook identifies several sources that show that four-quadrant gates by themselves reduce accidents at crossings by over 80% at crossings with normal flashing lights and gates. It also identified that adding median barriers also reduces the accident rates at crossings with both four-quadrant and normal flashing lights and gate equipped crossings.

To more accurately reflect the proposed conditions, the Analysis Team selected a conservative value for the overall accident reduction possible at the proposed crossings based on the warning device improvements. The team selected the 82% reduction reported by the Canadian Study 'A Human Factors Analysis of Highway-Railway Grade Crossing Accidents in Canada' cited in the FHWA Grade Crossing Manual for just adding four-quadrant gates to the crossings as the factor that would be applied to the APM output for the proposed conditions. The US data indicated reductions of over 90% in all cases. A link to the Canadian study is provided in Appendix B of this report. Recent conversations with the FRA grade crossing safety team has indicated that their future update of the APM will include a similar factor for the addition of Four Quadrant Gates.

One further data adjustment was made; White Ave, and Fulton Rd. are each currently treated as two separate crossings, one for the Pasadena Sub and one for the San Gabriel Sub at each crossing. WBAPS reports projections for each crossing. In the proposed condition, they will function as a single crossing. To address this, the team added the two projections for each of the existing crossings to create the existing baseline projections.

The APM model projections included in Table 3-18 present the existing, proposed 2035, and proposed adjusted for four quadrant gates projections for the six crossings in the study.

The predicted collisions reflect the percent chance of an accident per year. For Fulton Rd., there is a 4.3% chance that an accident will occur in any year. In 2035, the chance increases to 13.5% but with the addition of quadrant gates it is then reduced to 2.4%.

Table 3-18 APM Predicted Collisions – Proposed Conditions

Crossing	MP	Total WBAPS Predicted Collisions	APM 2035 Predicted Collisions	APM 2035 Predicted Collisions w/ 4 Quad Gates
White Ave.	30.33	0.043309	0.137675135	0.024781524
Fulton Rd.	30.80	0.043309	0.13474019	0.024253234
Cambridge Ave.	32.44	0.027394	0.058903933	0.010602708
Indian Hill Blvd.	32.91	0.112067	0.136854103	0.024633739
College Ave.	33.16	0.036295	0.059471971	0.010704955
Claremont Blvd.	33.68	0.050953	0.064996925	0.0116994

The predicted collision rate from the APM model for Fulton Rd. in 2035 with the increased number of trains and growth in AADT is lower than the WBAPS rate for the existing crossing.

3.5.3 Traffic Studies

The existing traffic studies included in the FEIR and CPUC supporting data were based in a simplistic way on the headways of the new LRT extension. These simplifying assumptions understated the gate down times leading to a less conservative analysis.

A series of additional traffic studies performed by AECOM were reviewed. The studies include the CPUC support memos for the grade crossings in this study, analysis of lane configurations, queues, and intersection modifications. The studies generally indicate a set of significant mitigations to the adjacent intersections along the corridor, typically moving them from LOS D, E and F to LOS A and B.

For Fulton Rd., the results of the more rigorous gate down time methodology and the simplified queue analysis did not produce a difference that would require different treatments at the crossing. The effects of the queues and their operation are similar across all of the studies

SECTION 4

Other Considerations

4.1 PTC, Railroad Signal, and Communications

The Analysis Team was charged with addressing several other concerns related to the proposed crossings. Each of the concerns are discussed individually in the following sections.

4.1.1 Ability to safely and effectively operate PTC

There are concerns in the rail industry about the new PTC systems, a major one being the operation and integration of grade crossings into the PTC system. PTC systems require that the grade crossing circuitry provide a health condition report from the crossing devices to the PTC control systems, adding additional points of failure to the system.

4.1.1.1 Crossing Interconnection

The design of the new crossings relies on the crossing circuitry already in place on the SCRRA tracks. The new circuitry on the proposed Gold Line tracks is expected to be similar to the systems installed in Phase 2A of the Gold Line. The circuitry and devices have operated effectively and were proven through the CPUC acceptance process.

Because the different trains operate on dedicated tracks, there is no reason to suspect that the circuitry and devices will not operate as they have in revenue service to this point in time. This arrangement only leaves the interconnection of the two systems to operate as a single crossing. The interconnections have been proven on the Gold Line Phase 2A crossings where the MTA and SCRRA devices have been functioning in an integrated single crossing system.

4.1.1.2 Four Quadrant Gates

The use of Four Quadrant Gates (quad gates) adds the requirement that the crossings include vehicle detection within the crossing. If a vehicle is detected, the exit gates remain up and tallow the vehicle to clear the crossing. The Analysis Team is not aware of any SCRRA quad gate crossings in the study area. The addition of quad gates to crossings has been applied at numerous crossings similar to the SCRRA crossings, and the Analysis Team foresees no impediments to fully implementing the vehicle detection on the existing SCRRA crossings or future PTC system if applicable.

MTA has implemented Quad Gates on Phase 2A of the Gold Line. Figure 4-1 shows the quad gate system installed on the Gold Line in Azusa, CA at N. Dalton Ave.

This implementation by MTA was accepted by CPUC, therefore the Analysis Team foresees no impediments to fully implementing the vehicle detection requirements on the new crossings in the study area.

Figure 4-1 Google Street View N. Dalton Ave. Azusa, CA

4.1.1.3 On board train control systems

The Gold Line has established train to wayside systems for the operator of the LRT to interact with the crossing gates at crossings adjacent to stations. The Gold Line crossings are set on timers that accommodate the normal station dwells.. In the event the LRT is at the platform for longer than the typical 20 second dwell time and with permission from Rail Operations Control (ROC) , the LRT operator can cancel the crossing warning devices through a train-to-wayside link. Once canceled and the LRT is ready to depart, the operator can reactivate the crossing warning devices with a TWC command.

At other crossings adjacent to LRT stations, the Gold Line has established train to wayside control loops and communication that provides for gate activation and allows the train operator to manually raise the gates for dwells longer than the dwells set by the timers.

SCRRA generally designs grade crossing warning devices adjacent to stations to remain down during station stops without timing out in all cases, except for unique crossings such as Gary Ave. This reduces and likely eliminates the need for any interaction beyond the potential PTC related functions.

4.1.1.4 Possibility of applying grade crossing near side signal stop/PTC technology

On the surface, having a near side signal that could be activated from the control cab of the train would seem to be just a modern update of the crossing start (for gates down) that the train activates after the station dwell, but it quickly gets more complicated, depending on the operating plan and PTC. The existing conditions at the Claremont Station and the adjacent College Ave. crossing, highlight some of the key issues.

1. Some issues must be addressed in the implementation of an outbound nearside signal at the east end of the station platform. The first issue to consider is whether the nearside signal would be an absolute signal. Making it an absolute signal would prevent a train from proceeding past the signal and would provide the PTC system with a defined target. To get past the signal it would need to be cleared by either a request from the control cab of the train, or from a Control Operator. Item 3 below discusses how the crossing could be handled. Regardless of the signal's indication, the entire route would need to be locked to the next interlocking to prevent routing an opposing move into the block in the advance of the nearside signal.

2. The next issue is how to set the routes in the PTC system so that the freight train or a commuter express train could run outbound unimpeded. The freight/express route request would set the nearside signal to a more permissive aspect. If the train is a local, then the system would have

to set a route that sets the nearside signal to STOP. In Denver, this is apparently beyond the capabilities of the PTC implementation, we are unsure if the SCRRA implementation could handle this.

3. Another issue is how to handle the crossing. This is less complex to implement, but needs to be considered. Under PTC operation, the nearside signal is a target point and the PTC system enforces the stop.
    - The first case is for a through train when the nearside signal is cleared without intervention. The gates would operate as they would normally under the PTC system.
    - Another method when the nearside signal is set to STOP would be to simply hold the gates down as they currently are, but this eliminates the need for the nearside signal.
    - With the nearside signal setup as an Absolute signal, PTC would enforce the stop, and subsequent request to clear the signal would start a timer that in turn would activate the crossing warning devices. After the appropriate interval on the timer the signal would upgrade from STOP and the train could proceed at the indicated speed. This method uses the nearside signal to minimize the gate down time.
4. Another approach to the near-side signal would be to make the nearside signal an absolute signal at the crossing rather than the end of the station. The signal could be cleared by the dispatcher for an express or freight train or auto routed by platform occupancy and timers. The timers would be set to allow for the train to pull into the station, stop, dwell to load and unload, then start the crossing. The downside is if a train is delayed in the station, the WTs would be longer. Therefore, a better approach may be to install a detection circuit at the end of the platform (AFO, Axle counter, etc.) As the train pulls out of the platform and occupies this detection circuit the crossing would activate clearing the signal once the entrance gates have reached the horizontal position. This approach would be more indicative to a "Positive Start" already used on the SCRRA system simply modified to accommodate a nearside absolute signal. There have been preliminary discussions between MTA and SCRRA on this implementation, and discussions are expected to continue.
5. The last method we'll discuss is outside the box, but is based on older techniques adapted to work within PTC controls. In this case the nearside signal is an automatic signal, where a STOP aspect is displayed and would be enforced by PTC. Under a through-PTC route it could be set to display any permissive aspect. Under a PTC route with a station stop, the nearside signal would display a STOP aspect. If the PTC implementation allowed, the train could then creep towards the nearside signal since the most restrictive indication is a STOP and PROCEED. The nearside signal would be placed farther east of the head end stopping location, and the island circuit would be extended to just to just east of the stopping location in the rear of the nearside signal. In effect, the train would creep onto the island circuit without passing the signal. The action of entering the island circuit would start a timer that would automatically request a signal upgrade, allowing the train to proceed without having to call for the signal. Timetable Special Instructions would detail this operation to the operator. Thus, under the rules, with the cab signal upgraded and the train in advance of the signal, the train could then proceed at the maximum indicated speed instead of at restricted speed.

4.2 Grade Crossing Geometry

The Analysis Team has reviewed the crossing geometry, and has determined that there are no significant opportunities or need to improve the geometric conditions at the Fulton Rd. crossing.

During construction, tree trimming may be required to maximize the sight lines and sight triangles.

4.2.1 Driveway within the Crossing

The N. Pomona Station driveway is a unique aspect of this crossing. The Advanced Concept Engineering Plans propose providing two sets of four quadrant gates to control the entrance to either crossing from the driveway. Alternately, MTA is considering closing the driveway on Fulton Rd.

The Analysis Team visited the site and reviewed the plans, and agree that closing the driveway is the preferred alternative at the crossing. If the driveway is to remain, the Analysis Team proposes that the two sets of gates interior to the crossing be eliminated and two gates and flashing lights be placed on the driveway with a median or channelization devices. This is due to the distance between the interior gates not being long enough to accommodate the design vehicle. This is discussed in more detail in section 4.5 below. By providing gates on the driveway, it would allow the crossing to be treated as one long crossing and prevent vehicles coming from the driveway from entering the area between the SCRRA and MTA/freight tracks.

4.2.1.1 Gating the Driveway

The gates on the driveway would function like the four quadrant gates on Fulton Rd. with the driveway lane entering the station parking lot (exiting the crossing) being treated like the far-side exit gate, and the driveway lane entering the crossing being treated like the other gates entering the crossing.

Using the inbound driveway lane as an exit lane, and holding the gates up allows clearance of the queue as intended by providing all exit paths. Dropping the outbound driveway lane gates holds the traffic back to allow the queue clearance on Fulton Rd. to proceed without additional vehicles. The analysis Team considered using traffic signals with block out signs, but felt that a gate arm is a more positive traffic control measure.

Having the driveway gated also would allow eliminating a median in Fulton Rd. in the crossing. This preserves the left and right out turns at the driveway and the access roadway. Additionally, pavement markings between the two crossings would be recommended to indicate no stopping.

4.3 Operation of Warning Devices

4.3.1 Vehicle Devices

For interconnected adjacent crossings configured as shown in AREMA Figure 3111-1 like Fulton Rd., Part 3.1.11 of the AREMA Manual states that the operation should flash all lights and lower both gates with activation on either track.

The proposed Fulton Rd. crossing has exit gates in a four-quadrant arrangement for both crossings. CPUC GO 75-D Paragraph 6.6 c) requires that the exit gates be controlled by a presence detection device, referred to as Dynamic Exit Gate Operating Mode (Dynamic EGOM) in the AREMA and CAMUTCD documents.

GO75-D Paragraph 6.6 b) specifies the gate sequencing and referenced CAMUTCD for additional requirements.

Section 8C.06 of the CAMUTCD details the design and operation of Four Quadrant crossing gates.

The Vehicle Warning Devices at Fulton Rd. are expected to operate in accordance with these standards.

4.3.2 Pedestrian Devices

AREMA and CPUC provide no specific guidance for the operation of pedestrian warning devices. The SCRRA Grade Crossing Manual describes the selection methodology, and type of devices and the SCRRA ES-4000 Standard Drawings present details for the physical configuration.

The configuration of the pedestrian devices has been proven to limit the frequency of pedestrians who avoiding the warning devices, however people can still actively circumvent the warning devices by taking extraordinary steps.

The configuration at Fulton Rd. allows for safe pedestrian refuge between the LRT and Metrolink tracks. The Pedestrian gates treat the SCRRA tracks as a separate crossing from the LRT/freight tracks with entrance and exit gates provided at each crossing. This results in warning and a pedestrian refuge between the tracks. The refuge area allows for a shorter walking distance compared to pedestrians walking across all tracks during warning activation.

4.4 Active Warning Device Performance and Reliability

At this point in the design, the specific equipment manufacturers cannot be determined, however the type of devices required are similar to those devices already deployed on both Metrolink and the earlier phases of the Gold Line, and used throughout the rail and transit industry including the Class 1 freight railroads. Performance and reliability of the general equipment type and manufacturers are known and are at acceptable levels for wide spread adoption.

The Illinois High-Speed Rail Four-Quadrant Gate Reliability Assessment study has detailed information on the probability and causes of failures of four-quadrant gated crossings. A link to the study is included in Appendix B. The result of the finding is that for a 10 train a day HSR route, the failures did not appreciably delay the operating schedule.

4.5 Need for Interconnecting Gold Line and SCRRA Warning Devices

The need to interconnect gates presumes that there is a potential configuration where the crossing is comprised of two independent crossings. The AREMA C&S Manual provides guidance in Part 3.1.11. Part 3.1.11 also includes guidance concerning timing if vehicles queue onto an adjacent track. Figure 3111-1 in the AREMA guidance shows that for crossings within 100 feet of each other, a single set of warning devices are used. Part 3.1.11 also describes how the devices are intended to function in response to train activations.

Figure 4-2 presents the Analysis Team's assessment for the minimum possible distance between the tracks where there would be no possibility of a queue on the adjacent track based on the length of the maximum design vehicle. As shown in AREMA Figure 3111-2, crossings between 100' and 200' apart are treated as separate crossings but require interconnection. Based on crossing configurations within the study area, the minimum track spacing to fit a WB-67 design vehicle is 117 feet between two independent crossings.

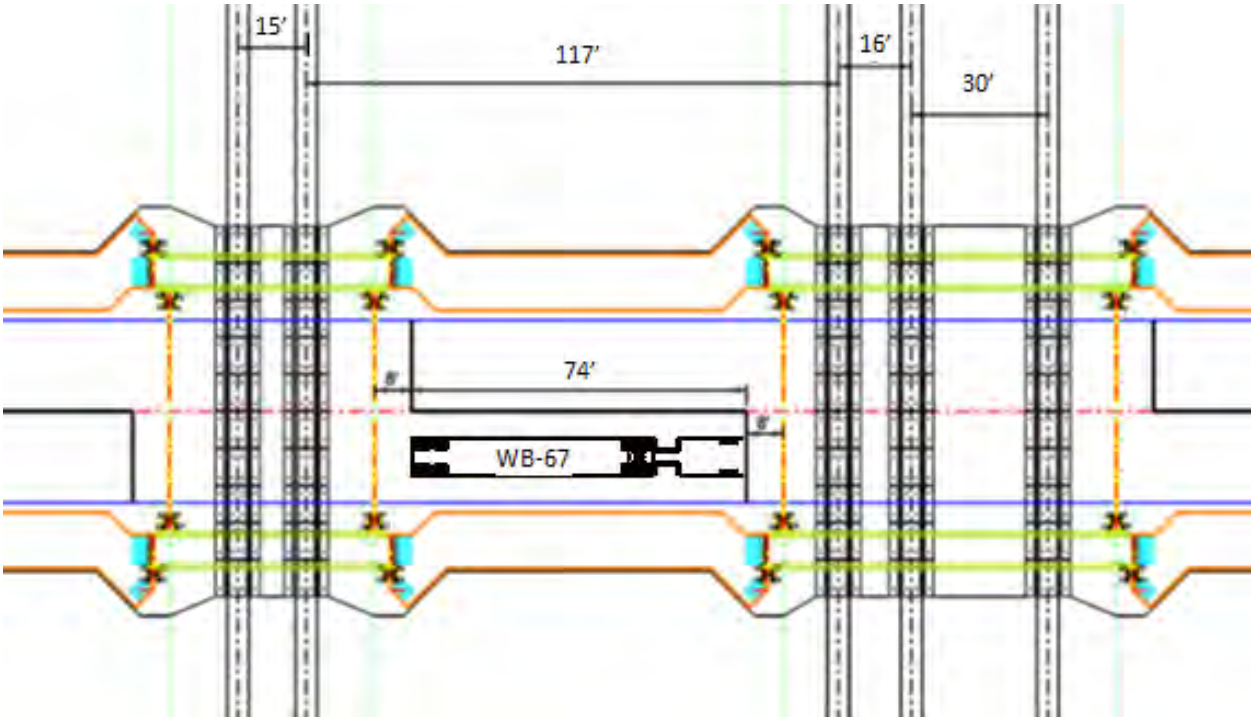

Figure 4-2 Minimum Track Spacing for WB-67 Vehicle Clearance

The proposed track configuration at Fulton Rd. has 115 feet minimum between the centerlines of the adjacent Gold Line and SCRRA tracks, requiring that the crossings be interconnected to operate as a single joint grade crossing.

The interconnection of the two sets of controllers is not a significant technical issue. The issue is of an administrative nature. Different systems have taken different paths. Utah Transit Authority's Front Runner commuter line shares crossings with the Union Pacific. Their solution was to have each operator maintain the gates adjacent to their tracks and to have joint testing. FRA had an issue with this arrangement, until a single phone number to report crossing issues was instituted for each of the crossings in place of individual UTA and UPRR numbers. In Denver, each crossing has a single party responsible for the crossing. Where two adjacent crossings are interconnected, each operator maintains its own crossing, but joint inspections and troubleshooting are performed.

A maintenance and operations agreement will be implemented between MTA and SCRRA, that further details maintenance of crossing equipment.

4.6 Preliminary Advanced Preemption Calculations

Fulton Rd. is a mid-block crossing. Previous traffic studies performed as part of the FEIR documents have indicated that no advanced pre-emption is required.

4.7 Quiet zones in the Future

The study area for the crossings between White Ave. (MP 30.33) and Claremont Blvd. (MP 33.68) includes two crossings not analysed in this report, N. Garey Ave. (MP 31.23) and N. Towne Ave. (MP 31.91). At these crossings, the Gold Line will be grade separated with reconfigurations of the existing tracks.

The addition of the Gold Line trains to the six at grade crossings in the study area, is mitigated to some extent by the grade separations at N. Garey Ave. and N. Towne Ave. The upgrades to the existing warning devices that will result in Four Quadrant Gates and/or medians at all of the crossings in the study area are further mitigation for the addition of the Gold Line trains. These mitigations may be adequate to meet the goals of the FRA's Quiet Zone application process and the requirements of the 'Horn Rule' regulations that form the underpinnings of the Quiet Zone process.

For the SCRRA service increases through the study area stated in their 2025 Long Range Plan, the modifications and upgrades to the existing warning devices that will result in Four Quadrant Gates at all crossings in the study area may be sufficient to accommodate the additional Metrolink trains and still meet the FRA's requirements for the Quiet Zone.

SECTION 5

Conclusions and Recommendations

5.1 Conclusions

1. The grade crossing equipment proposed in the Advanced Conceptual Design drawing set is configured similarly to the crossings in Phase 2A of the Gold Line extension in Azusa.
2. The gate down times and the resulting traffic queues provide no significant impacts and are similar in magnitude to those presented in the update to the FEIR analysis.
3. In the 2035 built-out state, the accident rate predicted by the APM is lower than the accident rate calculated in WBAPS for the current conditions.
4. Grade separation is not required at this location based on the analysis in this document.

5.2 Recommendations

1. The final design of the grade crossing at Fulton Rd. should include adding lighting to the crossing to meet the requirements of ANSI/IEC RP-8 and the CAMUTCD.
2. Consider the Analysis Team's recommendation to close the station driveway or the alternatives for the treatment of the N. Pomona Station driveway.
3. Proceed with the continued design of the project with the improvements identified in this section.

Exhibit H:

Crossing Working Group Meeting Minutes

(Agreement of Interested Parties)

Gold Line Foothill Extension
Crossing Diagnostic – City of Pomona
Meeting Minutes

Meeting Subject:
City of Pomona Diagnostic Evaluations

Meeting Date:
- February 21, 2018

Meeting Location:
Towne Ave, Garey Ave, and Fulton Road (Pomona)

Item	Description / Discussion	Diagnostic Action / Comments
1	Safety Briefing Briefing recap occurred at each grade crossing upon arrival.	
2	Introductions / Sign-in See attachment A for sign in sheet.	
3	Drawings provided in advance of the Diagnostic, and at diagnostic include: *Grade crossing equipment, guidance & flasher details, street improvements, signing/striping, traffic signal (if applicable), vehicle turning movements.* *CPUC application to also include simple structure drawings*	
General Section		
4	City requested Quad (exit) gates for each crossing, even if LRT is grade separated. Authority's position is quad gates are to be installed at all shared LRT/commuter at-grade crossings. SCRRA prefers no exit gates at freight/commuter rail only at-grade crossings. • City is concerned that quad gates are a requirement for quiet zones. • The group noted that raised medians also meet the Supplemental Safety Measure for quiet zones.	
5	Pedestrian Treatments: Pedestrian treatments are generally upgraded for each tracks, and include: Automatic Ped gates, flashers, bells/shrouds, channelization railing, ADA features.	
6		
Towne Avenue		
7	**Previous Towne Ave Diagnostic** Note that the initial Towne Ave. diagnostic was conducted on 4/27/2017 and meeting minutes are included as appendix to these meeting minutes. • This Towne Ave diagnostic was conducted 2/21/2018 to	

Item	Description / Discussion	Diagnostic Action / Comments
	review updated designs. • Updated design generally include LRT flyover of FRT at Towne Ave. (previous design was LRT flyover approx. 300-feet west of Towne Ave.)	
8	**LRT Grade Separation Discussion:** The LRT will be a grade separated flyover bridge, which clears both the single FRT track and Towne Ave. • The single FRT track and 2 SCRRA tracks to remain at grade. • The LRT bridge soffit will be over 25-feet above the roadway/FRT track (to allow for minimum FRT clearances) • The current overhead utility lines will be relocated (City preference is underground) • Bridge columns/piers should not block visibility of crossing equipment/flashers. • Confirm gate arms will clear (under) bridge structure • Bridge columns/piers will follow SCRRA standards for pier protection, etc.	The bridge designs will be provided as part of CPUC application. • To confirm crossing equipment is not obstructed by bridge including flashers and gate arms
9	**At-grade FRT/SCRRA Crossing Discussion:** **Raised Medians** • The group requested that the raised medians also be extended 100-ft both north and south of crossing. • Authority confirmed that raised medians are located between the tracks. • Authority noted that criteria specifies low level landscaping for length of median and to include river rock, etc. for 50-feet of the median nearest crossing to ensure visibility of flashers, etc.	Drawing to include 100-ft medians north and south of the crossing.
10	**At-grade FRT/SCRRA Crossing Discussion:** **Function** Currently the crossing operates on separate activation for FRT and SCRRA, such that northbound motorists may clear the SCRRA tracks to stop for FRT train, and southbound motorist clear the FRT track to stop for SCRRA trains. • The group confirmed that a single sealed crossing was preferred, as a there is not room between the tracks for the design vehicle (WB-65 truck). • The sealed crossing will have an Standard #9 entrance gates, median gate and/or flashers, raised medians and pedestrian treatments • There will not be (interior) gates located between the tracks	The CPUC application will include description of the sealed single crossing function. • Interior gates will be removed from the drawings.

Item	Description / Discussion	Diagnostic Action / Comments
11	**Overhead Flashers Discussion:** Currently overhead flashers (cantilevers) are at the crossing for the 2 SCRRA tracks. The single Freight track does not include overhead flashers. • The group agreed that overhead flashers are not necessary, as long as flashers are provided for each lane (median and side mounted flashers. • Since the FRT/SCRRA crossing will be one sealed crossing for the 3 tracks (and no longer 2 separate crossings), the interior southbound overhead flashers/gates will be removed. • If Authority does not plan to upgrade the northbound crossing equipment, the overhead flashers may remain.	Drawings to remove interior flasher, note that existing northbound entrance flasher to remain.
12	At-grade crossing lighting will be provided per SCRRA and City requirements (believed to be 1-ft candle) • City question how the lighting will be designs (on bridge or separate light pole) • Authority noted that design-build contractor will determine lighting fixtures as part of final design (light poles maybe design-build contractor and Metro preference)	
13	The City noted that the status of developments near the crossings is unknown at this time.	
	Garey Avenue	
14	**LRT Grade Separation Discussion:** The LRT will be a grade-separated bridge, adjacent (south) to the two FRT tracks. • The 2 FRT tracks and 2 SCRRA tracks to remain at grade. • The LRT bridge soffit will be min 16.5-feet above the roadway (to allow for minimum motorists clearances) • Bridge columns/piers should not block visibility of crossing equipment/flashers. Authority believes that bridge may span Garey Ave. (no median column supports). • Confirm gate arms will clear (under) bridge structure Bridge columns/piers will follow SCRRA standards for pier protection, etc.	The bridge designs will be provided as part of CPUC application. To confirm crossing equipment is not obstructed by bridge including flashers and gate arms
15	**Santa Fe/Supply St Discussion:** Currently Santa Fe St South of the crossing is a 2-lane roadway that allows for left turns in. • The drawings reviewed show Santa Fe as right out only with extended median south of the crossing on Garey Ave. • The group discussed circulation concerns for the stations if Santa Fe is one-way	Authority to confirm if Santa Fe is to be one-way (eastbound) right turn only.

Item	Description / Discussion	Diagnostic Action / Comments
	○ Authority noted that Pine St & Amberson St. along Arrow Hwy provide access to Supply St/Santa Fe and Stations. • The City and CPUC requested that exit gate proposed adjacent to Santa Fe remains, even if Santa Fe is limited to right out. ○ Exit gate removal maybe considered if the Santa Fe curb design/geometry is advanced to help ensure only right turn out.	
16	**At-grade FRT/SCRRA Crossing Discussion:** **Raised Medians** The crossing was recently resurfaced with updated raised medians (Also reference Towne Ave median discussion (#9)) Drawing proposes that the raised median to extend south of the tracks to prevent left turns to/from Santa Fe St.	
17	**At-grade FRT/SCRRA Crossing Discussion:** **Function** Currently the crossing operates on separate activation for FRT and SCRRA, such that northbound motorists may clear the SCRRA tracks to stop for FRT train, and southbound motorist clear the FRT track to stop for SCRRA trains. • The distance between the SCRRA and FRT tracks are adequate for the design vehicle (WB-65 truck), and the crossing can function as 2 separate crossings (not a "sealed" single crossing) • Interior gates and flashers are shown on the drawings • Authority will note if existing equipment is to remain. • During Metrolink train Pomona Station stops, gates at Garey Ave can remain activated for extended periods, release, and reactivate again to allow for berthing train movements. ○ The project will upgrade some Metrolink grade crossing components, such as pedestrian gates. However the project's scope does not include Metrolink signal upgrades. ○ City to continue discussion with Metrolink operations for efforts to reduce Garey Ave. gate down time.	The CPUC application will include description of the separate crossing operations function.
18	**Overhead Flashers Discussion:** Currently overhead flashers (cantilevers) are provided for southbound and northbound motorists for the SCRRA 2-track crossing. The existing 3 Freight tracks do not include overhead flashers. • If Authority does not plan to upgrade the northbound crossing equipment, the overhead flashers may remain –	Drawings to specify if existing crossing equipment remains

Item	Description / Discussion	Diagnostic Action / Comments
	Similar to Towne Avenue discussion (#11).	
19	**Access between the Tracks** It was noted that the SCRRA maintenance of way located on the west between the crossing tracks is being relocated. The proposed driveway located on the east between the crossing tracks is for Metro maintenance access to the LRT substation. However, the maintenance access does not cross the tracks.	
	Fulton Road	

20	**At-grade LRT/FRT/SCRRA Crossing Discussion:**
	Configuration
	Currently one FRT track is north of the two SCRRA tracks. There are not sidewalks or pedestrian crossing treatments
	The proposed crossing configuration includes 1 FRT track with adjacent 2 new LRT tracks, then 2 existing SCRRA tracks approximately 100-ft south. The LRT tracks and LRT station will remove approx. 100 of the existing parking lot spaces (on the north of the parking lot). Parking to be relocated in the new proposed parking structure.
	The drawings reviewed show grade crossing equipment of:
	• Std. 9 Entry and Exit gates on the outside of FRT and SCRRA tracks.
	  ○ SCRRA objected to the exit gate near the SCRRA tracks (to reduce maintenance). Authority to further discuss with Metro.
	• Pedestrian crossing treatments and sidewalks are proposed for the west side of the crossing.
	  ○ The east side of the crossing contains existing wash/drainage that will need construction of structure to support sidewalk (and acquiring additional property).
		The exit gate near SCRRA tracks will be subject to further Metro review, as this sealed single crossing subject to Metro criteria.

21	**At-grade LRT/FRT/SCRRA Crossing Discussion:** **Function** Currently the crossing operates on separate activation for FRT and SCRRA, such that northbound motorists may clear the SCRRA tracks to stop for FRT train, and southbound motorist clear the FRT track to stop for SCRRA trains. • The group confirmed that a single sealed crossing was preferred, as a there is not room between the tracks for the design vehicle (WB-65 truck). • The sealed crossing will have an Standard #9 entrance gates, median gate and/or flashers, raised medians and pedestrian treatments	

Item	Description / Discussion	Diagnostic Action / Comments
	• There will not be (interior) gates located between the tracks – except for the current station parking driveway located on the east between the tracks (if applicable)	
22	**Driveway (Pomona Station) Discussion:** Currently a driveway exists between the FRT and SCRRA tracks on the east of the crossing – to allow for existing parking lot access. • The drawings reviewed show the driveway to include entrance Std. 9 gate and median to restrict motorists from exiting the driveway between the tracks during train activation. • The drawings also show a median between the tracks to prevent left turns in/out of the driveway. Such that driveway is right in/out. The group presented concerns that if motorist drive around the driveway median there is risk of the motorist getting onto active track. • The CPUC recommended that **driveway is closed** to prevent motorists driving around the median or other unfavorable access around live tracks. ○ SCRRA also initially agrees with Driveway closure but due to several proposed project modifications to vehicular, pedestrian, and bicycle access to the existing Metrolink station, SCRRA requests that the Authority clearly define the overall access to the existing Metrolink Pomona station and future Metro LRT Pomona station. ○ The City is against driveway closure, and was concerned that motorists would park along Fulton, Supply Street may not be sufficient to access the parking lot, • The CPUC noted that if driveway was to remain open, design to be revised to prevent motorist driving around median, such as: ○ Lengthen the driveway median or redesign of parking lot circulation. ○ Provide "exit gate" on the driveway, so driveway is sealed. ○ Evaluate traffic signal of driveway and crossing.	The Authority will coordinate with the City to advance driveway designs for: • Driveway Closure or • Driveway median lengthen, or exit gate, or traffic signal Authority to evaluate pedestrian activity and determine if crosswalk, etc. is necessary.
23	**Pedestrian Discussion:** Currently no sidewalks are located along the Fulton Rd. crossing • The drawings reviewed show pedestrian crossing treatments and sidewalks for the west side of the crossing.	The Authority will coordinate with the City to advance sidewalk designs for: • Approved measures to protect driveway

Item	Description / Discussion	Diagnostic Action / Comments

	• The group was concerned that if the driveway was closed, motorist may park along Fulton Rd. and result in additional pedestrian activity.
	  ○ CPUC asked the authority to coordinate with the City to finalize driveway closure and provide justification if not closed.
	• If driveway is closed, consider additional pedestrians parking on the street. Mitigations may include:
	  ○ Study of motorists parking/pedestrian circulation to determine if risk exists for Fulton Rd. pedestrian activity
	  ○ Sidewalks and pedestrian treatments on the east side of the crossing (challenge with existing wash)
	  ○ Signalized midblock crosswalk for pedestrians between the tracks
		Or
		• Driveway Closure with consideration of ped activity, eastside sidewalk/Ped crossing treatments, signalized midblock crosswalk

24	**Fulton Road closure** was discussed with the group, and the City argued the need Fulton Road was necessary for circulation and further City development including a development planned to the south in 5-10 years.	

Exhibit I: The Final Environmental Impact Report (FEIR) legal description (FEIR SCH# 200361157)

Due to the size of this report, the FEIR is submitted in the format of plastic discs.

The format of the original FEIR report on disc is an Archival-Grade DVD.

The format of FEIR copies thereof are included in six (6) CD-ROMs.

The FEIR discs are separately presented for filing in individual manila envelopes along with reference to the application.

NOTICE OF DETERMINATION

To: X Office of Planning and Research
1400 Tenth Street, Room 113
Sacramento, CA 95814

X County Clerk
County of Los Angeles
12400 E. Imperial Highway # 201
Norwalk, CA 90650

County of San Bernardino
Hall of Records Building, First Floor
222 W. Hospitality Lane
San Bernardino, CA 92415-0022

From: Metro Gold Line Foothill Extension Construction Authority
406 E. Huntington Drive, Suite 202
Monrovia, CA 91016-3633

ORIGINAL FILED

MAR 0 7 2013

LOS ANGELES, COUNTY CLERK

Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code

2010121069
State Clearinghouse Number (if submitted to State Clearinghouse)

Metro Gold Line Foothill Extension – Azusa to Montclair
Project Title

Lisa Levy Buch (626) 305-7004
Lead Agency Contact Person **Area Code/Telephone/Extension**

Project Location (include county): The project would provide Light Rail Transit (LRT) service from the City of Azusa in Los Angeles County to the City of Montclair in San Bernardino County.

Project Description: The Metro Gold Line light rail transit (LRT) system currently extends from Los Angeles to Pasadena serving cities and communities along the alignment corridor. The Metro Gold Line Foothill Extension is a phased project that extends the existing Metro Gold Line by 24 miles to the east, from the City of Pasadena to the City of Montclair. The extension is proceeding in two phases. Construction of the first phase from the Pasadena Sierra Madre Villa Station to the Azusa-Citrus Station began in late 2011, and construction is anticipated to be completed in late 2015. The proposed project, known as the Metro Gold Line Foothill Extension from Azusa to Montclair is the next phase of this planned extension. It would extend the Metro Gold Line alignment 12.3 miles to the east and include six new stations in the cities of Glendora, San Dimas, La Verne, Pomona, Claremont, and Montclair.

This is to advise that the Metro Gold Line Foothill Extension Construction Authority
☒Lead Agency ☐Responsible Agency

approved the above described project on March 6, 2013 (Date) and has made the following determinations regarding the above described project:

1. The project [☒will ☐will not] have a significant effect on the environment.
2. ☒An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
   ☐ A Mitigated Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [☒were ☐were not] made a condition of the approval of the project.
4. A mitigation reporting or monitoring plan [☒was ☐ was not] adopted for this project.
5. A Statement of Overriding Considerations [☒was ☐was not] adopted for this project.
6. Findings [☒were ☐were not] made pursuant to the provisions of CEQA.

This is to certify that the final Environmental Impact Report with comments and responses and record of project approval is available to the General Public at: Metro Gold Line Foothill Extension Construction Authority, 406 E. Huntington Drive, Suite 202, Monrovia, CA 91016-3633.

Signature (Public Agency) Date 3/6/13 Title CHIEF EXECUTIVE OFFICER

Date Received for filing at OPR:

Authority cited: Section 21083, Public Resources Code. Reference: Section 21000-21174, Public Resources Code.

NOTICE

Each project applicant shall remit to the county clerk on or before filing a Notice of Determination (see Public Resources Code, Section 21152) the fee required under Fish and Game Code Section 711.4(d). Without the appropriate fee, statutory or categorical exemption, or a valid no effect determination form, issued by the California Department of Fish and Wildlife (CDFW), the notice of determination is not operative, vested, or final, and shall not be accepted by the clerk.

COLLECTION PROCEDURES FOR COUNTY GOVERNMENTS

1. The original cash receipt is to be issued to a project applicant when payment is made in conjunction with filing a Notice of Determination. The second copy is to be submitted to the CDFW on a monthly basis. The remaining copies will be retained by the county (one for the lead agency and one for the county clerk).
2. For projects that are statutorily exempt or categorically exempt (Sections 15260-15285 or 15300-15333, Title 14, California Code of Regulations) and are filed with the county clerk, the cash receipt shall be completed and attached to the Notice of Exemption. No fee is due for statutorily exempt or categorically exempt projects.
3. For projects that the CDFW has found to have no effect, the cash receipt shall be completed, and attached to the Notice of Determination; it is mandatory that a copy of the CDFW No Effect Determination Form be attached to the Notice of Determination. If the project applicant does not have a No Effect Determination Form from CDFW, then the appropriate filing fee is due.
4. Within 30 days after the end of each month in which the filing fees are collected, each county will summarize and record the amount collected on the monthly State of California Form No. CA25 (TC31) and remit the amount collected to the State Treasurer.

Identify the remittance on the State of California Form No. CA25 (TC31) as "Environmental Document Filing Fees" per Fish and Game Code Section 711.4.

DO NOT COMBINE THE ENVIRONMENTAL FEES WITH THE STATE SHARE OF FISH AND WILDLIFE FINES.

The following documents are to be mailed by the county clerk to CDFW on a monthly basis:

(A) A photocopy of the monthly State of California Form No. CA25 (TC31);
(B) CDFW/ASB copies of all cash receipts (including all voided receipts);
(C) A copy of all CDFW No Effect Determinations filed in lieu of fee payment;
(D) A copy of all Notices of Determination filed with the county during the preceding month; and
(E) A list of the complete name, address and telephone number of all project applicants for which a Notice of Determination has been filed. If this information is contained on the cash receipt filed with CDFW under Section 753.5(e)(5), Title 14, CCR, no additional information is required.

Mail to:
California Department of Fish and Wildlife
Accounting Services Branch
1416 Ninth Street, Box 944209
Sacramento, California 94244-2090

State of California—Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE

2013 ENVIRONMENTAL FILING FEE CASH RECEIPT

RECEIPT# 438259

STATE CLEARING HOUSE # (if applicable) 201012069

SEE INSTRUCTIONS ON REVERSE. TYPE OR PRINT CLEARLY

LEAD AGENCY: Metro Gold Line Foothill Extention Construction Agency — DATE: 3/7/2013

COUNTY/STATE AGENCY OF FILING: San Bernardino County — DOCUMENT NUMBER:

PROJECT TITLE: Metro Gold Line Foothill Extention Azusa to Montclair

PROJECT APPLICANT NAME: Lisa Levy Bachl / Metro Gold Line Foothill Extention Agency — PHONE NUMBER: (626) 305-7004

PROJECT APPLICANT ADDRESS: 406 E. Huntington Drive Ste 202 — CITY: Monrovia — STATE: CA — ZIP CODE: 91016

PROJECT APPLICANT (Check appropriate box):
☐ Local Public Agency ☐ School District ☒ Other Special District ☐ State Agency ☐ Private Entity

CHECK APPLICABLE FEES:

☐ Environmental Impact Report (EIR)	$2,995.25	$
☐ Mitigated/Negative Declaration (ND)(MND)	$2,156.25	$
☐ Application Fee Water Diversion *(State Water Resources Control Board Only)*	$850.00	$
☐ Projects Subject to Certified Regulatory Programs (CRP)	$1,018.50	$
☒ County Administrative Fee	$50.00	$ 50.00
☐ Project that is exempt from fees		
☐ Notice of Exemption		
☐ DFW No Effect Determination (Form Attached)		
☒ Other Fish + Game Fee Paid on 3/7/13 Los Angeles County #00015140		$ ∅

PAYMENT METHOD:
☐ Cash ☐ Credit ☒ Check ☐ Other — TOTAL RECEIVED $ 50.00

SIGNATURE: X [signature] — TITLE: DEPUTY Clerk

PROJECT APPLICANT — YELLOW: DFW/ASB — PINK: LEAD AGENCY — GOLDENROD: COUNTY CLERK — DFG 753.5a (Rev. 10/12)

State of California—Natural Resources Agency
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

2013 ENVIRONMENTAL FILING FEE CASH RECEIPT

PRINT CLEAR

RECEIPT#
201303071240018
STATE CLEARING HOUSE # (If applicable)

SEE INSTRUCTIONS ON REVERSE. TYPE OR PRINT CLEARLY

LEAD AGENCY
METRO GOLD LINE FOOTHILL EXTENSION CONSTRUCTION AGENCY

DATE
03/07/2013

COUNTY/STATE AGENCY OF FILING
LACC

DOCUMENT NUMBER

PROJECT TITLE
METRO GOLD LINE FOOTHILL EXTENSION-AZUSA TO MONTCLAIR

PROJECT APPLICANT NAME
LISA LEVY BUCH

PHONE NUMBER
(626) 305 7004

PROJECT APPLICANT ADDRESS
406 E. HUNTINGTON DRIVE STE, 202

CITY
MONROVIA

STATE
CA

ZIP CODE
91016

PROJECT APPLICANT *(Check appropriate box)*

☐ Local Public Agency ☐ School District ☐ Other Special District ☐ State Agency ☐ Private Entity

CHECK APPLICABLE FEES:

☐	Environmental Impact Report (EIR)	$2,995.25	$ 0.00
☒	Negative Declaration (ND)(MND)	$2,156.25	$ 0.00
☐	Application Fee Water Diversion *(State Water Resources Control Board Only)*	$850.00	$ 0.00
☐	Projects Subject to Certified Regulatory Programs (CRP)	$1,018.50	$ 0.00
☒	County Administrative Fee	~~$50.00~~	$ 75.00 ~~0.00~~
☐	Project that is exempt from fees		
	☐ Notice of Exemption		
	☐ CDFW No Effect Determination (Form Attached)		
☐	Other _____		$ _____

PAYMENT METHOD:

☐ Cash ☐ Credit ☒ Check ☐ Other _____ TOTAL RECEIVED $ 3010.25 ~~0.00~~

SIGNATURE
X Terry A. Pereira

TITLE
ITC

Exhibit J

Scoping Memo Information for Applications

A. Category (Check the category that is most appropriate)

☐ **Adjudicatory -** "Adjudicatory" proceedings are: (1) enforcement investigations into possible violations of any provision of statutory law or order or rule of the Commission; and (2) complaints against regulated entities, including those complaints that challenge the accuracy of a bill, but excluding those complaints that challenge the reasonableness of rates or charges, past, present, or future, such as **formal rough crossing complaints** (maximum 12 month process if hearings are required).

☒ **Ratesetting -** "Ratesetting" proceedings are proceedings in which the Commission sets or investigates rates for a specifically named utility (or utilities), or establishes a mechanism that in turn sets the rates for a specifically named utility (or utilities). "Ratesetting" proceedings include complaints that challenge the reasonableness of rates or charges, past, present, or future. Other proceedings may also be categorized as ratesetting when they do not clearly fit into one category, such as **railroad crossing applications** (maximum 18 month process if hearings are required).

Quasi-legislative - "Quasi-legislative" proceedings are proceedings that establish policy or rules (including generic ratemaking policy or rules) affecting a class of regulated entities, including those proceedings in which the Commission investigates rates or practices for an entire regulated industry or class of entities within the industry.

B. Are hearings necessary? **Yes** ☒ **No**

If yes, identify the material disputed factual issues on which hearings should be held, and the general nature of the evidence to be introduced. Railroad crossing applications which are not controversial usually do not require hearings.

Are public witness hearings necessary?

Yes [X] **No**

Public witness hearings are set up for the purpose of getting input from the general public and any entity that will not be a party to the proceeding. Such input usually involves presenting written or oral statements to the presiding officer, not sworn testimony. Public witness statements are not subject to cross-examination.

C. Issues - List here the specific issues that need to be addressed in the proceeding.

None

D. Schedule (Even if you checked "No" in B above) Should the Commission decide to hold hearings, indicate here the proposed schedule for completing the proceeding within 12 months (if categorized as adjudicatory) or 18 months (if categorized as ratesetting or quasi-legislative).

The schedule should include proposed dates for the following events as needed:

30-days Protest Period – July 30, 2018 through August 30, 2018

4-months Proposed Decision – November 30, 2018

6-months Final Decision – January 30, 2019

If an unexpected hearing becomes necessary:

6-months Prehearing conference – January 30, 2019

9-months Hearings – April 30, 2019

12-months Briefs due – July 30, 2019

13-months Submission – August 30, 2019

16-months Proposed decision (90 days after submission) – November 30, 2019

18-months Final decision (60 days after proposed decision) – January 30, 2020