ROAD REPAIR AND ACCOUNTABILITY ACT OF 2017
PROJECT BASELINE AGREEMENT
West Valley Connector Bus Rapid Transit

Resolution SCCP-P-2021-05B
(will be completed by CTC)

1. FUNDING PROGRAM

- ☐ Active Transportation Program
- ☐ Local Partnership Program (Competitive)
- ☒ Solutions for Congested Corridors Program
- ☐ State Highway Operation and Protection Program
- ☐ Trade Corridor Enhancement Program

2. PARTIES AND DATE

2.1 This Project Baseline Agreement (Agreement) for the *West Valley Connector Bus Rapid Transit*, effective on, June 23, 2021 (will be completed by CTC), is made by and between the California Transportation Commission (Commission), the California Department of Transportation (Caltrans), the Project Applicant, *San Bernardino County Transportation Authority (SBCTA)*, and the Implementing Agency, *SBCTA*, sometimes collectively referred to as the "Parties".

3. RECITAL

3.2 Whereas at its December 2, 2020 meeting the Commission approved the Solutions for Congested Corridors Program, and included in this program of projects the *West Valley Connector Bus Rapid Transit*, the parties are entering into this Project Baseline Agreement to document the project cost, schedule, scope and benefits, as detailed on the Project Programming Request Form attached hereto as Exhibit A and the Project Report attached hereto as Exhibit B, as the baseline for project monitoring by the Commission.

3.3 The undersigned Project Applicant certifies that the funding sources cited are committed and expected to be available; the estimated costs represent full project funding; and the scope and description of benefits is the best estimate possible.

4. GENERAL PROVISIONS

The Project Applicant, Implementing Agency, and Caltrans agree to abide by the following provisions:

4.1 To meet the requirements of the Road Repair and Accountability Act of 2017 (Senate Bill [SB] 1, Chapter 5, Statutes of 2017) which provides the first significant, stable, and on-going increase in state transportation funding in more than two decades.

4.2 To adhere, as applicable, to the provisions of the Commission:

- ☐ Resolution *Insert Number*, "Adoption of Program of Projects for the Active Transportation Program", dated
- ☐ Resolution *Insert Number*, "Adoption of Program of Projects for the Local Partnership Program", dated
- ☒ Resolution G-20-80, "Adoption of Program of Projects for the Solutions for Congested Corridors Program", dated December 2, 2020
- ☐ Resolution *Insert Number*, "Adoption of Program of Projects for the State Highway Operation and Protection Program", dated
- ☐ Resolution *Insert Number*, "Adoption of Program of Projects for the Trade Corridor Enhancement Program", dated

4.3 All signatories agree to adhere to the Commission's Solutions for Congested Corridors Program, Guidelines. Any conflict between the programs will be resolved at the discretion of the Commission.

4.4 All signatories agree to adhere to the Commission's SB 1 Accountability and Transparency Guidelines and policies, and program and project amendment processes.

4.5 The SBCTA agrees to secure funds for any additional costs of the project.

4.6 The SBCTA agrees to report to Caltrans on a quarterly basis; after July 2019, reports will be on a semi-annual basis on the progress made toward the implementation of the project, including scope, cost, schedule, outcomes, and anticipated benefits.

4.7 Caltrans agrees to prepare program progress reports on a quarterly basis; after July 2019, reports will be on a semi-annual basis and include information appropriate to assess the current state of the overall program and the current status of each project identified in the program report.

4.8 The SBCTA agrees to submit a timely Completion Report and Final Delivery Report as specified in the Commission's SB 1 Accountability and Transparency Guidelines.

4.9 All signatories agree to maintain and make available to the Commission and/or its designated representative, all work related documents, including without limitation engineering, financial and other data, and methodologies and assumptions used in the determination of project benefits during the course of the project, and retain those records for four years from the date of the final closeout of the project. Financial records will be maintained in accordance with Generally Accepted Accounting Principles.

4.10 The Transportation Inspector General of the Independent Office of Audits and Investigations has the right to audit the project records, including technical and financial data, of the Department of Transportation, the Project Applicant, the Implementing Agency, and any consultant or sub-consultants at any time during the course of the project and for four years from the date of the final closeout of the project, therefore all project records shall be maintained and made available at the time of request. Audits will be conducted in accordance with Generally Accepted Government Auditing Standards.

5. SPECIFIC PROVISIONS AND CONDITIONS

5.1 Project Schedule and Cost
See Project Programming Request Form, attached as Exhibit A.

5.2 Project Scope
See Project Report or equivalent, attached as Exhibit B. At a minimum, the attachment shall include the cover page, evidence of approval, executive summary, and a link to or electronic copy of the full document.

5.3 Other Project Specific Provisions and Conditions

The state will not cover costs in the event of a cost overrun.

Attachments:

Exhibit A: Project Programming Request Form
Exhibit B: Project Report

SIGNATURE PAGE
TO
PROJECT BASELINE AGREEMENT

West Valley Connector Bus Rapid Transit

Resolution SCCP-P-2021-05B

Frank Navarro — Date: 4/8/2021

President, SBCTA Board of Directors

Project Applicant

Frank Navarro — Date: 4/8/2021

President, SBCTA Board of Directors

Implementing Agency

Michael D. Beauchamp — Date

District Director

California Department of Transportation

Toks Omishakin — Date

Director

California Department of Transportation

Mitchell Weiss — Date: 08/17/21

Executive Director

California Transportation Commission

APPROVED AS TO FORM:
Julianna K. Tillquist
SBCTA General Counsel
Date: 4/8/2021

SIGNATURE PAGE
TO
PROJECT BASELINE AGREEMENT

West Valley Connector Bus Rapid Transit

Resolution SCCP-P-2021-05B

Frank Navarro — Date

President, SBCTA Board of Directors

Project Applicant

Frank Navarro — Date

President, SBCTA Board of Directors

Implementing Agency

Michael D. Beauchamp Digitally signed by Michael D. Beauchamp Date: 2021.04.15 09:09:41 -07'00'

Michael D. Beauchamp — Date

District Director

California Department of Transportation

Toks Omishakin — 5.19.21 Date

Director

California Department of Transportation

Mitchell Weiss — Date

Executive Director

California Transportation Commission

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST (PPR)

PRG-0010 (REV 08/2020)

PPR ID
ePPR-6507-2020-0011 v0

Amendment (Existing Project) ☐ YES ☒ NO | Date 05/25/2021 15:34:07

Programs ☐ LPP-C ☐ LPP-F ☐ SCCP ☐ TCEP ☐ STIP ☒ Other

District	EA	Project ID	PPNO	Nominating Agency	
08			1232B	Caltrans HQ	
County	**Route**	**PM Back**	**PM Ahead**	**Co-Nominating Agency**	
San Bernardino				San Bernardino County Transportation Authority	
				MPO	**Element**
				SCAG	Mass Transit (MT)
Project Manager/Contact			**Phone**	**Email Address**	
Victor Lopez			909-884-8276	vlopez@gosbcta.com	

Project Title

West Valley Connector Bus Rapid Transit (Phase 1 & Zero Emission Bus Initiative) – Maintenance Facility (D/B Contract)

Location (Project Limits), Description (Scope of Work)

In San Bernardino County through the cities of Pomona, Montclair, Ontario, and Rancho Cucamonga on Holt Blvd from Pomona Metrolink Station to Ontario International Airport (ONT), on Archibald Ave from ONT to Inland Empire Blvd, on Inland Empire Blvd from Archibald Ave to Ontario Mills Mall, on Milliken Ave from Ontario Mills Mall to Foothill Blvd, and on Foothill Blvd from Milliken Ave to Victoria Gardens Mall, construct the West Valley Connector (WVC), a 100% zero-emission Bus Rapid Transit system, the first stage of the SB County Zero-emission Bus Initiative and second BRT route in SB County. Headways will be 10 min in peak commute period and 15 min off-peak, providing a high level of service to the community. The project includes modifications to an existing maintenance facility in order to maintain the additional 18 zero-emission battery-electric buses that are needed to operate the new Bus Rapid Transit (BRT) service.

(continued in additional information)

Component	Implementing Agency
PA&ED	San Bernardino County Transportation Authority
PS&E	San Bernardino County Transportation Authority
Right of Way	San Bernardino County Transportation Authority
Construction	San Bernardino County Transportation Authority

Legislative Districts

Assembly:	52,40	Senate:	20,23	Congressional:	35,31

Project Milestone	Existing	Proposed
Project Study Report Approved		
Begin Environmental (PA&ED) Phase		11/02/2015
Circulate Draft Environmental Document Document Type EIR/FONSI		06/24/2019
Draft Project Report		06/24/2019
End Environmental Phase (PA&ED Milestone)		05/12/2020
Begin Design (PS&E) Phase		10/01/2021
End Design Phase (Ready to List for Advertisement Milestone)		10/01/2021
Begin Right of Way Phase		01/15/2021
End Right of Way Phase (Right of Way Certification Milestone)		10/21/2022
Begin Construction Phase (Contract Award Milestone)		10/24/2022
End Construction Phase (Construction Contract Acceptance Milestone)		05/14/2024
Begin Closeout Phase		05/15/2024
End Closeout Phase (Closeout Report)		04/11/2025

PPR ID
ePPR-6507-2020-0011 v0

Date 05/25/2021 15:34:07

Purpose and Need

The purpose of the project is to improve corridor mobility and transit efficiency in the San Bernardino Valley from Downtown Pomona to Victoria Gardens in the City of Rancho Cucamonga with an enhanced, green, state-of-the-art BRT system. It responds to the following needs:

1) it runs parallel to the two most congested freeways in the county.

2) need for improved network connectivity. The WVC is not an isolated project but one that ties into the growing high-capacity transit network in the San Bernardino Valley and the greater regional transit network of Southern California. The WVC will connect across four corridor cities: Pomona, Montclair, Ontario, and Rancho Cucamonga. It will serve the fastest growing major commercial airport in the U.S., Ontario International Airport, from both the Metrolink San Bernardino Line in Rancho Cucamonga as well as the Riverside Line at Downtown Pomona. It also links other major destinations along the route and fosters TOD.

(continued on next page)

NHS Improvements ☐ YES ☒ NO	Roadway Class NA	Reversible Lane Analysis ☐ YES ☒ NO

Inc. Sustainable Communities Strategy Goals ☒ YES ☐ NO Reduce Greenhouse Gas Emissions ☒ YES ☐ NO

Project Outputs

Category	Outputs	Unit	Total
Rail/ Multi-Modal	Miles of new track	Miles	3.5
Rail/ Multi-Modal	Rail cars/ transit vehicles	EA	18
Rail/ Multi-Modal	Miles of rehabilitated track	Miles	15.5
Rail/ Multi-Modal	New stations	EA	21

Additional Information

Description/Location (continued):
Modifications to the existing maintenance facility include installing the charging stations required to charge 18 zero-emission battery-electric buses and retrofits to the existing electrical infrastructure. The existing parking lot will also need to be reconfigured in order to accommodate the additional zero-emission battery-electric buses and new charging infrastructure.

Purpose and Need Section (continued):
3) corridor population will increase by 30% in the next 25 years. The entities that have coalesced around the WVC (local, regional, state, private sector, and community advocates) did not want just another auto-oriented community. They had a larger vision of the multimodal, multidimensional, diverse community this could become. The proposed WVC is part of a “critical mass” of transit network and supporting development coming together to write a new story about transportation and development in the western part of the San Bernardino Valley. Implementation of the WVC is projected to increase daily unlinked transit trips by 3,227 in opening year (2024) and 4170 by 2038 within the study area and reduce 32,660 metric tons of CO2 through year 2038.

4) represents an upgrade of Route 61, the highest ridership route on the Omnitrans system. The project offers a high level of service, reducing transit trip time by about 30% from 75 minutes to 54 minutes for the full length of the corridor.

The WVC is scheduled to begin revenue service in early 2024, pending the award of $65 million in SCCP funding.

Category and Outputs Section: There didn't seem to be a category to appropriately reflect a BRT project. In this case, the "Miles of New Track" refers to the miles of dedicated bus lanes in the project and the "Miles of Rehabilitated Track" refers to the balance of the length of the enhanced service.

Following submittal of the application, the scope of work of this component was revised. Instead of constructing a new maintenance facility, modifications, which will include the installation of charging infrastructure, will be made to the existing maintenance facility. The change in scope maintains the same benefit to the project while reducing the cost of this component.

PPR ID
ePPR-6507-2020-0011 v0

Performance Indicators and Measures						
Measure	**Required For**	**Indicator/Measure**	**Unit**	**Build**	**Future No Build**	**Change**
Congestion Reduction	LPPF, LPPC, SCCP	Project Area, Corridor, County, or Regionwide VMT per Capita and Total VMT	Total Miles	1,836,000,000	1,890,000,000	-54,000,000
			VMT per Capita	94,841	97,656	-2,815
	LPPF, LPPC, SCCP	Person Hours of Travel Time Saved	Person Hours	109,515,141	152,104,362	-42,589,221
			Hours per Capita	5,657	7,857	-2,200
	LPPF, LPPC, SCCP	Daily Vehicle Hours of Delay	Hours	0	0	0
System Reliability	LPPF, LPPC, SCCP	Peak Period Travel Time Reliability Index	Index	0	0	0
	LPPF, LPPC, SCCP	Transit Service On-Time Performance	% "On-time"	88	83.4	4.6
Air Quality & GHG	LPPF, LPPC, SCCP, TCEP	Particulate Matter	PM 2.5 Tons	0.8	0	0.8
			PM 10 Tons	0.9	0	0.9
	LPPF, LPPC, SCCP, TCEP	Carbon Dioxide (CO2)	Tons	118,287	0	118,287
	LPPF, LPPC, SCCP, TCEP	Volatile Organic Compounds (VOC)	Tons	22	0	22
	LPPF, LPPC, SCCP, TCEP	Sulphur Dioxides (SOx)	Tons	1.1	0	1.1
	LPPF, LPPC, SCCP, TCEP	Carbon Monoxide (CO)	Tons	403	0	403
	LPPF, LPPC, SCCP, TCEP	Nitrogen Oxides (NOx)	Tons	49	0	49
Safety	LPPF, LPPC, SCCP, TCEP	Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries	Number	0	0	0
	LPPF, LPPC, SCCP, TCEP	Number of Fatalities	Number	0.21	0.216	-0.006
	LPPF, LPPC, SCCP, TCEP	Fatalities per 100 Million VMT	Number	0.6	0.6	0
	LPPF, LPPC, SCCP, TCEP	Number of Serious Injuries	Number	10.16	10.46	-0.3
	LPPF, LPPC, SCCP, TCEP	Number of Serious Injuries per 100 Million VMT	Number	29	29	0
Accessibility	LPPF, LPPC, SCCP	Number of Jobs Accessible by Mode	Number	89,388	0	89,388
	LPPF, LPPC, SCCP	Number of Destinations Accessible by Mode	Number	5,125	0	5,125
	LPPF, LPPC, SCCP	Percent of Population Defined as Low Income or Disadvantaged Within 1/2 Mile of Rail Station, Ferry Terminal, or High-Frequency Bus Stop	%	74	0	74
Economic Development	LPPF, LPPC, SCCP, TCEP	Jobs Created (Direct and Indirect)	Number	3,157	0	3,157
Cost Effectiveness	LPPF, LPPC, SCCP, TCEP	Cost Benefit Ratio	Ratio	1.3	0	1.3

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST (PPR)

PRG-0010 (REV 08/2020)

PPR ID
ePPR-6507-2020-0011 v0

District	County	Route	EA	Project ID	PPNO
08	San Bernardino				1232B

Project Title

West Valley Connector Bus Rapid Transit (Phase 1 & Zero Emission Bus Initiative) – Maintenance Facility (D/B Contract)

Existing Total Project Cost ($1,000s)									
Component	Prior	20-21	21-22	22-23	23-24	24-25	25-26+	Total	Implementing Agency
E&P (PA&ED)									San Bernardino County Transportatio
PS&E									San Bernardino County Transportatio
R/W SUP (CT)									San Bernardino County Transportatio
CON SUP (CT)									San Bernardino County Transportatio
R/W									San Bernardino County Transportatio
CON									San Bernardino County Transportatio
TOTAL									
Proposed Total Project Cost ($1,000s)									Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON			3,500					3,500	
TOTAL			3,500					3,500	

Fund #1:	CMAQ - Congestion Mitigation (Committed)								Program Code
Existing Funding ($1,000s)									
Component	Prior	20-21	21-22	22-23	23-24	24-25	25-26+	Total	Funding Agency
E&P (PA&ED)									San Bernardino County Transportatio
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									
Proposed Funding ($1,000s)									Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON			3,500					3,500	
TOTAL			3,500					3,500	

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST (PPR)

PRG-0010 (REV 08/2020)

PPR ID
ePPR-6507-2021-0001 v6

Amendment (Existing Project) ☒ YES ☐ NO | Date 05/25/2021 11:37:58

Programs ☐ LPP-C ☐ LPP-F ☐ SCCP ☐ TCEP ☐ STIP ☐ Other

District	EA	Project ID	PPNO	Nominating Agency	
08	T458GA	0821000055	1232	Caltrans HQ	
County	**Route**	**PM Back**	**PM Ahead**	**Co-Nominating Agency**	
San Bernardino				San Bernardino County Transportation Authority	
				MPO	**Element**
				SCAG	Mass Transit (MT)
Project Manager/Contact			**Phone**	**Email Address**	
Victor Lopez			909-884-8276	vlopez@gosbcta.com	

Project Title

West Valley Connector Bus Rapid Transit (Phase 1 & Zero Emission Bus Initiative) – Mainline Improvements

Location (Project Limits), Description (Scope of Work)

In San Bernardino and Los Angeles Counties through the cities of Pomona, Montclair, Ontario, and Rancho Cucamonga on Holt Boulevard from Pomona Metrolink Station to Ontario International Airport (ONT), on Archibald Avenue from ONT to Inland Empire Boulevard, on Inland Empire Boulevard from Archibald Avenue to Ontario Mills Mall, on Milliken Avenue from Ontario Mills Mall to Foothill Boulevard, and on Foothill Boulevard from Milliken Avenue to Victoria Gardens Mall, construct the West Valley Connector (WVC), a 100% zero-emission Bus Rapid Transit system, the first stage of the SB County Zero-emission Bus Initiative and second Bus Rapid Transit route in San Bernardino County. The project includes the construction of 21 stations between Pomona and Rancho Cucamonga. The project will also provide level boarding, transit signal priority, off-board fare options, optimized operating plans, branded shelters/canopies in the aforementioned stations, security cameras, and variable message signs.

Component	Implementing Agency
PA&ED	San Bernardino County Transportation Authority
PS&E	San Bernardino County Transportation Authority
Right of Way	San Bernardino County Transportation Authority
Construction	San Bernardino County Transportation Authority

Legislative Districts

Assembly:	52,40	Senate:	20,23	Congressional:	35,31

Project Milestone	Existing	Proposed
Project Study Report Approved		
Begin Environmental (PA&ED) Phase	11/02/2015	11/02/2015
Circulate Draft Environmental Document Document Type EIR/FONSI	06/24/2019	06/24/2019
Draft Project Report	06/24/2019	06/24/2019
End Environmental Phase (PA&ED Milestone)	05/12/2020	05/12/2020
Begin Design (PS&E) Phase	05/06/2020	05/06/2020
End Design Phase (Ready to List for Advertisement Milestone)	07/30/2021	07/30/2021
Begin Right of Way Phase	01/15/2021	01/15/2021
End Right of Way Phase (Right of Way Certification Milestone)	10/21/2022	10/21/2022
Begin Construction Phase (Contract Award Milestone)	10/24/2022	10/24/2022
End Construction Phase (Construction Contract Acceptance Milestone)	10/25/2024	10/25/2024
Begin Closeout Phase	10/28/2024	10/28/2024
End Closeout Phase (Closeout Report)	04/11/2025	04/11/2025

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST (PPR)

PRG-0010 (REV 08/2020)

PPR ID
ePPR-6507-2021-0001 v6

Date 05/25/2021 11:37:58

Purpose and Need

The purpose of the project is to improve corridor mobility and transit efficiency in the San Bernardino Valley from Downtown Pomona to Victoria Gardens in the City of Rancho Cucamonga with an enhanced, green, state-of-the-art BRT system. It responds to the following needs:
1. It runs parallel to the two most congested freeways in the county.
2. Need for improved network connectivity. The WVC is not an isolated project but one that ties into the growing high-capacity transit network in the SBD valley and the greater regional transit network of Southern California. The WVC will connect across four corridor cities: Pomona, Montclair, Ontario, and Rancho Cucamonga. It will serve the fastest growing major commercial airport in the US, Ontario International Airport, from both the Metrolink San Bernardino Line in Ranch Cucamonga as well as the Riverside Line in Downtown Pomona, It also links other major destinations along the route and fosters TOD.
3. Corridor population will increase by 30% in the next 25 years. The entities that have coalesced around the WVC (local, regional, state, private, sector, and community advocates) did not want just another auto-oriented community. They had a larger vision of the multimodal, multidimensional, diverse community this could become. The proposed WVC is part of a "critical mass" of transit network and supporting development coming together to write a new story about transportation and development in the western part of the San Bernardino Valley. Implementation of the WVC is projected to increase daily unlinked transit trips by 3,227 in opening year (2024) and 4,710 by 2038 within the study area and reduce 32,660 metric tons of CO2 through year 2038.
4. Represents an upgrade of Route 61, the highest ridership route on the Omnitrans system. The project offers a high level of service, reducing transit trip time by about 30% from 75 minutes to 54 minutes for the full length of the corridor.

The WVC is scheduled to begin revenue service in early 2024.

NHS Improvements ☐ YES ☒ NO	Roadway Class NA	Reversible Lane Analysis ☐ YES ☒ NO

Inc. Sustainable Communities Strategy Goals ☒ YES ☐ NO Reduce Greenhouse Gas Emissions ☒ YES ☐ NO

Project Outputs

Category	Outputs	Unit	Total
Rail/ Multi-Modal	Rail cars/ transit vehicles	EA	18
Rail/ Multi-Modal	Miles of rehabilitated track	Miles	15.5
Rail/ Multi-Modal	New stations	EA	21
Rail/ Multi-Modal	Miles of new track	Miles	3.5

Additional Information

Description/Location (continued):
The various stations will include branded shelter/canopy, security cameras, benches, lighting, and variable message signs. Mainline improvements also include the construction of 3.5 miles of dedicated Bus Rapid Transit (BRT) only lanes through central Ontario and 15.5 miles of curb lane mixed-flow operations.

Purpose and Need Section (continued):
3) corridor population will increase by 30% in the next 25 years. The entities that have coalesced around the WVC (local, regional, state, private sector, and community advocates) did not want just another auto-oriented community. They had a larger vision of the multimodal, multidimensional, diverse community this could become. The proposed WVC is part of a “critical mass” of transit network and supporting development coming together to write a new story about transportation and development in the western part of the San Bernardino Valley. Implementation of the WVC is projected to increase daily unlinked transit trips by 3,227 in opening year (2024) and 4170 by 2038 within the study area and reduce 32,660 metric tons of CO2 through year 2038.

4) represents an upgrade of Route 61, the highest ridership route on the Omnitrans system. The project offers a high level of service, reducing transit trip time by about 30% from 75 minutes to 54 minutes for the full length of the corridor.

The WVC is scheduled to begin revenue service in early 2024, pending the award of $65 million in SCCP funding.

Category and Outputs Section: There didn't seem to be a category to appropriately reflect a BRT project. In this case, the "Miles of New Track" refers to the miles of dedicated bus lanes in the project and the "Miles of Rehabilitated Track" refers to the balance of the length of the enhanced service.

Performance Indicators and Measures						
Measure	**Required For**	**Indicator/Measure**	**Unit**	**Build**	**Future No Build**	**Change**
Congestion Reduction	LPPF, LPPC, SCCP	Project Area, Corridor, County, or Regionwide VMT per Capita and Total VMT	Total Miles	1,836,000,000	1,890,000,000	-54,000,000
			VMT per Capita	94,841	97,656	-2,815
	LPPF, LPPC, SCCP	Person Hours of Travel Time Saved	Person Hours	109,515,141	152,104,362	-42,589,221
			Hours per Capita	5,657	7,857	-2,200
	LPPF, LPPC, SCCP	Daily Vehicle Hours of Delay	Hours	0	0	0
System Reliability	LPPF, LPPC, SCCP	Peak Period Travel Time Reliability Index	Index	0	0	0
	LPPF, LPPC, SCCP	Transit Service On-Time Performance	% "On-time"	88	83.4	4.6
Air Quality & GHG	LPPF, LPPC, SCCP, TCEP	Particulate Matter	PM 2.5 Tons	0.8	0	0.8
			PM 10 Tons	0.9	0	0.9
	LPPF, LPPC, SCCP, TCEP	Carbon Dioxide (CO2)	Tons	118,287	0	118,287
	LPPF, LPPC, SCCP, TCEP	Volatile Organic Compounds (VOC)	Tons	22	0	22
	LPPF, LPPC, SCCP, TCEP	Sulphur Dioxides (SOx)	Tons	1.1	0	1.1
	LPPF, LPPC, SCCP, TCEP	Carbon Monoxide (CO)	Tons	403	0	403
	LPPF, LPPC, SCCP, TCEP	Nitrogen Oxides (NOx)	Tons	49	0	49
Safety	LPPF, LPPC, SCCP, TCEP	Number of Non-Motorized Fatalities and Non-Motorized Serious Injuries	Number	0	0	0
	LPPF, LPPC, SCCP, TCEP	Number of Fatalities	Number	0.21	0.216	-0.006
	LPPF, LPPC, SCCP, TCEP	Fatalities per 100 Million VMT	Number	0.6	0.6	0
	LPPF, LPPC, SCCP, TCEP	Number of Serious Injuries	Number	10.16	10.46	-0.3
	LPPF, LPPC, SCCP, TCEP	Number of Serious Injuries per 100 Million VMT	Number	29	29	0
Accessibility	LPPF, LPPC, SCCP	Number of Jobs Accessible by Mode	Number	89,388	0	89,388
	LPPF, LPPC, SCCP	Number of Destinations Accessible by Mode	Number	5,125	0	5,125
	LPPF, LPPC, SCCP	Percent of Population Defined as Low Income or Disadvantaged Within 1/2 Mile of Rail Station, Ferry Terminal, or High-Frequency Bus Stop	%	74	0	74
Economic Development	LPPF, LPPC, SCCP, TCEP	Jobs Created (Direct and Indirect)	Number	3,157	0	3,157
Cost Effectiveness	LPPF, LPPC, SCCP, TCEP	Cost Benefit Ratio	Ratio	1.3	0	1.3

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST (PPR)

PRG-0010 (REV 08/2020)

PPR ID
ePPR-6507-2021-0001 v6

District	County	Route	EA	Project ID	PPNO
08	San Bernardino		T458GA	0821000055	1232

Project Title

West Valley Connector Bus Rapid Transit (Phase 1 & Zero Emission Bus Initiative) – Mainline Improvements

Existing Total Project Cost ($1,000s)								
Component	Prior	21-22	22-23	23-24	24-25	25-26	26-27+	Total
E&P (PA&ED)	6,704							6,704
PS&E	20,440							20,440
R/W SUP (CT)								
CON SUP (CT)								
R/W	92,311							92,311
CON		116,932						116,932
TOTAL	119,455	116,932						236,387

Implementing Agency
San Bernardino County Transportatio
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San Bernardino County Transportatio
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San Bernardino County Transportatio

Proposed Total Project Cost ($1,000s)								
E&P (PA&ED)	6,704							6,704
PS&E	20,440							20,440
R/W SUP (CT)								
CON SUP (CT)								
R/W	92,311							92,311
CON		116,932						116,932
TOTAL	119,455	116,932						236,387

Notes

Fund #1:	RIP - State Cash (Committed)							
Existing Funding ($1,000s)								
Component	Prior	21-22	22-23	23-24	24-25	25-26	26-27+	Total
E&P (PA&ED)								
PS&E								
R/W SUP (CT)								
CON SUP (CT)								
R/W								
CON		39,745						39,745
TOTAL		39,745						39,745

Program Code
20.XX.075.600

Funding Agency
Caltrans HQ

For construction contract and construction management

Proposed Funding ($1,000s)								
E&P (PA&ED)								
PS&E								
R/W SUP (CT)								
CON SUP (CT)								
R/W								
CON		39,745						39,745
TOTAL		39,745						39,745

Notes

Fund #2:	CMAQ - Congestion Mitigation (Committed)								Program Code
	Existing Funding ($1,000s)								20.30.010.820
Component	Prior	21-22	22-23	23-24	24-25	25-26	26-27+	Total	Funding Agency
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON		2,887						2,887	
TOTAL		2,887						2,887	
	Proposed Funding ($1,000s)								Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON		2,887						2,887	
TOTAL		2,887						2,887	

Fund #3:	FTA Funds - Omnitrans Land Sale Funds (80% federal) (Committed) (Committed)								Program Code
	Existing Funding ($1,000s)								FTA-TRANSIT
Component	Prior	21-22	22-23	23-24	24-25	25-26	26-27+	Total	Funding Agency
E&P (PA&ED)									Omnitrans
PS&E									Federal portion of funds received from mid-valley land sale
R/W SUP (CT)									
CON SUP (CT)									
R/W	20,079							20,079	
CON									
TOTAL	20,079							20,079	
	Proposed Funding ($1,000s)								Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W	20,079							20,079	
CON									
TOTAL	20,079							20,079	

PPR ID
ePPR-6507-2021-0001 v6

Fund #4:	State SB1 SCCP - Solution for Congested Corridors Program (Committed)								Program Code
	Existing Funding ($1,000s)								30.10.030.100
Component	Prior	21-22	22-23	23-24	24-25	25-26	26-27+	Total	Funding Agency
E&P (PA&ED)									Caltrans HQ
PS&E									SCCP for construction and construction management
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON		65,000						65,000	
TOTAL		65,000						65,000	
	Proposed Funding ($1,000s)								Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON		65,000						65,000	
TOTAL		65,000						65,000	

Fund #5:	Local Funds - SBD Co Measure I (Committed)								Program Code
	Existing Funding ($1,000s)								20.10.400.100
Component	Prior	21-22	22-23	23-24	24-25	25-26	26-27+	Total	Funding Agency
E&P (PA&ED)	6,704							6,704	San Bernardino County Transportatio
PS&E	20,440							20,440	$11M for Project Management is included in PS&E cost
R/W SUP (CT)									
CON SUP (CT)									
R/W	43,726							43,726	
CON									
TOTAL	70,870							70,870	
	Proposed Funding ($1,000s)								Notes
E&P (PA&ED)	6,704							6,704	
PS&E	20,440							20,440	
R/W SUP (CT)									
CON SUP (CT)									
R/W	43,726							43,726	
CON									
TOTAL	70,870							70,870	

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST (PPR)

PRG-0010 (REV 08/2020)

PPR ID
ePPR-6507-2021-0001 v6

Fund #6:	Local Funds - Omnitrans Land Sale Funds (20% local) (Committed) (Committed)								Program Code
Existing Funding ($1,000s)									20.10.400.100
Component	Prior	21-22	22-23	23-24	24-25	25-26	26-27+	Total	Funding Agency
E&P (PA&ED)									Omnitrans
PS&E									Local portion of funds from mid-valley land sale
R/W SUP (CT)									
CON SUP (CT)									
R/W	5,020							5,020	
CON									
TOTAL	5,020							5,020	
Proposed Funding ($1,000s)									Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W	5,020							5,020	
CON									
TOTAL	5,020							5,020	

Fund #7:	Other State - STA Transit Assist (Committed)								Program Code
Existing Funding ($1,000s)									20.30.207.811
Component	Prior	21-22	22-23	23-24	24-25	25-26	26-27+	Total	Funding Agency
E&P (PA&ED)									San Bernardino County Transportatio
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W	23,486							23,486	
CON									
TOTAL	23,486							23,486	
Proposed Funding ($1,000s)									Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W	23,486							23,486	
CON									
TOTAL	23,486							23,486	

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST (PPR)

PRG-0010 (REV 08/2020)

PPR ID
ePPR-6507-2021-0001 v6

Fund #8:	Local Funds - In-kind Roadway Work by City of Ontario (Committed) (Committed)								Program Code
Existing Funding ($1,000s)									20.10.400.100
Component	Prior	21-22	22-23	23-24	24-25	25-26	26-27+	Total	Funding Agency
E&P (PA&ED)									City of Ontario
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON		9,300						9,300	
TOTAL		9,300						9,300	
Proposed Funding ($1,000s)									Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON		9,300						9,300	
TOTAL		9,300						9,300	

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST (PPR)

PRG-0010 (REV 08/2020)

PPR ID
ePPR-6507-2021-0001 v6

Complete this page for amendments only Date 05/25/2021 11:37:58

District	County	Route	EA	Project ID	PPNO
08	San Bernardino		T458GA	0821000055	1232

SECTION 1 - All Projects

Project Background

Print for baseline agreement

Programming Change Requested

Print for baseline agreement

Reason for Proposed Change

Print for baseline agreement

If proposed change will delay one or more components, clearly explain 1) reason for the delay, 2) cost increase related to the delay, and 3) how cost increase will be funded

Print for baseline agreement

Other Significant Information

Print for baseline agreement

SECTION 2 - For SB1 Project Only

Project Amendment Request (Please follow the individual SB1 program guidelines for specific criteria)

Print for baseline agreement

Approvals

I hereby certify that the above information is complete and accurate and all approvals have been obtained for the processing of this amendment request.

Name (Print or Type)	Signature	Title	Date

SECTION 3 - All Projects

Attachments
1) Concurrence from Implementing Agency and/or Regional Transportation Planning Agency
2) Project Location Map

FINAL BASIS OF DESIGN REPORT

West Valley Connector Project

Environmental Clearance, Preliminary & Final Design

sbcta
San Bernardino County Transportation Authority

OmniTrans
Connecting Our Community.

January 2021

Contract Number:
17-1001636
Project Number:
648601

BASIS OF DESIGN REPORT (FINAL)

West Valley Connector Project

Omnitrans sbX BRT System

Rev. 2
January 2021

Prepared for:

San Bernardino County Transportation Authority (SBCTA)

Prepared by:

Parsons

This is a controlled document; please do not duplicate. If additional copies are required, please request them from Document Control. This will ensure that all recipients of the document receive revisions and additions.

Victor Lopez, Chief of Transit and Rail Programs, SBCTA	Date
Carrie Schindler, Director of Transit and Rail Programs, SBCTA	Date
Raymond Wolfe, Executive Director, SBCTA	Date

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Final Basis of Design Report

1.0 Introduction

The San Bernardino County Transportation Authority (SBCTA), along with the public transit operator Omnitrans, is proposing to construct the West Valley Connector (WVC) Bus Rapid Transit project (The Project). The West Valley Connector corridor is a bus rapid transit line servicing the Cities of Rancho Cucamonga, Ontario, Montclair, and Pomona.

The Project is an implementable new system that will greatly improve transit service. This new high-tech, user-friendly system will offer more frequent service, fewer stops, and higher average speeds than traditional bus service. Investing in this new transportation system will greatly improve Omnitrans' ability to meet growing travel demands, encourage redevelopment, and maintain economic vitality in the Project Corridor.

2.0 Scope

This Basis of Design Report (BOD) establishes the general design objectives of the Project and shall be the basis for developing the civil, station, systems, structural, and other design components. This document will discuss BRT elements including Roadway Facilities, Geometrics, Design Speeds, Clearances, Drainage, Traffic Control, Utilities, Electrical Design, Mechanical Design, Communications, and Station elements.

3.0 West Valley Connector Transitway

The project is a 19-mile-long, BRT corridor project located primarily along Holt Avenue/Boulevard and Foothill Boulevard that would connect the Cities of Pomona, Montclair, Ontario and Rancho Cucamonga in Los Angeles and San Bernardino counties.

More specifically, the project alignment runs primarily along Holt Avenue/Boulevard, Archibald Avenue, Inland Empire Boulevard, Milliken Avenue, Foothill Boulevard, and Day Creek Boulevard. The project alignment consists of two phases. Phase I of the project would construct the "Milliken Alignment", from Pomona Transit Center to Victoria Gardens in Rancho Cucamonga. Phase I/Milliken Alignment would be constructed first and is proposed to have 10-minute peak and 15-minute off-peak headways.

Phase I/Milliken Alignment

Phase I of the project would construct the Milliken Alignment, from Pomona to Victoria Gardens in Rancho Cucamonga. In Pomona, the alignment starts from the Pomona Metrolink Transit Center station. It exits north along Main Street before turning east onto Monterey Avenue. It turns left onto Garey Avenue and continues north to Holt Avenue. The alignment turns right onto Holt Avenue and continues east into Montclair.

In Montclair, the alignment runs on Holt Boulevard between Mills Avenue and Benson Avenue and continues into Ontario.

In Ontario, the alignment continues on Holt Boulevard starting from Benson Avenue and then continues to Vineyard Avenue and into Ontario International Airport (loop through Terminal Way). From the airport, it heads north on Archibald Avenue to Inland Empire Boulevard and turns right to go east on Inland Empire Boulevard.

On Inland Empire Boulevard, the alignment continues east to go straight into Ontario Mills (loop through Mills Circle), and then heads north on Milliken Avenue into Rancho Cucamonga.

In Rancho Cucamonga, the alignment makes a loop into the Metrolink Station from Milliken Avenue and then continues up Milliken Avenue and turns east onto Foothill Boulevard. The alignment continues east on Foothill Boulevard, turns north onto Day Creek Boulevard, then terminates with a layover at Victoria Gardens at Main Street. From Victoria Gardens, the bus line begins a return route by continuing north on Day Creek Boulevard, turns west onto Church Street, turns south onto Rochester Avenue, then turns west back onto Foothill Boulevard.

The project includes 33 stations (5 center-running and 28 side-running stations) at 21 locations/major intersections and associated improvements, premium transit service, Transit Signal Priority, dedicated lanes, and integration with other bus routes.

Two build alternatives (Alternatives A and B) and a No Build Alternative were considered for the project and are described below (see attachment for build alternatives map).

- No Build Alternative – No improvements to the existing local bus services.
- Build Alternative A – Full BRT corridor with 38 side-running stations at 21 locations/major intersections. No dedicated bus-only lanes.
- Build Alternative B – Full BRT corridor with 33 stations consisting of 5 center-running and 28 side-running with dedicated bus-only lanes in Ontario. With exception of the 3.5-mile dedicated bus-only lanes in Ontario, the remainder of “Alternative B” is identical to “Alternative A”. Within the 3.5-mile dedicated bus-only segment proposed for “Alternative B”, “Alternative A” incorporates side running stations instead of center running stations.

Build Alternative B was selected during the Project Approval and Environmental Document phase, and is being incorporated into Final Design. A major feature of the future West Valley Connector transitway is the dedicated lanes within Ontario that allow for bus operations to be separated from vehicular traffic. These lanes would reside in the center of the roadway. Stations would be located between the two bus-only lanes within a median island. Segments where buses operate in regular traffic lanes are referred to as “mixed-flow lanes” and are not restricted for use by any particular type of vehicle.

Center-running station platforms will be raised approximately 13 inches above the transitway pavement surface to accommodate level patron access on the left side of the bus. Where the buses operate in regular mixed-flow lanes adjacent to the curb, the station would be located on the sidewalk at existing curb height.

A project map is included as Figure 3-1.

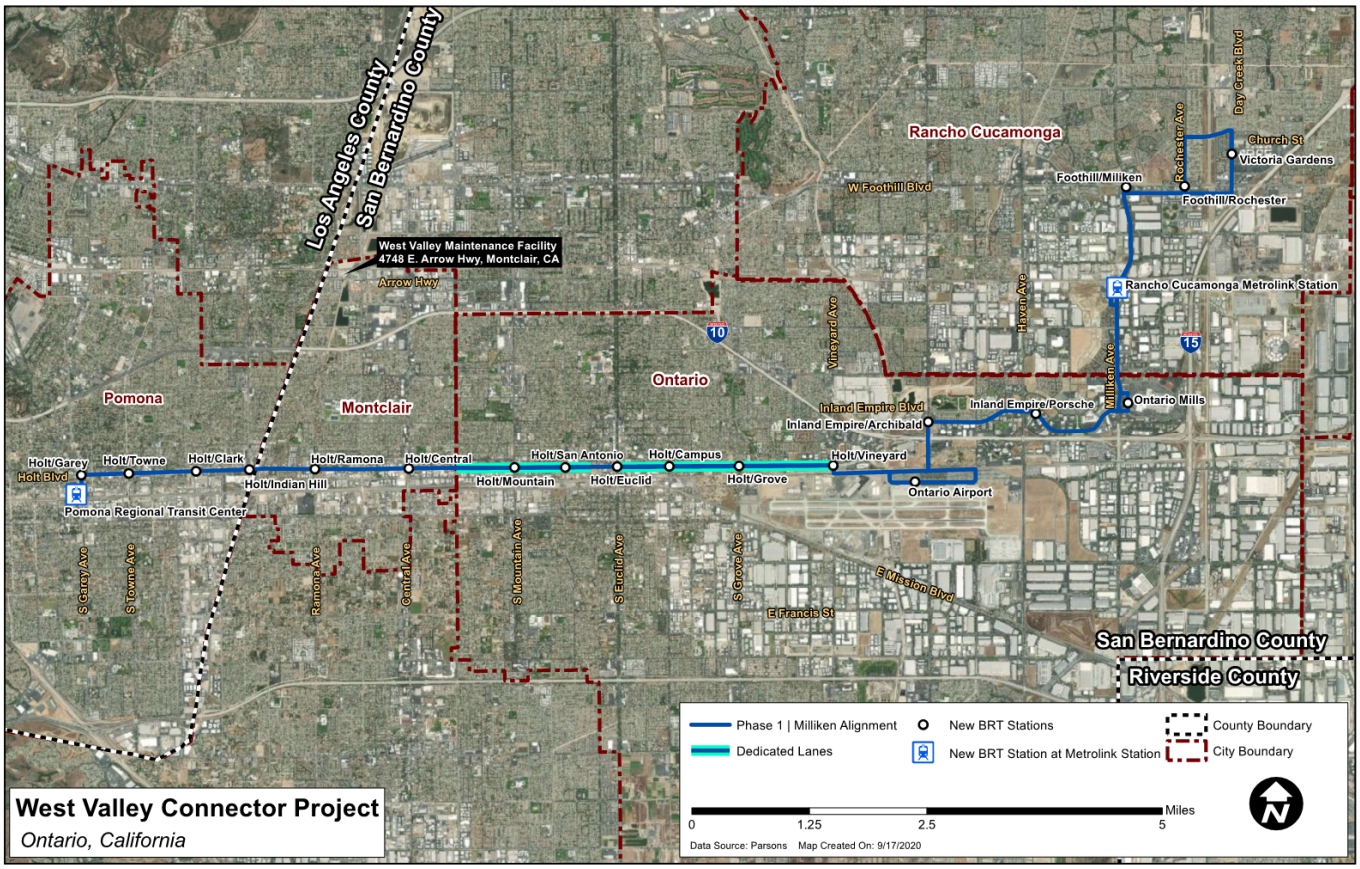

Figure 3-1: Project Map

4.0 Design Vehicle

4.1 Vehicle Dimension Characteristics

The West Valley Connector BRT Corridor Project is designed for both 40-foot battery-electric buses and 60-foot articulated buses. It is expected that the transitway will utilize 40-foot electric buses. However, should the need arise to deploy 60-foot articulated buses at a later date, the project will have the capacity to utilize the larger buses. Omnitrans has shown a typical turning template for an articulated 60-foot bus of this type in its Transit Design Guidelines (Omnitrans Transit Design Guidelines, March 2013, Figure 7-14) showing minimum and maximum turning radii. The turning template is used for design and is shown below in Figure 4-1.

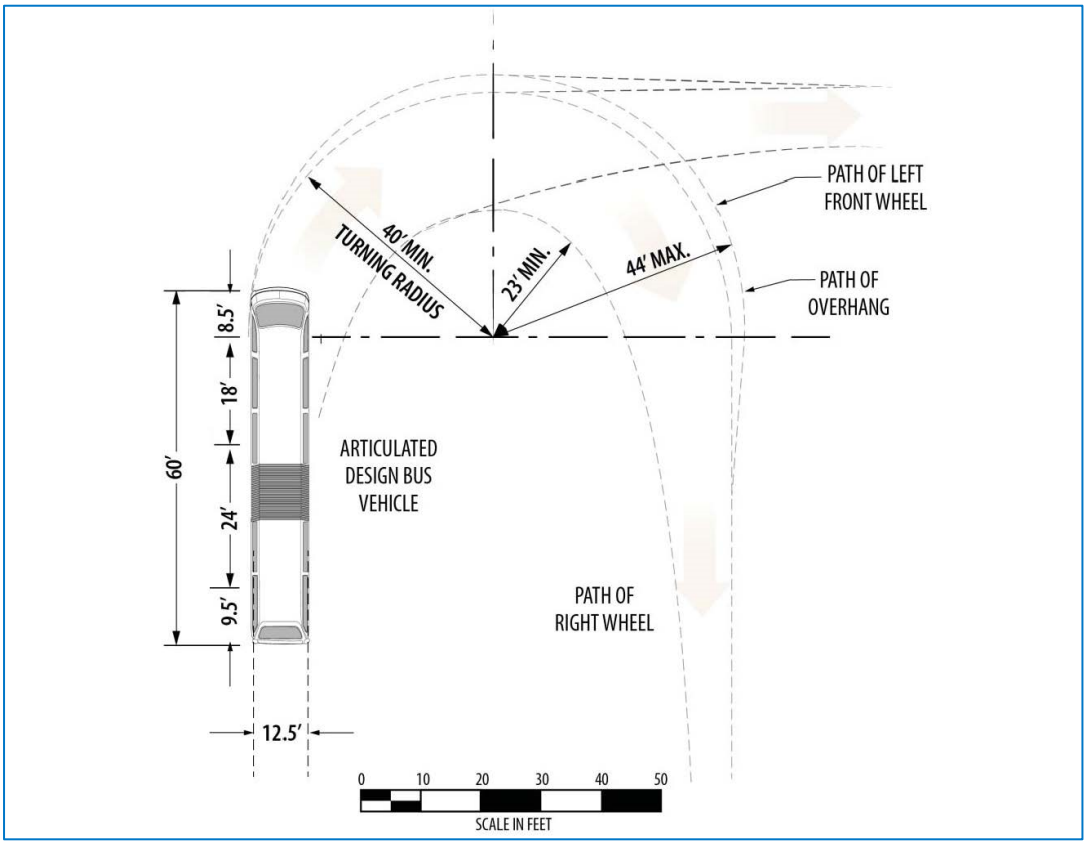

Figure 4-1: Design Turning Template for Articulated Bus

Listed below are the basic dimensions of a typical 40' bus to be used for the BRT Corridors:

- Length Overall (over body): ..... 40 feet
- Width Overall (over body - not including mirrors or other extensions): ..... 102 inches
- Height Overall (maximum): ..... 130 inches
- Floor Height Above Ground: ..... 14 inches
- Kneeler Option Height Above Ground: ..... 10 inches
- Turning Radius (outside body including bumper): ..... 42 feet

4.2 Vehicle Storage

Vehicles are designed for comfort and a smooth ride and hold approximately 81 passengers at maximum capacity with up to three bicycles attached to the bicycle racks at the front of the vehicle.

5.0 Civil Design

5.1 Design Speeds

5.1.1 Maximum Operating Speed

Maximum operating speed in the BRT vehicles shall be 45 mph, but will not be more than 10 mph greater than the posted speed limit of parallel traffic. Design speed of parallel traffic and for BRT in mixed flow shall be the posted speed limit. Posted speed limits are shown in Table 5-1.

Table 5-1: Posted Speed Limits

City	Street	Segment	Posted Speed (mph)
Pomona	Main St	Commercial St to Monterey Ave	No Posted Speed Limit
Pomona	Monterey Ave	Main St to Garey Ave	35
Pomona	Garey Ave	Monterey Ave to Holt Ave	30
Pomona	Holt Ave	Garey Ave to Mills Ave	35
Montclair	Holt Blvd	Mills Ave to Benson Ave	45
Ontario	Holt Blvd	Benson Ave to San Antonio Ave	45*
Ontario	Holt Blvd	San Antonio Ave to Grove Ave	40*
Ontario	Holt Blvd	Grove Ave to Vineyard Ave	45*
Ontario	Vineyard Ave	Holt Blvd to Airport Dr	45
Ontario	Airport Dr	Vineyard Ave to Archibald Ave	50
Ontario	Archibald Ave	Airport Dr to Inland Empire Blvd	50
Ontario	Inland Empire Blvd	Archibald Ave to Milliken Ave	45
Ontario	Milliken Ave	Inland Empire Blvd to Forth St	50
Rancho Cucamonga	Milliken Ave	Fourth St to Foothill Blvd	50
Rancho Cucamonga	Foothill Blvd	Milliken Ave to Day Creek Blvd	50
Rancho Cucamonga	Day Creek Blvd	Foothill Blvd to Church St	45
Rancho Cucamonga	Church St	Day Creek Blvd to Rochester Ave	45
Rancho Cucamonga	Rochester Ave	Church St to Foothill Blvd	45

*Note: Alternative B proposes posted speed limits decreased to 35 mph within the proposed widening area

5.1.2 Average Operating Speed

Today the average local bus operating speeds are only 12 to 15 miles per hour and getting slower as Corridor congestion worsens. With the West Valley Connector Project, in-vehicle travel times will be competitive with autos in the Corridor during peak commute hours. In calculating run times it was assumed that the average dwell at stations would be 30 seconds and average overall speed would be 20 mph.

5.1.3 Headways

The West Valley Connector Project will require 18 vehicles (15 in service with 3 spares) to serve the 10-minute peak headway and have sufficient spare vehicles.

5.2 Guidelines For Following Design Standards

The civil design will generally be in accordance with local city standards where the civil design occurs. If the local jurisdiction does not have standards to cover a specific design, the Standard Plans for Public Works Construction (SPPWC) also known as the "Greenbook", American Association of State Highway and Transportation Officials (AASHTO) or Caltrans standards will be followed.

5.3 Cross Section Elements

Accommodation of BRT lanes will require shared or exclusive use of some existing travel lanes, possible reduction in some existing lane widths, widening of roadways, and development of modified cross sections with space for BRT lanes, general travel lanes, parkway, sidewalks, and shoulders as appropriate, in order to meet pedestrian and vehicular space requirements. The geometry of the design of intersections shall be approved by Omnitrans, the City of Ontario, or other Cities where applicable.

In the segments of exclusive lanes on Holt Boulevard in the City of Ontario, a 103' right-of-way cross-section will be designed including a 10' median and a widening to 108' where 15' center -running BRT stations are located. In each direction a 12' BRT lane, 11' thru lane, 13' thru lane adjacent to the curb, a 5.5' parkway, and a 5' sidewalk will be provided. If the right-of-way width must be reduced to avoid impacts to adjacent structures, the parkway would be reduced or eliminated.

5.4 Curbs, Gutters and Medians

New curb and gutter will adhere to applicable city standards. Where the existing roadway is to be widened, curb and gutter shall be replaced according to city standards. Curb and gutter will be 6 or 8 inches high, with a 1.5 ft to 2.0 ft gutter width according to individual city standards.

A design exception for curb heights will be requested. At center-running station platforms, the curb height of approximately 13 inches for level boarding is proposed.

All existing curb ramps will be maintained or relocated to new curb return locations. All new curb ramps will adhere to city, AASHTO, or Caltrans standards where possible. At locations where a standard curb ramp would impact an existing facility, a specially designed modified curb ramp will be proposed. The modified curb ramp will be designed in accordance with current ADA requirements.

If the existing curb return at a proposed station location does not have a curb ramp, one will be provided.

5.5 Cross Slopes and Superelevation

Generally, existing cross slopes along the corridor will be maintained.

When widening an existing street, the cross slope should match the existing cross slope as much as possible, but in no case shall the cross slope be less than 1.5% or more than 4.0%. A variable overlay of existing pavement will be required to flatten the cross slope when widening streets.

Design Elements	Criteria
Cross-slope of Sidewalk	2% maximum
Curb Height	6” or 8”
Bus Pad	matches cross slope of road
Cross-Slope of Traveled Way	1.5% to 4%

BRT pavement will not normally be superelevated. However, if guideway geometrics require superelevation, the Caltrans Highway Design Manual will be utilized during design.

5.6 Clearances

Minimum horizontal clearance from fixed objects on sidewalks that are to be reconstructed or located on BRT platforms shall be 2 ft measured from the edge of the traveled way or face of curb. At stations, the minimum clearance between overhead canopy and curb face will be 2 ft.

Existing minimum vertical clearances will not be reduced along the BRT transitway.

6.0 Horizontal and Vertical Geometry Design

The general geometric design principals contained in the AASHTO publication “A Policy on Geometric Design of Highway and Streets,” and the standards for the Cities of Pomona, Montclair, Ontario, and Rancho Cucamonga will be followed.

6.1 Horizontal Alignment

The existing horizontal alignment will be developed from a survey of recovered existing street centerline monuments. This alignment will be used as the record centerline of improvement and the centerline of construction.

Minor shifts in the travel lanes will be designed as tapers if the deflection angle of the shift is consistent with (not greater than) that as calculated for the design speed. Otherwise, a horizontal curve must be introduced or the design speed reduced.

Turns at intersections will be designed on the basis of vehicle turn templates.

6.2 Vertical Alignment

The vertical alignment will be controlled by a grade line along both roadway curb lines utilizing elevations established by local benchmarks.

The BRT centerline profile will follow the existing pavement surface. However, minor changes in flow line elevations at the proposed curb and gutter will be necessary for the widening portions of the corridor. Existing vertical alignments along the remainder of the corridor will not be impacted.

6.3 Intersection Geometry

The geometry of the design of intersections shall be approved by the City of Ontario, or other Cities where applicable.

6.3.1 Minimum Curb Radii

The minimum curb radii at intersections where BRT buses makes a turn will be determined using the maximum of the turning templates from Omnitrans local and articulated BRT buses or city standards, whichever is greater.

Curb returns will be reconstructed only where impacted. Non standard curb radii will conform to standard unless, by doing so, would impact an existing building or structure.

6.4 Turn Lane Storage Length

Turn lane storage length is based on the existing storage length or standard traffic engineering assessment of acceptable levels of service.

6.5 Highways

The project alignment crosses over Interstate 10 along Archibald Ave, however no roadway improvements are proposed at this location.

There is one traffic signal along the BRT corridor whose jurisdiction is Caltrans. This signal is located at the intersection of Holt Boulevard and Euclid Avenue (State Route 83). An encroachment permit will need to be obtained from Caltrans District 8 to modify the signal at this intersection and to make any improvements within Caltrans right of way.

6.6 Railroads

The project alignment crosses under BNSF tracks at the following locations:

- Vineyard Ave between Holt Blvd and Airport Dr (City of Ontario)
- Archibald Ave between Guasti Rd and Airport Dr (City of Ontario)
- Milliken Ave south of Jersey Blvd (City of Rancho Cucamonga)

The roadway improvements will be made within the limits of the existing pavement. Coordination and approval from BNSF, CPUC, and SCRRA are required if any modifications to the roadway are proposed within railroad right of way.

6.7 Channels

The Project alignment has channel crossings occurring at the following locations:

- Holt Blvd, east of Grove Avenue (West Cucamonga Channel)
- Airport Dr, between Moore Way and Terminal Way
- Foothill Blvd, between Nursery Dr and Day Creek Blvd

Buses will run in mixed flow lanes at all of these channel crossing locations, except for the Holt Blvd crossing. The section of the Project alignment where the channel crosses under Holt Blvd will require roadway widening to facilitate center-running dedicated bus lanes. Coordination is required with San Bernardino County Flood Control District (SBCFCD) and US Army Corps of Engineers for this channel.

7.0 Drainage Design

7.1 Existing Drainage

The existing storm drain facilities throughout the entire project limits can be categorized as a Municipal Separate Storm Sewer System (MS4). This is attributed to the project taking place in an urban developed setting and that all storm runoff is collected by some sort of engineered facility.

With the existing topography of the project being relatively flat, with a trending north to south slope, no major physical boundaries exist to segment the project limits for drainage. In turn, the entire existing drainage features and patterns can be described as a whole. Currently, all storm runoff from private parcel and public right-of-way is conveyed to the existing streets by a combination of sheet flow and shallow concentrated flows. Where at this point the existing streets utilize a curb and gutter to collect the runoff and convey it to a catch basin in either sag or on-grade condition. The existing catch basins vary in both type and dimensions. Some of the runoff collection systems utilized are: curb openings, grate inlet, and a combination grate and curb opening.

Once the runoff is intercepted by a catch basin, it is conveyed through a network of drainage pipes. The existing drainage pipes range in size from 18-inch to 96-inch; with the smaller as laterals and the larger as system trunk lines. Going back to the general topography of the project limits, these gravity type drainage systems follow the same constraints as the areas general topography. The typical layout of these is such that a separate collector system exists every few blocks or at main cross streets. At these cross streets, a trunk line exists flowing north to south. The catch basins located within the project footprint are then connected to these trunk lines with smaller lateral pipes in a trending east to west or west to east fashion. The common material for the existing pipes is reinforced concrete (RCP).

In addition, four concrete flood control channels that are under the jurisdiction of the San Bernardino County Flood Control District transverse the project alignment. All four of the concrete channels also flow north to south and convey flows from the base of the foothills to their outfalls into the Santa Ana River.

7.2 Hydrology and Hydraulics

The proposed hydrology and hydraulic studies shall be performed in accordance with the Cities of Rancho Cucamonga, Ontario, Montclair, and Pomona, San Bernardino Flood control Design Criteria, US Army Corps of Engineers, and FEMA.

7.2.1 Hydrology

According to the Hydrology Manual of San Bernardino County August, 1986, it is the goal of the Agency to provide 100-year return frequency flood protection for all habitable structures and other non-flood proof structures. Consequently, all drainage plans must demonstrate the 100-year flood protection

criteria. Flood protection levels for 25-year floods may be required for major street travel ways and catch basin sump design.

The San Bernardino County Hydrology Manual dated 1986 and the Master Plan of Drainage for each impacted city will be used to develop the hydrologic parameters for the 25-year and 100-year storm events. Rational method will be used to determine the peak flow rates. Computations will be performed using Bentley Flowmaster V8i.

The rainfall values and intensities for the study will be obtained from isohyetal maps contained in the SBCFCD hydrology manual. These rainfall values are 1.05 inch for the 10-year storm event, and 1.5 inches for the 100-year storm event. 25-year discharges will be determined by interpolating between 10-year and 100-year values with a slope of 0.60 in accordance with SBCFCD methods.

Hydrologic soil groups “A” & “B” will be used for the entire watershed. Antecedent Moisture Condition (AMC) II was used to determine the peak flow rates for 25 year storm events, and AMC III for 100 year storm events.

Criteria for the conceptual layout and design of drainage improvements will be adopted based on the current guidelines of the involved cities and San Bernardino County Flood Control District (SBCFCD). All underground storm drains proposed in the study will be intended to collect local urban runoff and offsite undeveloped flows. These drains will be located in existing and proposed West Valley Connector rights-of-way including proposed easements. For local and major streets located in the study area, runoff from the 25-year storm is allowed to flow in the street until it reaches the top of curb; however the 100-year storm flow, is allowed to flow within the street section until it reaches the right-of-way limit. If either of these two conditions is exceeded an underground storm drain system will be proposed. All conduits will be reinforced concrete pipes. The minimum pipe size will be 18” RCP, with a minimum cover of 2 feet or greater than existing where 2’ cover does not allow for positive flow within the system.

Off-site runoff coefficients will be determined by soil type and impervious percentage in the San Bernardino Hydrology Manual Rational Method hydrologic model. The on-site runoff coefficient is 0.9 for AC or PCC surfaces (lanes/shoulders/Medians), 0.65 for graded median (existing natural) and landscaped / unimproved areas, and 0.5 for unpaved areas with slopes less than 10 percent.

The offsite design flows (10-year and 100-year) will be determined from the San Bernardino County Flood Control District Comprehensive Storm Drain Plan No. 7. The onsite design flows (10-year and 25-year) will be determined by using Rational Method to perform the hydrologic calculation of the project site.

7.2.2 Hydraulics

All hydraulic analyses will be performed in accordance with the San Bernardino County Flood Control District and the Cities’ Design Criteria. The more conservative criteria will be used.

The basis of design is summarized as follows:

All existing pipe and other conveyance elements will be investigated in accordance with acceptable hydraulic performance criteria including but not limited to Manning’s equation for open channel and full flows. The Water Surface Pressure Gradient (WSPG) program will be utilized for hydraulics of the pipes and channels.

Investigations of off-site channels will be performed for determining hydraulic capacity of the connecting on-site drainage systems by utilizing FHWA culvert charts.

Manning's equation for shallow, triangular and rectangular channels will be used to calculate the depth of flow and the design spread (T) of gutter flows where applicable.

Design storm drain conveyance for the subject study area will be in accordance with the following design criteria:

- Street and Gutter – 25-year flood event
- Storm Drain System – 100-year flood event
- Flood Control Channel – 100-year flood event
- For on-grade conditions, 25-year flood events will be utilized for inlet interception and outlet pipe design.
- For sump conditions, 100-year flood events will be utilized for inlet interception and outlet pipe design.

Where the above design criteria cannot be met, the proposed system will meet or exceed the existing flow condition.The 25-year and 100-year balance of storm runoff will be carried in West Valley Connector curbed portion of roadway and right-of-way, respesctively.

7.3 Proposed Drainage

Proposed drainage systems shall be designed in accordance with the criteria set forth by the San Bernardino County Flood Control District, U.S. Army Corp of Engineers, Federal Emergency Management Agency, and the Cities.

To the fullest extent, the grassed swales will be utilized to convey both storm water quality flows and peak flows. To the maximum extent possible, the existing flow pattern will not be altered. There are locations where additional storm water conveyance systems will be needed and preliminarily identified in drainage system drawings.

The project will not alter and/or modify the following drainage systems and receiving waters located within the study area:

- San Antonio Channel (within City of Montclair)
- West Cucamonga Channel (within City of Ontario)
- Cucamonga Channel (within City of Ontario)
- Day Creek Channel (within City of Rancho Cucamonga)

As noted above, the proposed project would entail minor grading activities that would impact the onsite drainage pattern of some roadways, and station locations, but the impact would be mitigated by treatment BMPs. The proposed project would only cause very minor modifications to the existing storm drain systems to ensure that drainage of new stations facilities are connected to existing storm drain systems and that all street drainage from the proposed condition will be operating adequately.

The selection of proposed drainage structures will be based on providing the maximum drainage efficiency for the roadway characteristics.

7.4 Water Quality

7.4.1 Water Quality Management Plan (WQMP)

The Federal Clean Water Act (CWA) requires that discharge of pollutants into "Waters of the United States" from any point source is effectively prohibited, unless the discharge is in compliance with a National Pollutants Discharge Elimination System (NPDES) Permit.

The WQMP template and procedure guidelines are located at:

http://www.swrcb.ca.gov/santaana/water_issues/programs/stormwater/sb_wqmp.shtml

The project corridor is located within both the Santa Ana and Los Angeles Regional Water Quality Control Board jurisdictions. However, since the proposed improvements within the Los Angeles boundary will be minimum to none and the portion within the Los Angeles boundary flows back into the Santa Ana limits, this project will adhere to the Santa Ana Regional Water Quality Control Board. This board stipulates that the Cities in their jurisdiction implement and monitor all water quality permit requirements. Water Quality Managements Plans per San Bernardino County Stormwater Model Program is required and shall be reviewed and approved by the involved cities prior to any permit issuance.

Runoff is ultimately conveyed to the Santa Ana River, which is listed on Section 303 (d) for California, (reach 4) for pathogens. Under section 303 (d) of the CWA, states are required to identify waters that do not meet current water quality standards and must develop an action plan to improve water quality. The BMPs that will be proposed throughout the corridor consist of drywell infiltration basins that will collect runoff from adjacent catch basins and inlet filters affixed to the adjacent catch basins. The system will discharge into the ground or into storm drain trunk lines. This BMP treatment train will treat the pathogens listed under Section 303 (d) for the Santa Ana River Watershed.

Surface water quality in the Santa Ana River and some tributary drainages exhibit degraded water quality due to uncontrolled pollutant discharge from non-point sources (NPS) pollution.

NPS pollution is caused by storm water runoff that collects and carries away natural and human made pollutants, finally depositing them into inland surface waters, coastal waters and groundwater resources.

7.4.2 Stormwater Pollution Prevention Plan (SWPPP)

The Regional Water Quality Control Board requires all construction projects over one acre to obtain coverage under the state wide general construction permit. The production of a SWPPP is requirements of the general construction permit. The Cities will review the SWPPP before any permits are issued. The SWPPP will address erosion and other pollutants typically generated by a construction project.

The SWPPP template and procedure guidelines are located at:

www.cabmphandbooks.com/construction.asp

7.4.3 Best Management Practices (BMP)

The project site is located within the Santa Ana River Watershed. Runoff is ultimately conveyed to the Santa Ana River, which is on the 2006 303(d) list (Reach 4) for surface water quality in the Santa Ana

River. Some tributary drainage exhibits degraded water quality due to uncontrolled pollutant discharge from non-point sources (NPS) pollution.

NPS pollution is caused by storm water runoff that collects and carries away natural and human made pollutants, finally depositing them into inland surface waters, coastal waters and groundwater resources.

Atmospheric deposition and hydro-modification are also sources of non-point source pollution. Surface water courses crossing the project site experience NPS effects from urbanized and agricultural land uses located both within and upstream of the study area. Along the project alignment and within areas proposed for station facilities, pesticides used for landscape care and oil and grease from automobiles, etc. can contribute to water quality degradation within Santa Ana River and associated tributaries.

8.0 Systems Design

A variety of advanced traffic and transit management systems will be designed to improve transit service for the West Valley Connector service area operated by Omnitrans. This new high-tech, user-friendly system will offer more efficient and cost-effective bus service. The communications and security elements will be a primary consideration in developing the system infrastructure design. Applicable national codes and regulations, use of secure technology in communication systems, performance-based design, and industry standards will be utilized to optimize the system design.

8.1 Bus Technology Systems

Buses will be equipped with global positioning system (GPS) based Automatic Vehicle Location (AVL) equipment to manage transit route operations in real-time. This will function with a dynamic message sign (DMS) displaying live bus arrival times at the stations to advise passengers of expected waiting times for coming buses.

Bus communication equipment will be comprised of on-board radios, public address (PA) and passenger information system that include interior LED displays, exterior destination signs and an automatic announcement system (AAS). Closed circuit television (CCTV) cameras will be provided for bus vehicle interior surveillance that will be recorded via an on-board digital video recorder (DVR).

Radios will be commercial units functionally compatible with the existing Omnitrans radio system and integrated into the bus vehicle.

Buses will be equipped with transit signal priority emitters which allow buses to communicate with traffic signal controllers via the transmission of visible light, infrared signals, or Digital Short-Range Communications (DSRC) transceivers. This will activate the local traffic signal to adjust timings to enable buses to stay on schedule and/or have priority phases to allow optimal BRT performance. The PA system will allow one-way communication between the operator and passengers via the interior and/or exterior speakers.

The AAS system will control all pre-recorded audible announcements. The audio messages will be stored in digital form and played over the PA system.

Other in-bus technologies include in-vehicle CCTV surveillance technology (to record in vehicle video images for passenger security) and vehicle passenger counters.

8.2 Station Related Subsystems

Design standards and specifications for each station related subsystem will be developed as the design progresses. As with all phases of the design process, these standards and specifications will be reviewed with affected agencies and utilities as applicable for conformance with existing national and local standards and codes, or the need for approval of variances. Station related subsystems include, but are not limited to the following:

- Communication System
- Dynamic Message Display (DMS) with Live Bus Arrival System
- Public Address (PA) System
- Emergency Telephone System
- Closed-Circuit Television (CCTV) Surveillance System
- Video Management System (VMS)

The station subsystems shall follow Omnitrans common operational standards for remote control, management, and operations. The remote CCTV cameras shall integrate with head-end VMS for video storage, live viewing and video sharing for event monitoring and incident investigations. The dynamic digital displays shall interface into the head-end DMS server to disseminate actual bus arrivals along the WVC route to bus riders. The SIP speakers and horns shall integrate with the head-end PA for public addressing which shall interface into the existing AAS for mass notifications and emergency announcements via Omnitrans leader group or emergency call stations.

Additionally, each bus station communications box shall host SNMP based devices including a watch dongle and a UPS Net-Agent to transport self-diagnostics, self-test, notification and alarm data to Omnitrans CCF for agency wide network management and centralized power control. The station related SNMP data shall be configured to route to designated CCF platforms including RMON servers (for intelligent network monitoring) and power management servers (for UPS battery monitoring) and will be mananged by Omnitrans under common operational standards.

8.2.1 Communications System

The communications system serves as the infrastructure for high speed data transmission between each bus station and the Omnitrans Central Control Facility (CCF). It supports broadband data, video, and voice communications at the head-end platform at the CCF to manage, monitor, and control various bus station components. The options for communications technology and/media include:

- Wireless broadband transmissions of high-speed 4G/LTE (5G capable) cellular data services to each bus station.
- The dynamic message displays at every station will utilize double sided LED screens to provide live bus arrival information as well as provide Omnitrans the opportunity to send repeating and scrolling advertisements from the CCF to all stations.
- Every station will also include two double sided E-paper screens which will display static bus schedule and bus route information just below the LED screens. The E-paper content can be easily updated with new information by Omnitrans but is not anticipated to be frequently changed.

- Dedicated Emergency Telephones are provided at each bus station and will be routed to a designated 911 call center via Omnitrans CCF cloud service. The emergency telephone network will automatically be assigned with a 911 call party in order to route to one of the four jurisdictional city police 911 call centers depending on the location of each bus station.
- UPS battery power at each station will provide critical communications continuity for emergency telephone and key CCTV coverage during utility service disruptions.

8.2.2 Dynamic Message Display with Real-Time Bus Arrival System

The AVL equipment on buses will interface with the existing DMS server to feed in real-time bus locations. The Contractor shall coordinate with Omnitrans to transmit and post live bus arrival times to the new WVC station displays by using existing interfaces provided by the DMS server. The server has a live prediction algorithm operated by the Omnitrans CCF to estimate when the next bus will arrive at each station. This prediction will be posted on Dynamic Message Displays located at each station, on traveler information websites (which can be accessed via cell phones) or it can also be made available to riders as text messages (i.e. a rider simply sends a text message corresponding to the bus stop, then the time for when the next bus will arrive is sent back to the user via a text message). Multiple buses using the station will be identified and clearly listed on the dynamic LED displays at every station.

8.2.3 Closed-Circuit Television System

An Internet Protocol (IP) based video surveillance system will be provided at all West Valley stations. The system will consist of color PTZ (pan, tilt, zoom) and fixed cameras to monitor activities at these locations. CCTV coverage of the stations will be primarily confined to station platform areas, with special attention being paid to the passenger boarding areas. The cameras will typically be dome mounted and housed in suitable durable enclosures to help protect them from vandalism and the environment. Cameras can be positioned on shelter structural arms holding the canopy, integrated within pylons or kiosks, or mounted on light poles, depending on the coverage needed by these cameras. All cameras will be controlled from the CCF using the CCTV control system.

CCTV surveillance with pan-tilt zoom (PTZ) and fixed cameras video streams shall be transmitted to the CCF central control platform for video capturing, live viewing, archiving, control, distribution, and management and recording by network video recorders. The Operators and Supervisors at the CCF shall be able to call up live videos and pre-recorded video streams from any station for regular video tour display and event/incident investigation (motion detection, fence guard, and loitering detection) using the video management software (VMS) workstations.

Video will be retained at the CCF for typically 60 days of duration. In addition, the VMS will be able to obtain live video streams of higher resolution from the same cameras for police forensics investigation if an incident occurs that warrants closer examination. Higher resolution video typically can only be retrieved from a single camera per bus station depending upon the station bandwidth and capabilities of the VMS system.

8.2.4 Public Address System

A public address system will be installed at each of the stations so announcements can be made to riders, e.g. announcement on bus incidents, bus delays or public service announcements. This will

consist of SIP-based hardened speakers, mounted on the station shelters in most locations. The Omnitrans CCF will be equipped with a VOIP PA server and microphone call stations to control, manage and operate the station speakers. The PA server shall also have a SIP interface to tie into the existing head-end Cisco CUCM platform currently in operation for mass notification and emergency announcements.

The emergency telephones located at each station will have built-in speakers and a small camera, both of which activate only when the emergency call button is pressed.

8.2.5 Traffic Signal Control Systems

An important aspect of the BRT system are the various traffic signal control systems used to coordinate the traffic signals along the BRT corridor. Since four cities plus Caltrans have jurisdiction of the multiple traffic signals, the Transit Signal Priority (TSP) capabilities are dependent on each city's traffic signal controller interfaces with the chosen TSP technology. Depending on the nature, types and age of the local signal controllers, equipment upgrades or replacements may be required. Within the City of Ontario dedicated center running bus portion, all traffic signal equipment shall be replaced with new poles, arms, signal heads and controllers.

8.2.6 Transit Signal Priority (TSP) System

This is a key part of the station related technology systems. See Section 9 of this report for a detailed discussion of this system.

8.3 Central Control Facility (CCF) Related Systems

The CCF is physically located at Omnitrans' East Valley Facility located at 1700 West Fifth Street in San Bernardino. Communication end-devices for each bus station shall be IP-based/VOIP-based, directly routed to the CCF head-end rack cabinets over secured wireless WAN and require no protocol conversion.

CCF will make available a Demarcation Equipment Cabinet by a third-party service provider with wireless WAN rack equipment and service router to connect to the new West Valley Connector (WVC) head-end communications rack cabinets. The WVC head-end rack cabinets shall be located in the CCF Data Center Room and shall hold WVC servers and video storage recorders with full remote monitoring and configuration capabilities for remote communication devices at each WVC bus station.

A new CCTV workstation will be installed with VMS client software to manage all WVC station cameras. A new DMS workstation with DMS client software will manage all WVC station kiosk displays. A third new PA workstation with PA client software will manage all WVC station speakers. A CCF operator shall use these workstations to display, monitor, control, and configure associated remote devices. Each WVC workstation shall be a Dell Desktop Computer or approved as equal with minimum two (2) 17" LCD monitors to facilitate head-end operations, displaying and live viewing of field devices.

9.0 Traffic Control, Signals and Signage Design

9.1 Transit Signal Priority (TSP)

Transit Signal Priority is employed at signalized intersections to provide priority to transit vehicles (buses) thereby reducing the total travel time. TSP technology can be provided at intersection in two levels: Always-on or Conditional priority. Always-on Priority requests priority to all transit vehicles. Conditional Priority requests priority based on various factors such as schedule variance, scheduled headway variance, passenger load, time of day, direction of route, etc. In order to minimize traffic impacts and maximize the benefits due to TSP, local jurisdictions and transit operators prefer to have the option of seeking / requesting TSP only when certain conditions are met. For example, TSP would only be requested if the BRT vehicle is behind schedule.

Given the objective of implementing conditional TSP, the selected technology should be able to communicate or interface with the transit operations management system. The selected TSP technology is intended to be expanded beyond the West Valley Connector BRT Corridor to other routes

illustrates the four functions in the Transit signal priority process. illustrates the technical approach recommended for TSP deployment for the West Valley Connector corridor. Under the proposed approach, TSP functions could be executed by on-bus systems, bus-to-intersection communications, and traffic controller equipment.

Figure 9-1: TSP Functions

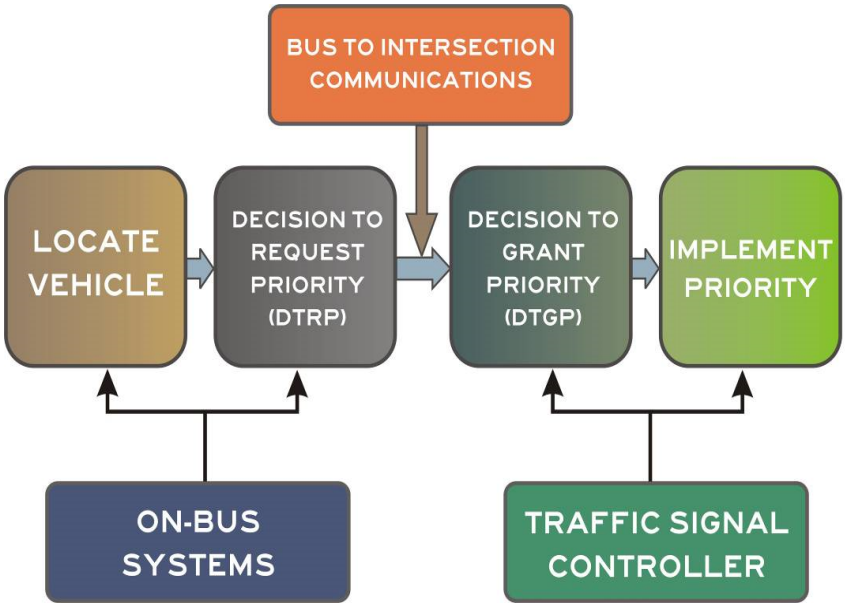

Figure 9-2: TSP Decision Process

9.1.1 Transit Signal Priority Architecture

Under the proposed TSP system architecture, buses are equipped with both GPS & RF based on-bus systems that communicate with the intersection controllers. Once in the corridor, TSP-equipped buses request priority by sending specific check-in, position update, and checkout messages to the intersections. The traffic controllers then process the messages and implement priority for the buses according to criteria set for granting such priority. The TSP Parameters would be jointly determined by Omnitrans and each City along the corridor prior to deploying the system.

Priority may be requested at signalized intersections equipped with the TSP Components and granted based on parameters determined by Omnitrans and the City. When the decision to request priority has been made by the on-bus system, communications are initiated with the intersection where priority is requested. The system architecture provides for health and performance monitoring of the TSP systems by the Omnitrans and each City where the system is located. Data is extracted from the signal priority data network and sent to the TSP Network Monitor data server. The TSP Network Monitor provides for network monitoring, maintenance planning, and historical data reporting. For health monitoring purposes, network devices can be accessed once they are on the network by sending requests to the signal priority data network.

The proposed system architecture would employ a communications between mobile network clients that is, TSP-equipped BRT vehicle, and intersection traffic signal controllers. The WLAN consists of a network of devices known as access points (AP) that are connected together using both wired, where available, and wireless communications. Each AP manages a number of wireless mobile and intersection clients associated to it by authenticating a client's right to be utilizing the network and to broker network communications between the client and other network devices.

9.1.2 TSP System Design

The implementation of bus signal priority systems along the West Valley Connector corridor would require the installation of communications equipment and traffic signal control equipment upgrades at intersections along the corridor as well as software on-bus and fixed end systems for TSP functions.

Intersection Traffic Signal Hardware

Intersection signal controller hardware and software modifications could be necessary for the intersections along the West Valley Connector corridor. The modifications could include upgrading the signal controller equipment to Type 170E controllers at intersections not already equipped with Type 170E controllers, upgrading signal controller firmware to a version of BI Tran 233 already modified to accommodate wireless bus-to-intersection communications, and modifying signal timing with TSP parameters. Each of the modifications could be necessary to provide full system implementation at each intersection.

Signal timing for bus signal priority for the intersections would be performed by each of the Cities. Timing would be based on rules set by the City and typically provide for green extension, early green return, and limitations on granting priority for consecutive cycles in order to maintain progression.

Intersection TSP Hardware

Each traffic signal is locally and independently managed and operated by a traffic controller located in a nearby traffic signal cabinet. TSP parameters and configurations are always stored and operate locally, so even if communications to other systems are lost, TSP operations can continue without interruption. The TSP equipment shall be able to retains TSP configuration data, logs, and processes all signals received from the on board equipment.

The traffic controller firmware/software residing in the traffic controller makes the ultimate determination of what action to take in terms of potentially granting a TSP request.

On-Board TSP Hardware

Similar to how each intersection can operate independently once the TSP parameters are in place, transit vehicles process their location, schedule status, direction, proximity to TSP intersections, etc. on a near-second by second basis. Transit vehicles independently determine whether or not they meet the TSP criteria configured for the route they are currently operating. When criteria are met and the transit vehicle reaches a location defined by a check-in box (a latitude/longitude based polygon along an intersection approach), the bus will trigger the TSP request. The vehicle logs the details of the criteria and the request which is later downloaded to OmniTrans Central system. Buses determine schedule adherence based on comparisons of real-time and scheduled time arrivals at timing points, with interpolation judging schedule adherence between timing points. Timing points may or may not be part of the published schedule and have no effect on the TSP operations. Schedule adherence can be set anywhere from +120 minutes to -120 minutes.

9.2 Traffic Signal Modification Upgrades

There are 108 signalized intersections along the corridor and 78 unsignalized intersections. Traffic signals in the corridor would need to be modified primarily to reflect changes in roadway and lane configurations. TSP Elements could also be modified at these intersections. For example, signal pole relocation and mast-arm modifications will be required due to the proposed implementation of the center “Bus Only” lanes on Holt Blvd in the City of Ontario.

9.3 Signing and Pavement Markings

Signing and pavement markings should be designed as per applicable California MUTCD and municipal standards, with variances requested, if necessary for any BRT distinguishing signing or markings. Treatments or markings to differentiate the transitway can effectively convey where a BRT service operates. Differentiation in the appearance of the transitway can be accommodated through a number of techniques including pavement markings, lane delineators, and alternate pavement color.

Signage and Striping

Signage is the most basic form of marking a lane as reserved for BRT service. The use of “BUS ONLY” pavement legends has been chosen to indicate the exclusive use of the lanes by buses. In addition, the logo “sbX” will be installed on each block in the center of the sbX lanes in each direction to indicate that the lanes are for the exclusive use of sbX and to prevent any other vehicles, including non-sbX buses, to enter the exclusive lanes. Where transitways and/or bus lanes are built on arterials, signs are provided in each direction at each intersection.

10.0 Utility Design

The utility design will be coordinated with utility owners to identify all the locations where the proposed Project features are in conflict with the existing underground or above ground utilities. Utilities will include, but not be limited to, gas, electric, telephone, water, sewer and fiber optics. A list of the utilities in the area of the Project is shown in Table 10-1.

Table 10-1: Initial Utility List

Utilities in Project Area	
AT&T	Marygold Mutual Water Company
AT&T Transmission	Metropolitan Water District
City of Montclair	Monte Vista Water District
City of Ontario	Plains All American Pipeline
City of Pomona	Southern California Edison
City of Rancho Cucamonga	Southern California Gas
Crown Castle	Sunesys, LLC
Cucamonga Valley Water District	Time Warner Cable / Spectrum Charter
Chino Basin Municipal Water District	Verizon Business (formerly MCI)
Frontier	Verizon Wireless (formerly Airtouch)
Kinder Morgan	Water Facilities Authority
Level 3 Communications	Wilshire Connections

Coordination with the utility companies will be ongoing throughout the design process. Plans will be provided to utility companies at various milestones for their review and comments. Meetings with utility companies will be held to review conflicts and dispositions.

The procedure to identify underground utilities and dispositions consists of the following:

- Review existing plans provided by the utility companies
- Prepare existing utility mapping
- Field verify utility mapping
- Identify utility conflicts and dispositions

An initial list of utility impacts and dispositions will be developed during the early stage of the preliminary design effort. This list will be updated as the project progresses.

10.1 Field Work/Verification

Topographic surveying techniques will be used to preliminarily identify the location of existing utility lines and structures such as manholes, meters, valve boxes, and poles. Standard field survey methods will be used to identify the location of existing utility surface features and structures. Finally, a combination of subsurface utility scanning and potholing will be used to positively identify any utilities identified as a conflict.

10.2 Identification of Utility Conflics and Disposition

The existing utility mapping will be revised as necessary based on the results of the field verification. Potential utility conflicts will be identified and compiled in the Utility Conflict Matrix.

Once it has been determined that there is a conflict with the proposed design, a field visit will be scheduled with each affected utility company to review all conflicts and discuss resolution of the conflicts. Possible dispositions for the utility conflicts will be:

- Modify corridor or station design to avoid utility conflict.
- Relocation or modification of the utility in conflict.

11.0 Lighting and Electrical Design

Electrical work on the sbX BRT system may include street and pedestrian lighting, traffic signal power and controls, station power and lighting, and existing information kiosks. All electrical work beyond the electrical meter will be in accordance with the following:

- NFPA 70
- IES (Illuminating Engineering Society)
- IEEE (Institute of Electrical and Electronics Engineers)
- ANSI (American National Standards Institute)
- California MUTCD
- California Building Code
- Building Code for the City of Pomona
- Building Code for the City of Montclair
- Building Code for the City of Ontario
- Building Code for the City of Rancho Cucamonga

All electrical work for street lighting as well as for traffic signals will follow standard practices, local electrical utility and local municipalities' traffic engineering requirements.

11.1 Power Source

Power shall be supplied through local grid by local electrical utility as required. During the design stage, the local electrical utility should be contacted to determine the location and type of service available. Separate metering will be needed for various usages (shelters, informational kiosks, signals, lighting, etc.) due to rate differentials. Low voltage requirements will be added on an as-need basis for Systems related items including but not limited to CCTV, TVM/SAV, network equipment, etc.

11.2 Street and Pedestrian Lighting

Affected street lights will be replaced in kind along the corridor. Upgrades to the affected street light system; type of luminary pole or light intensity, will be treated as needed on a case by case basis. In the majority of cases, the affected street lights will be either relocated, if in good condition, or replaced by new ones to an adjacent location within the new sidewalk area. The relocation of street lights will be coordinated with all the other proposed street elements such as landscaping, fire hydrants, traffic signs, traffic signals, and other street furniture.

It is anticipated that no additional power sources will be needed to energize the relocated or replaced street lights.

12.0 Station Design

12.1 Design Objectives for Stations

As per the requirements of the sbX Design Criteria, stations along the West Valley Connector corridor will have a common design aesthetic that brands the sbX line and yet is adapted to the individual platform locations. Elements from the "kit-of-parts" are assembled to suit the functionality of the station platform to maintain the desired cohesiveness of the stations and to economize on ease of maintenance, parts replacement, and costs. The following report provides an overview of the station design as incorporated into the Engineering Drawings and Specifications. All elements meet the standards set forth in the sbX Design Criteria, unless specifically noted herein.

12.2 Codes and Standards

The following codes and standards apply to all stations.

- U.S. Department of Transportation guidelines for major capital investments
- U.S. Department of Transportation, Transportation for Individuals with Disabilities: 49 CFR Parts 27, and 37
- Architectural and Transportation Barriers Compliance Board, Americans with Disabilities Act (ADA) Accessibility Guidelines For Buildings And Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines, 36 CFR Part 1191 (September 2013)
- Americans with Disabilities Act (ADA) Standards for Accessible Design, 28 CFR, Part 36
- Department of Justice, 2010 ADA Standards for Accessible Design (September 15, 2010)
- Omnitrans, Transit Design Guidelines (March 15, 2013)

Stations along the line occur in a variety of locations and are required to also comply with the requirements of the various jurisdictions. Confirmation of the Plan Check process for all stations is to be determined. These are detailed below.

12.2.1 City of Pomona

Stations in the City of Pomona include: Pomona Metrolink Station, Holt Ave at Garey Ave, Holt Ave at Towne Ave, Holt Ave at Clark Ave, and Holt Ave at Indian Hill Blvd. Stations are located primarily within the public right-of-way. The following additional codes apply to the stations in the City of Pomona:

- City of Pomona Municipal Code
- California Building Standards Code (2016 CCR Title 24) as adopted by the City of Pomona

12.2.2 City of Montclair

Stations in the City of Montclair include: Holt Blvd at Ramona Ave, and Holt Blvd at Central Ave. Stations are located primarily within the public right-of-way. The following additional codes apply to the stations in the City of Montclair:

- City of Montclair General Plan
- California Building Standards Code (2016 CCR Title 24) with City of Montclair amendments

12.2.3 City of Ontario

Stations in the City of Ontario include: Holt Blvd at Mountain Ave, Holt Blvd at San Antonio Ave, Holt Blvd at Lemon Ave, Holt Blvd at Campus Ave, Holt Blvd at Grove Ave, Holt Blvd at Vineyard Ave, Ontario International Airport, Inland Empire Blvd at Archibald Ave, Inland Empire Blvd at Porsche Way, Inland Empire Blvd at Haven Ave, and Ontario Mills. The following additional codes apply to the stations in the City of Ontario:

- City of Ontario General Plan (September 2010)
- Downtown Ontario Design Guidelines (August 18, 1998)
- California Building Standards Code (2016 CCR Title 24) as adopted by the City of Ontario
- Los Angeles World Airports Design & Construction Handbook (June 2015) [Ontario Airport Station Only]

12.2.4 City of Rancho Cucamonga

Stations in the City of Rancho Cucamonga include: Rancho Cucamonga Metrolink Station, Foothill Blvd at Milliken Ave, Foothill Blvd at Rochester Ave, and Day Creek Blvd at Main St. The following additional codes apply to the stations in the City of Rancho Cucamonga:

- City of Rancho Cucamonga Zoning Code
- California Building Standards Code (2016 CCR Title 24) as adopted by the City of Rancho Cucamonga

12.3 Station Design and Material Selection

Functionality and compliance with the sbX Design Criteria primarily guides the design for the stations. Some of the major considerations were protection from elements, security, ease of access, level boarding at BRT stations and alighting to buses, station image, sense of place, and protection from vandalism. See the sbX Design Criteria for a complete list of considerations.

There are three types of stations for the West Valley Connector Project: Side-Running Rapid Bus, Center-Running BRT, and Metrolink Stations. The platform designs for these types of stations are within the same family, but not all identical.

12.3.1 Side-Running Stations

As per the Design Criteria, Side Running Station platforms occur curbside on sidewalks at all stations along the Project where buses run in mixed flow lanes. These stations are as follows:

- Holt Ave at Garey Ave, Towne Ave, Clark Ave, and Indian Hill Blvd

- Holt Blvd at Ramona Ave, Central Ave, and Vineyard Ave
- LA/Ontario International Airport
- Inland Empire Blvd at Archibald Ave and Porsche Ave
- Ontario Mills
- Rancho Cucamonga Metrolink
- Foothill Blvd at Milliken Ave and Rochester Ave
- Day Creek Blvd at Main St (Victoria Gardens)

The majority of side stations are configured into a typical layout and will use the kit-of-parts listed in the Omnitrans Transit Design Guidelines with some modifications to the minimum side running configuration. At all side running stations (in each direction), there will be an integrated smart kiosk/pylon with a branded logo with large screen showing bus arrival information and maps, as well as an emergency telephone. The double-sided screen may also show advertisements on one side. Side running stations with full station amenities will also have a shelter, bike rack, a bench, a trash receptacle compatible with those used for sbX, security cameras, and lighting integrated within the shelter. Shelters will be approximately 18’ in length and a width to fit on a 10’ minimum sidewalk. There will be no fare collection equipment. Pedestrian wayfinding signage, solar power, and public art are being explored in final design. The side-station platforms will be equal in height to the existing curb heights. Stations in Rancho Cucamonga which already have shelters will not have proposed shelters with the project.

12.3.2 Center-Running Stations

Center Running BRT Station platforms are identified as Phase 1 work and occur in the center median along the Project where buses run in exclusive center lanes. These stations are as follows:

- Holt Blvd at Mountain Ave, San Antonio Ave, Lemon Ave, Campus Ave, and Grove Ave

Center-running stations are utilized on the West Valley Connector corridor within the city of Ontario. From the center of the crosswalk, sloped walks are used to gain access to the 13-inch platform curb height, which provide level boarding. Platforms are placed as close to the intersection as possible while still maintaining left turn pockets. Some refinements to the design of the kit-of-parts have been made based on lessons learned from E Street sbX. A bike ramp on each side of the station will also be provided to allow bicyclists to load their bikes on the front of the 40-foot buses. Each center-running station will also have a maintenance vehicle pull-in and equipment pad area, separated by a gate from the boarding area.

12.3.3 Metrolink Stations

There are two stations along the West Valley Connector Project that provide a direct connection to Metrolink Stations. These stations are:

- Pomona Metrolink Station
- Rancho Cucamonga Metrolink Station

In order to keep a cohesive aesthetic along the Project, the design of these stations is approached from the kit of parts perspective.

The Metrolink BRT station will include standard Omnitrans signage and a branding pylon with the aforementioned amenities. In addition, the Rancho Cucamonga and Fontana Metrolink BRT stations will include security cameras. These station platforms will not be elevated.

12.3.4 Design and Material Selections

Regardless of where a station is located, the unifying elements of the station design remain consistent. Materials were chosen for their durability. Dimensional standards from the sbX Design Criteria are indicated on the drawings and are not repeated within this report. The side running station layout dimensions will differ from the Omnitrans Design Guidelines and will be refined during final design.

12.3.5 Station Structural Design

The major structural components include structural steel canopy, canopy spread footing, platform structural slab, and pylon cast-in-drilled-hole pile. Other minor structural components include concrete formed planter, stairway, etc. The “kit-of-parts” modular design of the stations benefits cost effectiveness in design, construction, and future maintenance.

The station structural design will conform to 2019 California Building Code as stated in the Codes and Standards Section of this document. A list of frequently cited design codes and standards by the 2019 CBC is as follows (but not limited to):

- ASCE 7-16 – Minimum Design Loads for Buildings and Other Structures by American Society of Civil Engineers
- AISC 360-16 – Specification for Structural Steel Buildings by American Institute of Steel Construction
- ACI 318-14 – Building Code Requirements for Structural Concrete by American Concrete Institute

The important design classifications and parameters for station structures are listed as follows:

- Structural Occupancy Category II
- Importance Factor (I_e) = 1
- Live load: Platform – 100 psf; Roof – 20 psf or 300 pound concentrated load whichever is greater
- Wind Load (per Project Site): Basic Wind Speed is 90 mph; Exposure Category B per ground surface condition; station structural profile is less than 15 ft height above ground; structural type is classified as rigid and open structure with mono-sloped or troughed roofs.
- Seismic Load (per Project Site): Seismic Site Class E; Seismic Design Response Spectrum per Geotechnical recommendation; structural type is classified as Steel Special Cantilever Column System

12.3.6 Station Art

An art consultant will assist in a process to define art opportunities. Art opportunities at the side running stations may include perforated metal panels, paving, or painting of electrical cabinets. Art opportunities for the center running stations may include those listed for the side running plus railings and other components identified by stakeholders and the art consultant.

13.0 Landscaping

13.1 Landscape

Landscaping will vary along the sbX alignment from segments in mixed-flow traffic to segments in exclusive bus lanes. For buses travelling in mixed-flow traffic, landscape improvements will be focused around the station areas. Planting design for all areas will include a mix of deciduous and evergreen trees, shrubs, vines and groundcover where possible. Landscaping will also include a mix of appropriate native and/or drought tolerant plants that fit with local design context and resource conservation goals. The landscape will also attempt to mitigate environmental factors such as hot temperatures, and strong winds where possible.

Specific goals of the overall landscape plans are to:

- Preserve and improve the visual environment of the corridor by replanting and/or relocating mature or specimen trees displaced by the relocated curbs, parkways, and sidewalks, where feasible
- Provide creative design strategies to integrate as much vegetation as possible at the stations to soften urban edges, minimize surfaces for graffiti, compliment station architecture and surrounding context, and provide shade and visual interest
- Identify stations with a plant palette that is unique, yet compliments the plant palette of the streetscape
- Address safety concerns with carefully located plant massings to discourage pedestrian shortcuts across vehicular and bus travel lanes
- Follow design guidelines for safe distances from utilities and access such as driveways, street lights, and fire hydrants

13.2 Reference Documents

Documents used in the preparation of the PE landscape drawings are as follows:

- Holt Boulevard Mobility and Streetscape Strategic Plan
- City of Ontario Landscape Development Guidelines
- City of Ontario Tree Planting Notes and Details
- City of Ontario Tree Protection Notes and Details

13.3 Cities of Pomona, Montclair, & Rancho Cucamonga

In these cities, buses will travel in mixed-flow traffic. Therefore, landscape improvements will only occur around the stations.

13.4 City of Ontario

In the City of Ontario, buses will run in exclusive lanes along Holt Blvd between Benson Ave and Vineyard Ave with the exception of a section through the Historic District where buses will run in mixed use lanes. Landscape in the areas of exclusive lanes will see improvements along relocated curbs where

possible. Landscape in the side running district will only occur at stations or to replace trees removed for project improvements.

13.5 Irrigation

Complete landscape irrigation systems will be employed in areas where new and relocated plantings are developed within the public domain. Each separate system will include a water tap, control valve, backflow protection and an automatic controller. Existing irrigation systems impacted by the project, either within the public or private realm, will be repaired and or modified as necessary to provide adequate water to the modified landscapes. Wherever possible, these repairs/modifications will be connected to the existing systems. Where no existing system exists or where wholesale removals have occurred, independent systems will be developed to water the new stations and/or city streetscape plantings.

Water conserving irrigation systems will be used wherever possible while remaining sensitive to the existing maintenance practices, local ordinances, and resource conservation goals of the Cities of Pomona, Montclair, Ontario, and Rancho Cucamonga. Drip irrigation will be incorporated on all shrub and ground cover plantings while street trees will be watered on separate irrigation zones utilizing tree bubblers to provide for the specific water needs of each plant type while minimizing run off and overspray. Repaired or modified areas of existing turf will be watered using pop up spray heads as necessary to match the precipitation rates of the existing irrigation systems to which they will be connected. Landscape planters included in the BRT station platforms will be connected to the irrigation systems within the adjacent medians.

Sleeves under existing roadway will be included in the design to efficiently provide water to new street tree plantings. The location of sleeves will take existing utilities into consideration and they will be designed to try to keep them no longer than 150 feet in length. Separate sleeves will be provided for piping and electrical wiring.