Appendix J

Traffic Analysis Report

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METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Pure Water Southern California

Traffic Analysis Report

Draft | Version 1.9

Submitted to:

Project # 11690

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Acronyms and Abbreviations

ADT	Average Daily Traffic
AHJ	Authority Having Jurisdiction
AWP Facility	Advanced Water Purification Facility
BMPs	Best Management Practices
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CEQA	California Environmental Quality Act
CM	Construction Method
DPR	Direct Potable Reuse
EIR	Environmental Impact Report
GHG	Greenhouse Gas
HELIX	HELIX Environmental Planning
I-	Interstate
LACFCD	Los Angeles County Flood Control District
LADWP	Los Angeles Department of Water and Power
LOS	Level of Service
Metropolitan	The Metropolitan Water District of Southern California
MGD	Million Gallons per Day
MUTCD	Manual of Uniform Traffic Control Devices
OPR	Office of Planning and Research
PS	Pump Station
Pure Water	Pure Water Southern California
ROW	Right-of-way

RTP	Regional Transportation Plan
Sanitation Districts	Los Angeles County Sanitation Districts
SB	Senate Bill
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SFSGPS	Santa Fe Spreading Grounds Pump Station
SGVCOG	San Gabriel Valley Council of Governments
TAZ	Traffic Analysis Zone
TCBs	Temporary Concrete Barriers
TCP	Traffic Control Plan
TMCs	Traffic Management Centers
TMP	Traffic Management Plan
USACE	U.S. Army Corps of Engineers
VMT	Vehicle Miles Traveled
Warren Facility	A.K. Warren Water Resource Facility
WATCH	Work Area Traffic Control Handbook
WNPS	Whittier Narrows Pump Station
WTP	Water Treatment Plant
WTC	Workforce Training Center

1 INTRODUCTION

1.1 Purpose of the Report

Iteris has completed this traffic analysis report for The Metropolitan Water District of Southern California (Metropolitan) proposed Pure Water Southern California (Pure Water) program. Pure Water would be a partnership between Metropolitan and the Los Angeles County Sanitation Districts (Sanitation Districts) to develop and implement a regional recycled water program. This report addresses components of Pure Water that are being analyzed at the project level, which consist of the construction and operation of a new Advanced Water Purification (AWP) Facility and associated improvements at a Joint Treatment Site in the City of Carson, and the construction and operation of an approximately 39-mile backbone conveyance system from the AWP Facility to the existing San Gabriel Canyon Spreading Grounds in the City of Azusa (referred to as the Proposed Project for the purposes of this report). This report provides the traffic-related technical documentation necessary for the review of the Proposed Project under the California Environmental Quality Act (CEQA) by Metropolitan. As part of Pure Water, more specific or updated impact analysis would occur in the future for components that are being addressed in the Environmental Impact Report (EIR) at the program level. Those components are not addressed in this technical report.

1.2 Project Background and Description

Metropolitan is a public agency comprised of 26 member agencies serving 19 million people in the counties of Los Angeles, Orange, San Diego, Ventura, Riverside, and San Bernardino. Metropolitan imports water from the Colorado River via the Colorado River Aqueduct and from Northern California via the State Water Project to supplement local water supplies.

The Sanitation Districts' A.K. Warren Water Resource Facility (Warren Facility) in the City of Carson is one of eleven wastewater treatment plants in their system and is one of the largest wastewater treatment plants in the world. The Warren Facility provides primary and secondary treatment for approximately 260 million gallons per day (MGD) of wastewater, which currently is discharged into the Pacific Ocean.

Pure Water would utilize AWP processes to purify treated effluent from the Warren Facility in the City of Carson, and then pump the advanced purified water to select locations within Metropolitan's service area for beneficial reuse. The full implementation of the Pure Water system would include modifications to the existing Warren Facility, construction of a 150 MGD AWP Facility, pipelines, pump stations, groundwater recharge improvements, and various additional appurtenant facilities as required to convey purified water to the delivery points. In addition to the AWP Facility, a new Workforce Training Center (WTC) would be built north of AWP Facility across Sepulveda Boulevard. The modifications to the existing Warren Facility, new AWP Facility, and WTC comprise the Joint Treatment Site.

This new water supply would help reduce the region's dependence on imported water and would assist the region in addressing disruption to imported water supplies. This purified water would not only provide a more diversified water supply to Southern California, it also would enhance Metropolitan's operational resilience, reliability, and flexibility in the face of ongoing challenges, including long-term drought and climate change.

Iteris, Inc. (Iteris) developed this report for identification and analysis of potential impacts on the region's transportation system due to the development of the Proposed Project during both the construction phase and ultimate operational phase of the Project.

Construction activities for the Proposed Project include general traffic associated with construction vehicles including trucks transporting pipe sections and other equipment as well as hauling of excavated dirt and other materials. The other key impact on the transportation system would be the temporary effects on traffic due to short and/or longer-term road closures, detours, or temporary reduction of traffic lanes on surface streets, all of which could result in traffic delays and/or diversions during construction.

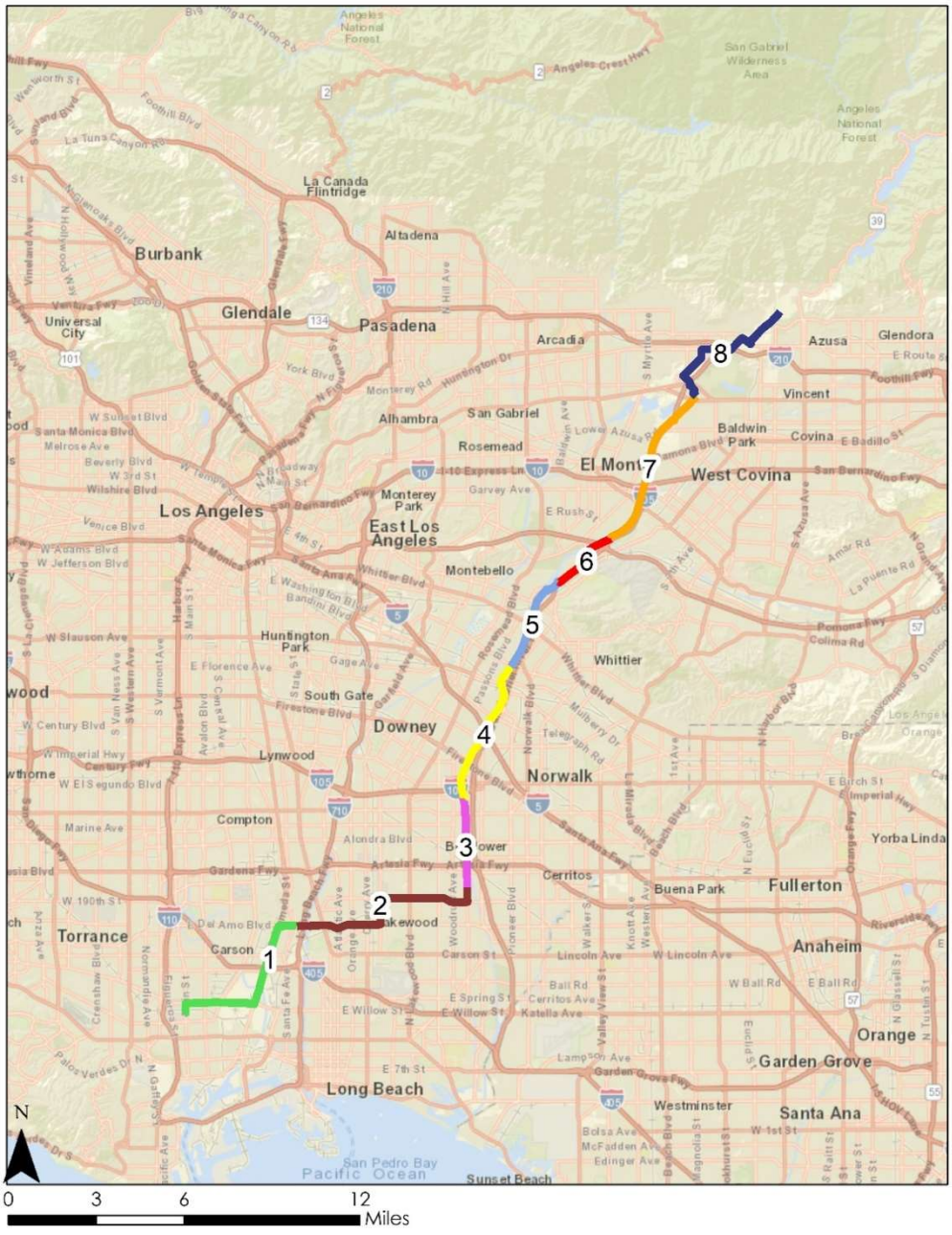
Per CEQA, assessment metrics for roadway capacity and vehicle delay measures, which previously were typically represented and measured by Level of Service (LOS), have been replaced by vehicle miles traveled (VMT), which estimates the total distance that is driven by vehicles. This shift in CEQA transportation metric promotes outcomes that reduce reliance on automobile travel, and thus aligns with state goals for reducing emissions, investing in multimodal transportation networks, and encouraging higher development density with in-fill developments. Therefore, for the purposes of this

analysis, Iteris did not conduct any traditional LOS or capacity impact analysis at roadway segments and/or at intersections which may be affected by construction traffic or diverted auto trips.

1.3 Pure Water Area

The proposed backbone alignment is approximately 39 miles long and consists of eight segments or reaches. The backbone alignment extends from the AWP Facility in the City of Carson, initially heading north on Main Street, then east along Sepulveda Boulevard, north along Alameda Street, then east along Del Amo Boulevard to the City of Lakewood. It then heads north on Paramount Boulevard, then east on South Street, north on Palo Verde Avenue, and roughly follows the San Gabriel River to the San Gabriel Canyon Spreading Grounds in the City of Azusa. Portions of the Proposed Project area also occur within the cities of Long Beach, Lakewood, Cerritos, Bellflower, Norwalk, Downey, Whittier, Santa Fe Springs, Pico Rivera, Industry, Baldwin Park, Irwindale, Duarte, and Azusa as well as unincorporated portions of Los Angeles County. The backbone alignment and reaches are illustrated in **Figure 1-1**.

Figure 1-1: Backbone Alignment and Reaches



The length and jurisdiction for each reach are shown in **Table 1-1**.

Table 1-1: Reach Length and Jurisdiction

Reach	Approximate Length (miles)	Jurisdictions
1	6.2	City of Carson, Unincorporated Los Angeles County
2	7.3	Cities of Carson, Long Beach, Lakewood, Unincorporated Los Angeles County
3	3.1	Cities of Bellflower, Cerritos, Norwalk
4	5.0	Cities of Norwalk, Santa Fe Springs, Downey, Pico Rivera, Unincorporated Los Angeles County
5	3.6	Cities of Pico Rivera, Whittier, Unincorporated Los Angeles County
6	2.6	Cities of Pico Rivera, Industry, Unincorporated Los Angeles County
7	6.0	Cities of Industry, Baldwin Park, Irwindale
8	5.5	Cities of Irwindale, Duarte, Azusa
Total	**39.3**	

2 CEQA TRANSPORTATION ANALYSIS

CEQA transportation analysis is predicated upon the assessment of potential significant impacts based on the following four CEQA checklist criteria listed in Appendix G of the CEQA Guidelines, 2018 amendment:

1. Would the project conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?
2. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
3. Would the project result in inadequate emergency access?
4. Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b) (VMT assessment)?

Assessment of in-street construction conditions and traffic management resulting from the Proposed Project falls under the first impact criterion related to consistency with ordinances and policies. The only components of the Proposed Project that would generate a notable number of long-term vehicle trips are the AWP Facility and WTC in the City of Carson. There would be a small number of trips associated with operations/maintenance of the pump stations and backbone pipeline, but those trips are anticipated to be minimal on a recurring daily basis. One staff person was assumed for conservative modeling purposes of analyzing long-term vehicle trips associated with operations/maintenance of the pump stations.

The Proposed Project's impacts related to transportation would be temporary for construction traffic and permanent for long-term operations. The Proposed Project's impacts on transportation due to construction traffic are discussed qualitatively for criteria one, two and three. Criteria four is addressed quantitatively by calculating the temporary construction VMT and long-term operations VMT, although construction VMT is for disclosure purposes only and does not have a significance threshold under CEQA.

2.1 Conflict with Program, Plan, Ordinance, or Policy

Construction and long-term operations traffic could have the potential to conflict with programs, plans, ordinances, or policies addressing circulation system.

2.1.1 Construction

Construction of the Proposed Project facilities could have the potential to conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities in each of the jurisdictions at the Joint Treatment Site and along the backbone alignment. Construction would require activities such as mobilization of substantial off-road equipment and materials, removal of substantial soil quantities to/from staging areas or offsite locations, and transportation of construction personnel.

These activities would add construction vehicle traffic to roadways around the Joint Treatment Site and

along the backbone alignment, which could add to existing roadway congestion in urban areas, cause intersection delays, or degrade conditions for bicycle, pedestrian, and transit circulation, such that they would conflict with applicable programs, plans, ordinances, or policies addressing the circulation system for those. The degraded conditions could include temporary removal of bike lanes and pedestrian sidewalks.

As a standard measure to prevent a potentially significant impact associated with conflict with a program, plan, ordinance, or policy addressing the circulation system, Metropolitan or the contractor(s) would prepare and implement a Traffic Control Plan (TCP) and/or a Traffic Management Plan (TMP) for each reach to manage traffic flow during construction, reduce potential interference with local emergency response plans, reduce potential traffic safety hazards, and ensure adequate access for emergency responders as required by the Authority Having Jurisdiction (AHJ). Development and implementation of this plan would be coordinated with local agencies with jurisdiction over affected roadways. Metropolitan would provide oversight of the construction contractor(s) to ensure that the plan would be implemented during construction. The plan would include the following measures as appropriate:

- Identify construction truck haul routes to limit conflicts between truck and automobile traffic. The identified routes would be designed to minimize impacts on vehicular, bicycle, and pedestrian traffic, circulation, and safety.
- Implement comprehensive traffic control measures, including scheduling of major truck trips and deliveries to avoid peak traffic hours, installing warning and detour signs (as needed), drafting lane closure procedures, and placing traffic cones to guide drivers indicating potential road hazards or detours (as needed). Other potential traffic control measures include the provision of safe detour routes for pedestrians if sidewalks are to be closed and temporary changes to traffic signal phases and timings, if needed. Traffic control measures would be consistent with the California Manual of Uniform Traffic Control Devices (MUTCD) and the Work Area Traffic Control Handbook (WATCH).
- Coordinate construction activities to ensure that at least one lane of traffic in each direction remains open at all times, unless flaggers or temporary traffic controls are in place, to provide emergency traffic access.
- Evaluate the need to provide flaggers or temporary traffic control at access points to construction sites, backbone construction zones, and entries to staging areas.
- Notify affected adjacent property owners and public safety personnel regarding the timing of major deliveries, detours, and lane closures.
- Coordinate with local Police and Fire departments to ensure their awareness of construction activities and provide detour routes for emergency vehicles. Develop a process for responding to and tracking issues pertaining to construction activity impacts on traffic. Post 24-hour contact information for the traffic manager on all construction sites.

Implementing this standard operating procedure would ensure that temporary construction impacts related to a conflict with a program, plan, ordinance, or policy addressing the circulation system would be less than significant.

2.1.2 Operations

Long-term operation of the Proposed Project facilities includes the backbone conveyance system (including eight reaches and two pump stations) and Joint Treatment Site (including AWP Facility, Joint Treatment Site Pump Station, and WTC). The backbone conveyance system is not anticipated to generate substantial vehicular traffic on a daily basis. The two pump stations, Whittier Narrows Pump Station (WNPS) and Santa Fe Spreading Grounds Pump Station (SFSGPS), are anticipated to have only one member of staff producing up to four trips per day.

The AWP Facility and WTC are the main traffic-generating permanent facilities of the Proposed Project. The AWP Facility would have a total of 194 employees, with 54 of which being operations staff. Based on the shifts for operations staff, only half of them would be at the AWP Facility on any given day, so there would be a maximum of 167 employees at the AWP Facility on any given day. As such, it is anticipated that the AWP Facility would have approximately 167 employees, 10 visitors, and 30 chemical deliveries per day, and the WTC is anticipated to have 31 trainees per day. The long-term operation traffic generated by the AWP Facility and WTC would be minimal, compared with the average daily traffic (ADT) volumes for adjacent roadways of the AWP Facility and WTC.

The long-term operation of backbone conveyance system, AWP Facility, and WTC is not anticipated to conflict with programs, plans, ordinances, or policies addressing the circulation system; therefore, impacts would be less than significant.

2.2 Hazards

Construction and long-term operations traffic could potentially increase hazards due to a geometric design feature or incompatible uses.

2.2.1 Construction

Pipeline construction could affect transportation infrastructure such as roads, bridges, railroads, and trails.

Construction work may require temporary alterations to the horizontal and vertical alignments of these facilities. In addition, new off-road haul routes may be constructed between staging areas and construction sites, for example along the San Gabriel River. These constructed access roads would be temporary and will be restored to pre-project conditions upon the completion of construction. Slow-moving trucks that deliver materials and remove materials and debris would enter and exit public streets, which could create hazards to vehicles, pedestrians, and bicyclists.

Construction zones that include vehicles and materials could create road hazards. Trenching along roadway segments could potentially lead to damage to traffic signal fiber optic communication cables, which could inadvertently affect traffic operations and safety. Trenching along roadway segments could also potentially damage other non-transportation underground utilities. Construction could also result in damage to roads and sidewalks, potentially creating uneven surfaces.

Metropolitan would avoid significant impacts by coordinating with each applicable jurisdiction to identify potentially affected facilities and structures, best management practices (BMPs) to avoid

impacts, and the appropriate procedures to replace or repair a facility or structure should it become impacted.

If unanticipated damage to roads, sidewalks, trails, and/or medians occurs, the construction contractor would coordinate with Metropolitan and corresponding local jurisdiction to ensure that the damage is repaired in a timely manner in accordance with applicable agency standards. Roads and/or driveways disturbed by construction activities or construction vehicles should be properly restored to ensure long-term protection of road surfaces. Roadside drainage structures and road drainage features would be protected or restored by properly regrading and reconstructing roads to ensure proper drainage. The construction contractor would work with applicable agencies to document the preconstruction conditions of road features before construction begins and road conditions after the construction is complete.

Implementing these practices would ensure that temporary construction impacts related to traffic hazards would be less than significant.

2.2.2 Operations

Permanent long-term operation of the backbone conveyance system, AWP Facility, and WTC would not increase hazards due to geometric design feature or incompatible uses. As such, long-term operation impacts related to traffic hazards would be less than significant.

2.3 Emergency Access

Construction and long-term operations traffic could result in inadequate emergency access in each jurisdiction.

2.3.1 Construction

Traffic could be delayed, and lanes could be temporarily closed when construction material or vehicles are being moved on and off the sites of the proposed work zones, especially at high-volume intersections. Potential detours, lane closures, street closures, or intersection closures could all interfere with emergency access. Extended lane closures may be necessary depending on the construction method and construction schedule, which could potentially cause traffic congestion and interfere with emergency access.

Reduced travel lanes due to traffic incidents (unplanned roadway events that affect or impede the normal flow of traffic) is a major cause of congestion. The impacts of traffic incidents are compounded through a construction zone due to reduced lanes and narrower shoulder widths. As a result, an efficient incident management plan is imperative to construction area traffic management. Effective incident management would ensure that incidents in construction areas are cleared quickly and do not lead to substantial delays for the traveling public and emergency vehicles through work zones. The three key components of incident management are detection, response, and clearance.

Implementing a TCP and/or a TMP as required by the AHJ, as described above, would provide traffic control at the access points to construction sites and would facilitate management action that could allow site access for emergency vehicles. The TCP and/or TMP would identify procedures for informing

and coordinating with relevant Police and Fire departments of construction location and would identify potential detour routes. For local jurisdictions which operate Traffic Management Centers (TMCs), these TMCs would also be part of the coordination since they could help emergency access by identifying incidents and adjusting signal timing settings in real time. The TCP and/or TMP would also consider enabling emergency vehicles to travel behind temporary concrete barriers (TCBs) through the work area to access incidents located in a work zone.

As a result of implementing a TCP and/or TMP, the temporary construction impacts related to emergency access would be less than significant.

2.3.2 Operations

Permanent long-term operation of the backbone conveyance system, AWP Facility, and WTC would not result in inadequate emergency access since regular daily operation of the Proposed Project would not interfere with potential detours, lane closures, street closures, or intersection closures. As such, long-term operation impacts related to inadequate emergency access would be less than significant.

2.4 VMT

Construction and long-term operations traffic could be inconsistent with CEQA Guidelines Section 15064.3 subsections (b) (VMT). The Proposed Project has the potential to result in two types of VMT effects:

1. Temporary VMT changes due to construction traffic and reassignment of background traffic during construction, and
2. Long term VMT changes at new permanent facilities during regular operations.

Much of the construction traffic would be truck-related for the transportation of materials and equipment to the staging areas and work sites, and removing spoils to landfills or other areas. However, for the purposes of CEQA (CEQA Guidelines Section 15064.3 Subsection (a)), VMT refers to the amount and distance of “automobile” travel attributable to a project and “automobile” refers to on-road passenger vehicles, specifically cars and light trucks. Heavy vehicles such as semi-trucks and large delivery trucks are excluded from the current transportation VMT assessment per the CEQA Guidelines due to Interstate commerce considerations including the long-distance nature of truck traffic traveling from the Ports of Long Beach, Los Angeles, and Oakland to other states. Therefore, heavy truck trips and heavy truck VMT related to construction are calculated for disclosure purposes only. VMT comparisons are based on VMT per employee.

2.4.1 Construction

CEQA VMT assessment is intended to focus on the long-term, permanent transportation impacts related to the generation of automobile trips and the opportunities for alternative modes of transportation (public transit, walking, bicycling) associated with a development project. Neither the State of California Governor’s Office of Planning and Research (OPR) Technical Guidelines for Senate Bill (SB) 743 nor any jurisdiction within the Proposed Project area specify any requirements for construction VMT assessments.

Due to the temporary nature of project construction, VMT assessments typically do not account for construction activities. Construction VMT analysis is for disclosure purposes only and does not have a significance threshold.

The construction VMT analysis is divided into two components:

- Construction Traffic (predominantly construction heavy vehicles and construction worker auto trips to and from the construction site)
- Background Traffic diverted to alternative routes due to construction-related lane closures (predominantly auto traffic)

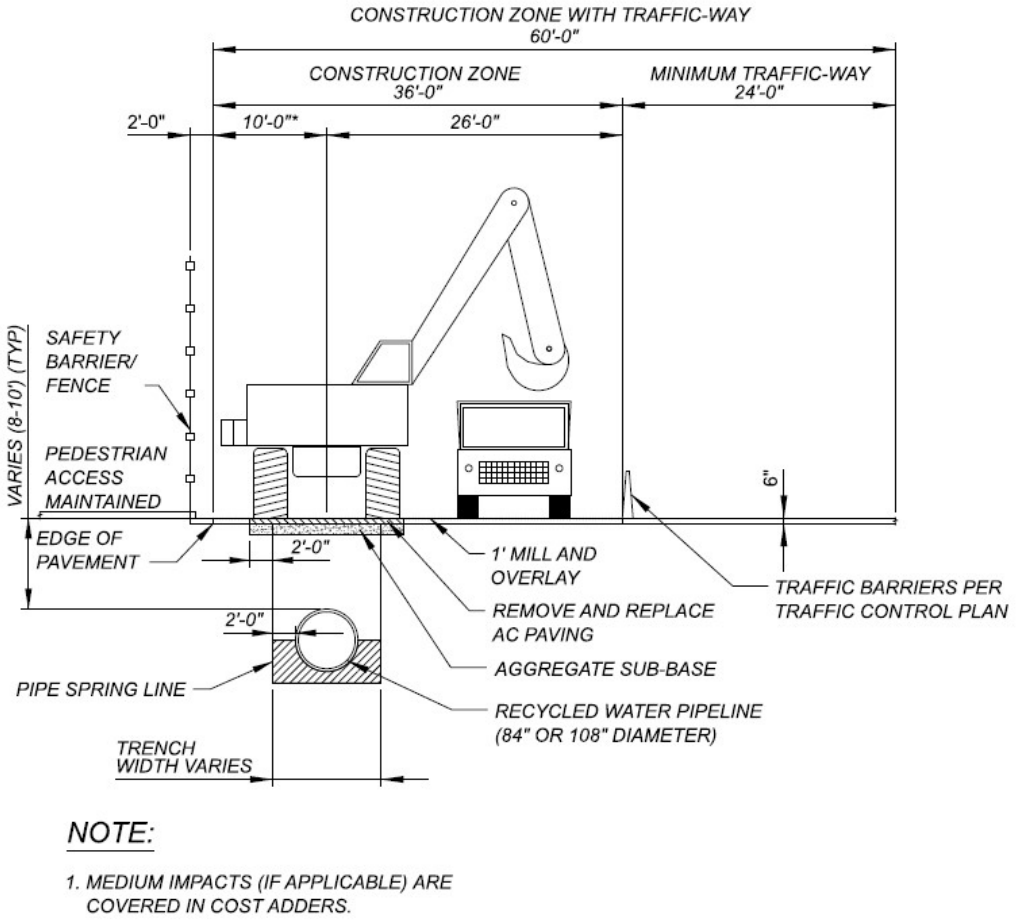
The draft programmatic project schedule provided in **Appendix A** indicates that the main pipeline construction schedule time frame is five to six years from mid 2027 to late 2032 including contingencies. There are two early start construction phases scheduled for 2026. To be conservative for the transportation analysis, a time period in year 2030 was selected when most reaches are planned to be under construction concurrently and could possibly create the largest potential for overall traffic disruption. Year 2030 traffic forecasts from the Southern California Association of Governments (SCAG's) Regional Transportation Plan (RTP) travel demand model were therefore used as the basis for the future year traffic volumes for the background traffic diversion analysis.

Backbone Conveyance System (includes both the backbone pipeline and two pump stations)

Each reach of the pipeline requires a unique set of construction methods (CMs) to build the pipeline given that section's location and characteristics. The following construction methods are used as described in the Conveyance System Data Needs Excel spreadsheets, which are provided in **Appendix B**.

- **Roadways CM** – This typical construction method is the primary method that affects traffic as it involves cut and cover trench digging construction along arterial roadways with construction zones on either side of the construction site, which reduces the width of the arterial by two lanes as shown in **Figure 2-1**.

Figure 2-1: Typical Construction Method for Roadways (with typical dimensions)



CONSTRUCTION METHOD 1 - ROADWAY

The arterials along the backbone alignment are typically four lanes wide (minimum), which would therefore be reduced to two lanes (one lane in each direction) due to construction activities. The construction zone for the work needs to be of sufficient length to both accommodate construction vehicles and materials and to provide sufficient distance for traffic to merge into the reduced number of lanes. When construction is performed at an intersection, the through movements of the cross street and the left-turning movements of both streets need to be temporarily restricted.

- **SCE Easement CM** - This method would be used when digging a trench within Southern California Edison (SCE) easements, which are typically not on roadways and would not divert the traffic.
- **LACFCD Easement CM** - This method is specific to segments within Los Angeles County Flood Control District (LACFCD) easements adjacent to the San Gabriel River and generally would not divert the traffic.

- **Pipe Jacking CM** - This method would be used for tunneling relatively short distances. This CM may or may not involve lane closures depending on the location of tunnel access portals and availability of suitable off-street staging areas.
- **Microtunneling CM** - A type of trenchless construction typically used for crossings not suitable for pipe jacking, such as those below the groundwater table. This CM may or may not involve lane closures depending on the location of tunnel access portals and availability of suitable off-street staging areas adjacent to the tunnel entrances.
- **Shield Tunneling with Ribs and Lagging CM** - This method uses a shield with a digger arm or road header excavating at the face, and hydraulic jacks at the rear of the shield push off the previously installed support elements to propel the shield forward. This method would not require lane closures or result in traffic diversion since the construction would not be on a roadway.
- **Traditional Tunneling CM** - This method would be used for long distances but requires an excavated diameter large enough for human-operated equipment to function. This method is typically used on long segments beyond the distance limits of pipe jacking and microtunneling, such as adjacent to the San Gabriel River in Reach 7 and would not require lane closures or result in traffic diversion since the construction is not on a roadway. However, access points to the adjacent roadway system would be required and a temporary off-street access road may be needed.

The impact on traffic varies between reaches due to variance in construction methodologies. For example, the three Tunneling CMs have a more limited impact on background traffic than Roadways CM since tunneling creates less disruption to the arterial roadways. **Table 2-1** shows the estimated length of each reach by construction method.

Table 2-1: Estimated Reach Length and Construction Method (miles)

Reach #	Estimated Reach Length (from GIS)	Estimated Reach Length (from CM)	CM 1 Roadways	CM 2 SCE Easement	CM 3A LACFCD Easement (Adjacent to River)	CM 4A Pipe Jacking (7 foot)	CM 4B Micro tunneling	CM 4C Traditional Tunneling (7 foot)	CM 4D Pipe Jacking (9 foot)	CM 4E Shield Tunneling with Ribs and Lagging	CM 4F Traditional Tunneling (9 foot)
1	6.2	6.1	5.41	-	-	0.39	0.25	-	-	-	-
2	7.3	7.3	6.13	-	-	0.02	1.18	-	-	-	-
3	3.1	3.1	0.49	1.47	0.59	0.12	0.42	-	-	-	-
4	5.0	4.3	2.42	-	0.23	-	0.08	1.53	-	-	-
5	3.6	5.9	4.31	0.73	-	0.11	0.15	0.64	-	-	-
6	2.6	2.5	-	-	-	-	-	-	-	-	2.48
7	6.0	5.8	0.89	3.35	-	-	-	-	-	0.27	1.25
8	5.5	5.8	0.84	1.37	2.37	-	-	-	1.13	0.04	-
Total	**39.3**	**40.8**	**20.49**	**6.91**	**3.20**	**0.64**	**2.08**	**2.17**	**1.13**	**0.31**	**3.73**

Based on **Table 2-1**, estimated reach length calculated from the GIS files provided by Metropolitan (39.3 miles) is different from estimated reach length calculated from the CM worksheets (40.8 miles). While most reaches have minor differences between length of the shapefile in GIS and the length of all CMs

combined in that each, Reach 4 and Reach 5 have greater differences due to the possibility that Metropolitan may select a different, longer alignment. For purposes of this analysis, calculation of construction VMT for the backbone conveyance system based on the length of individual CM in each reach provides a conservative assessment of environmental impacts.

Construction trips and VMT were calculated herein for disclosure purposes only. They are also used for input to the air quality, GHG, and noise analyses as shown in **Appendix C**.

CONSTRUCTION TRIPS

Construction-related vehicle trips are estimated by summing the number of trips required for backbone conveyance system construction activities based on trip types, which include the following:

1. Light vehicle trips for construction workers commuting to and from the site;
2. Truck trips for construction equipment and materials moving to and from original source location to the staging areas and then to the work site; and
3. Haul truck trips to transport construction spoils to landfills.

The trip calculations were derived from information provided in the Conveyance System Data Needs spreadsheets in **Appendix B**. The key information from the spreadsheets is the length of pipeline segments, number of working days, number of workers needed per day, equipment requirements, and number of daily one-way haul truck trips due to material transportation for each construction method for each reach.

1. Light Vehicle Trips for Construction Worker Commute

Construction generates light vehicle trips due to construction workers commuting to and from the site. The workers are assumed to park at the staging/storage areas. The construction workers' commute is broken up into two parts: (1) private auto travel between their home and the parking location and (2) shuttle between parking location and work site.

The number of daily private auto round trips between the workers' homes and the parking lot is a function of the number of workers needed for each construction method. The daily private auto trips are multiplied by the total number of construction days to calculate the total private auto trips throughout the period of construction.

The number of daily shuttle trips between the parking location and the work site is provided in the Conveyance System Data Needs spreadsheets. The shuttle is assumed to seat 15 passengers. The daily shuttle trips are multiplied by the total number of construction days to calculate the total shuttle trips throughout construction.

2. Truck Trips for Construction Equipment and Materials

The Proposed Project would generate truck trips due to construction equipment and materials traveling to and from the staging/storage area and then to and from the work site. It is assumed that the required construction equipment moves between the staging/storage area and the work site each construction day. The Conveyance System Data Needs spreadsheets list the equipment required for each construction method.

The daily average equipment requirement is multiplied by two to calculate the number of one-way trips required. This calculation was performed for all construction methods. The daily number of construction equipment truck trips are multiplied by the total number of construction days to calculate the total construction equipment trips throughout construction.

3. Haul Truck Trips

The Proposed Project would generate haul truck trips due to material transportation to and from the work site. Each haul trip could fall in the following categories:

- Trips to move material between staging/storage area and work site
- Trips to move spoils between work site and staging area/landfill
- Trips to move construction building (pipe bedding, pipe, and paving) material from manufacturer to staging/storage area

The Conveyance System Data Needs spreadsheets document the volume of materials that need to be moved, which is used to estimate the number of vehicle loads required for each construction method. The vehicle load calculations include vehicle loads for backfill, spoils, including a 15 percent increase in volume due to material swelling.

Due to the limited work area at each construction site, it is anticipated that stockpiling of soil at the site would not be feasible in most areas. For purposes of this analysis, most excavated soil would be hauled offsite to a staging/storage area or landfill, and some would be hauled directly from the site to landfill. The spoil portion of the excavated material would be separated and hauled to disposal site(s) and the remaining soil would be hauled back to the construction site to be used to backfill the pipe trench. An estimated 40 percent of the total excavated material would be spoils or deemed unusable that would need to be hauled and disposed of at landfills. Of that 40 percent, it is estimated that 10 percent (hence 4 percent of total excavated material) would be deemed hazardous and require hauling and disposal at a hazardous waste landfill. Daily haul truck trips are multiplied by the total number of construction days to calculate the total haul truck trips throughout construction.

ESTIMATING CONSTRUCTION VMT

Construction VMT estimates are calculated by multiplying the estimated number of generated trips with estimated average trip distance (trip length) for each trip type.

Trip Distance Assumptions

1. Worker Commute from Home to Staging/Storage Area

The worker commute distance is assumed to be the average worker commute in the Southern California region in construction year 2030. This average distance traveled was derived from the SCAG RTP model and documented in SCAG's Connect SoCal 2020-2045 RTP/SCS. The year 2030 average commute trip distance in Los Angeles County is assumed to be 19.7 miles.

2. Parking to Work Site and Staging/Storage Area to Work Site

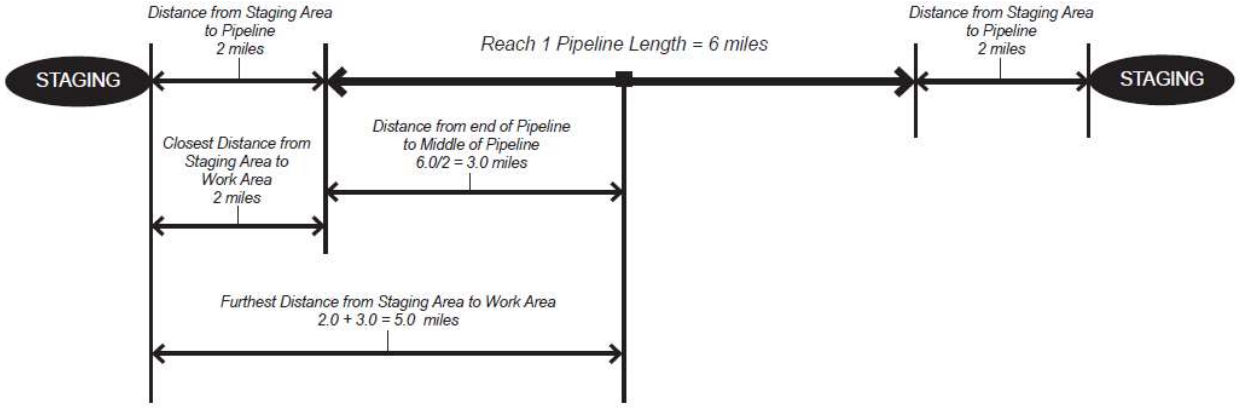
The exact locations of the parking and staging/storage area for the pipeline construction activities have

not yet been determined. The Conveyance System Data Needs spreadsheets imply that the parking and staging/storage areas would be the same locations and that each of the eight reaches would have its own set of parking and staging/storage areas. Thus, the trip distance assumptions for this trip category would vary by reach.

A staging/storage area is described in the Conveyance System Data Needs spreadsheets as an area of four acres and within five miles of the work site. Based on a review of aerial imagery of the backbone alignment, it appears that there would likely be several opportunities for locating staging areas within two miles of the work site, so the staging/storage locations were assumed to be two miles away from the end of a pipeline work site.

The distance used to estimate VMT was the average distance from the staging/storage location to the closest and furthest points of the work site. The trip distance assumption varies by reach based on the estimated pipeline length for that particular reach. A pictorial representation of the assumptions for Reach 1 is shown in **Figure 2-2**. The distance used to estimate VMT for Reach 1 is the average of the closest point (2 miles) and the furthest point (5 miles), 3.5 miles.

Figure 2-2: Example of Parking and Staging/Storage Area to Work Site Assumptions for Reach 1



A summary of the estimated distances from parking and staging/storage area to the work site for each reach is shown in **Table 2-2**.

Table 2-2: Summary of Parking and Staging/Storage Area to Work Site Trip Distance Assumptions

REACH	TOTAL ESTIMATED PIPELINE SEGMENT LENGTH (MILES)	ONE WAY TRIP DISTANCE (MILES)
1	6.0	3.5
2	7.3	3.8
3	3.1	2.8
4	4.3	3.1
5	5.9	3.5
6	2.5	2.6
7	5.8	3.4
8	5.8	3.4

3. Construction Spoils from Work Site or Staging/Storage Area to Landfill

The contractor would be responsible for identifying an appropriate landfill for disposal of non-hazardous construction spoils; however, for the purposes of these calculations, Scholl Canyon Landfill in the City of Glendale is assumed to be the disposal location. The trip distance assumptions for trips to the landfill vary by reach and are summarized in **Table 2-3**.

Table 2-3: Work Site or Staging/Storage Area to Scholl Canyon Landfill Trip Distance Assumptions

REACH	ONE WAY TRIP DISTANCE (MILES)
1	32
2	32
3	29
4	25
5	26
6	26
7	20
8	20

The contractor would be responsible for identifying an appropriate landfill for disposal of hazardous construction spoils; however, for the purposes of these calculations, Kettleman Hills hazardous waste landfill in Central Valley is assumed to be the disposal location. This landfill is approximately 200 miles from the backbone alignment.

4. Construction Materials to Worksite or Staging/Storage Area from Supplier

The following assumptions were made for the hauling of specialized construction materials to the pipeline construction area:

- Pipe Bedding to Storage Area from Supplier is 30 miles
- Pipe to Storage Area from Supplier is 50 miles
- Paving Materials to Work Site from Supplier is 50 miles
- Pipe to Site from Storage Area is 5 miles

A summary of all trip distance assumptions is shown in **Table 2-4**:

Table 2-4: Summary of Trip Distance Assumptions

TRIP CATEGORY	ONE WAY TRIP DISTANCE (MILES)
Worker Commute	19.7
Parking to Work Site	Varies by reach[1]
Staging/Storage Area to Work Site	Varies by reach[1]
Work Site or Staging/Storage Area to Landfill	Varies by reach[2]
Storage Site to Hazardous Waste Landfill	200
Pipe Bedding to Storage Site from Supplier	30
Pipe to Storage from Supplier	50
Importing Paving Materials to Site	50
Pipe to Site from Storage	5

Notes:

1. *Refer to Table 2-2 for Parking and Staging/Storage Area to Work Site Trip Distance Assumptions.*
2. *Refer to Table 2-3 for Work Site or Staging/Storage Area to Scholl Canyon Landfill Trip Distance Assumptions.*

BACKBONE PIPELINE CONSTRUCTION VMT

Table 2-5 shows the average daily construction-related VMT for the backbone pipeline. **Figure 2-3** illustrates the average daily construction-related VMT for autos and trucks by reach. Detailed calculations for the backbone pipeline are provided in **Appendix D**. Truck traffic represents roughly 69.0 percent of the average daily construction VMT.

Construction durations vary across the eight project reaches, ranging from 300 working days for Reach 8 to 1,280 working days for Reach 4. Consequently, the total VMT follows a different pattern over the construction period than the average daily VMT. **Table 2-6** shows the total backbone pipeline VMT for the entire construction period. **Figure 2-4** shows the total backbone pipeline VMT for the entire construction period and the length of each reach.

As shown in **Figure 2-4**, the total VMT of each reach throughout construction is roughly proportional to the length of the reach's pipeline segment. There is also a correlation between the daily VMT and the assumed construction progress (feet per day), which varies by construction method. More progressive construction leads to more workers, more equipment, and more hauling; therefore, increasing the daily VMT. Certain construction methods that could generate higher daily/total VMT than others have been observed:

- Overall, total VMT throughout reach duration is greater when the reach length is longer, but construction methods could also affect the total VMT throughout reach duration. Reach 2 is approximately 3 times the length of Reach 6, but total VMT for Reach 2 is approximately 4.4 times the total VMT for Reach 6. The main construction method for Reach 2 is Roadways CM, whereas Reach 6 utilizes Traditional Tunneling CM for the entire reach length.

- Light Vehicle VMT: The construction methods with a higher number of workers per day would have a higher light vehicle daily VMT than others. The duration of the construction schedule for each construction method in each reach would also affect the total VMT.
- Heavy Vehicle VMT: Pipe Jacking CM, Microtunneling CM, Shield Tunneling with Ribs and Lagging CM, and Traditional Tunneling CM require fewer haul trucks than Roadways CM, SCE Easement CM, and LACFCD Easement CM. The volume of soil removed using Pipe Jacking CM, Microtunneling CM, Shield Tunneling with Ribs and Lagging CM, and Traditional Tunneling CM is much less than that is required for Roadways CM, SCE Easement CM, and LACFCD Easement CM. In addition, spoils from the three Tunneling CMs would not be needed for backfill and could be sent directly to a landfill, while most spoils from Roadways CM, SCE Easement CM, and LACFCD Easement CM have to travel to the staging area before being re-distributed either back to the construction site as backfill or transported to an appropriate landfill.

Table 2-5: Daily VMT for Backbone Pipeline Construction

		SUMMARY DAILY VMT (AVERAGE DAILY THROUGHOUT THE CONSTRUCTION SCHEDULE)								
			Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Total Per Day
Construction Worker and Non-Haul Truck VMT Per Day	**Light Vehicle**	2,714	2,463	992	573	2,035	1,027	2,490	4,510	**16,805**
	Heavy Vehicle	1,485	1,415	346	193	999	167	937	1,721	**7,264**
	Total	4,199	3,878	1,338	765	3,034	1,195	3,428	6,231	**24,068**
Haul Truck Trips VMT Per Day	**Light Vehicle**	-	-	-	-	-	-	-	-	**-**
	Heavy Vehicle	5,874	4,593	2,578	932	4,743	419	3,890	7,137	**30,165**
	Total	5,874	4,593	2,578	932	4,743	419	3,890	7,137	**30,165**
Total VMT Per Day	**Light Vehicle**	2,714	2,463	992	573	2,035	1,027	2,490	4,510	**16,805**
	Heavy Vehicle	7,359	6,008	2,923	1,125	5,742	586	4,827	8,859	**37,428**
	Total	10,073	8,471	3,916	1,698	7,777	1,613	7,317	13,368	**54,233**

Figure 2-3: Daily VMT by Reach

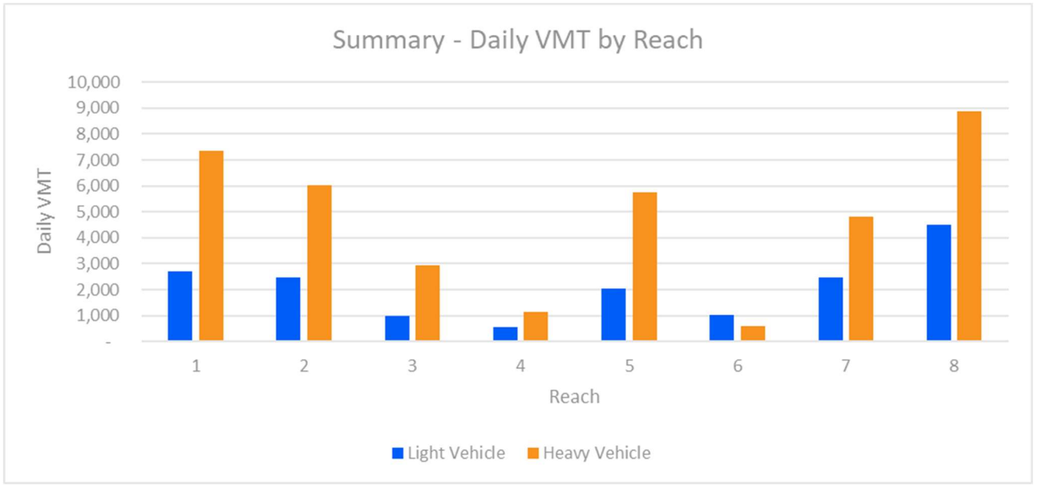


Table 2-6: Total VMT for Backbone Pipeline Construction

		SUMMARY TOTAL VMT (THROUGHOUT THE CONSTRUCTION SCHEDULE)								
		Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Total Throughout Construction Schedule
Construction Worker and Non-Haul Truck VMT Throughout Reach Duration	**Light Vehicle**	1,221,442	1,601,082	411,868	732,956	942,628	790,085	1,335,661	1,370,389	**8,406,110**
	Heavy Vehicle	668,230	919,873	143,482	246,555	457,494	128,775	501,980	519,214	**3,585,604**
	Total	1,889,672	2,520,955	555,350	979,511	1,400,122	918,861	1,837,641	1,889,603	**11,991,714**
Haul Truck Trips VMT Throughout Reach Duration	**Light Vehicle**	-	-	-	-	-	-	-	-	**-**
	Heavy Vehicle	2,643,334	2,985,169	1,069,670	1,193,417	2,207,406	321,869	2,090,830	2,188,705	**14,700,402**
	Total	2,643,334	2,985,169	1,069,670	1,193,417	2,207,406	321,869	2,090,830	2,188,705	**14,700,402**
Total VMT Throughout Reach Duration	**Light Vehicle**	1,221,442	1,601,082	411,868	732,956	942,628	790,085	1,335,661	1,370,389	**8,406,110**
	Heavy Vehicle	3,311,564	3,905,043	1,213,153	1,439,972	2,664,900	450,645	2,592,810	2,707,919	**18,286,006**
	Total	4,533,006	5,506,124	1,625,020	2,172,928	3,607,528	1,240,730	3,928,471	4,078,308	**26,692,116**

Figure 2-4: Total VMT throughout Reach Duration

PUMP STATION CONSTRUCTION VMT

Construction VMT for the WNPS and the SFSGPS was calculated based on inputs provided in the pump station data needs matrix in **Appendix E**. The detailed ADT and VMT calculations are provided in **Appendix F**. The two pump stations combined generate around 4.3 million total VMT throughout the construction schedule as shown in **Table 2-7.**

Table 2-7: ADT and VMT for Backbone Conveyance System Pump Station Construction

ADT (Throughout the Construction Schedule)				
		WNPS	SFSGPS	Total
Construction Worker and Non-Haul Truck ADT	Light Vehicle	80,600	80,600	161,200
	Heavy Vehicle	74	74	148
	Total	80,674	80,674	161,348
Haul Truck Trips ADT	Light Vehicle	-	-	-
	Heavy Vehicle	16,518	16,228	32,746
	Total	16,518	16,228	32,746
Total ADT	Light Vehicle	80,600	80,600	161,200
	Heavy Vehicle	16,592	16,302	32,894
	Total	**97,192**	**96,902**	**194,094**

VMT (Throughout the Construction Schedule)				
		WNPS	SFSGPS	Total
Construction Worker and Non-Haul Truck VMT	Light Vehicle	1,584,511	1,584,511	3,169,022
	Heavy Vehicle	2,220	2,220	4,440
	Total	1,586,731	1,586,731	3,173,462
Haul Truck Trips VMT	Light Vehicle	-	-	-
	Heavy Vehicle	576,268	569,410	1,145,678
	Total	576,268	569,410	1,145,678
Total VMT	Light Vehicle	1,584,511	1,584,511	3,169,022
	Heavy Vehicle	578,488	571,630	1,150,118
	Total	**2,162,999**	**2,156,141**	**4,319,140**

BACKBONE CONVEYANCE SYSTEM CONSTRUCTION VMT

Table 2-8 shows the average daily construction-related VMT for the backbone conveyance system and **Table 2-9** shows the total backbone conveyance system VMT for the entire construction period. Backbone conveyance system construction VMT includes construction-related VMT for the backbone pipeline, WNPS, and SFSGPS. The total construction VMT for the backbone conveyance system for the entire construction period is 31.0 million vehicle miles (62.7 percent truck traffic and 37.3 percent auto traffic) or 61,200 vehicle miles per day. For context, the daily VMT in the SCAG region is approximately 490 million miles per day and the daily VMT within a 1-mile buffer of the backbone alignment (without project) is approximately 18.9 million vehicle miles per day. Therefore, the daily construction VMT for the backbone conveyance system represents only 0.01 percent of daily VMT in the SCAG region, and 0.3 percent of the daily VMT within a 1-mile buffer of the backbone alignment (without project). As such,

the construction's contribution to overall VMT represents a small effect over the construction period. **Table 2-10** shows the backbone conveyance system construction VMT comparison.

Table 2-8: Daily VMT for Backbone Conveyance System Construction

		SUMMARY DAILY VMT (AVERAGE DAILY THROUGHOUT THE CONSTRUCTION SCHEDULE)										
		Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	WNPS	SFSGPS	Total Per Day
	Light Vehicle	2,714	2,463	992	573	2,035	1,027	2,490	4,510	2,556	2,556	**21,917**
	Heavy Vehicle	1,485	1,415	346	193	999	167	937	1,721	4	4	**7,272**
	Light Vehicle	-	-	-	-	-	-	-	-	-	-	**-**
	Heavy Vehicle	5,874	4,593	2,578	932	4,743	419	3,890	7,137	929	918	**32,012**
	Light Vehicle	2,714	2,463	992	573	2,035	1,027	2,490	4,510	2,556	2,556	**21,917**
	Heavy Vehicle	7,359	6,008	2,923	1,125	5,742	586	4,827	8,859	933	922	**39,283**

Table 2-9: Total VMT for Backbone Conveyance System Construction

		SUMMARY TOTAL VMT (THROUGHOUT THE CONSTRUCTION SCHEDULE)										
		Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	WNPS	SFSGPS	Total Throughout Construction Schedule
Construction Worker and Non-Haul Truck VMT Throughout Reach Duration	**Light Vehicle**	1,221,442	1,601,082	411,868	732,956	942,628	790,085	1,335,661	1,370,389	1,584,511	1,584,511	**11,575,132**
	Heavy Vehicle	668,230	919,873	143,482	246,555	457,494	128,775	501,980	519,214	2,220	2,220	**3,590,044**
	Total	1,889,672	2,520,955	555,350	979,511	1,400,122	918,861	1,837,641	1,889,603	1,586,731	1,586,731	**15,165,176**
Haul Truck Trips VMT Throughout Reach Duration	**Light Vehicle**	-	-	-	-	-	-	-	-	-	-	**-**
	Heavy Vehicle	2,643,334	2,985,169	1,069,670	1,193,417	2,207,406	321,869	2,090,830	2,188,705	576,268	569,410	**15,846,080**
	Total	2,643,334	2,985,169	1,069,670	1,193,417	2,207,406	321,869	2,090,830	2,188,705	576,268	569,410	**15,846,080**
Total VMT Throughout Reach Duration	**Light Vehicle**	1,221,442	1,601,082	411,868	732,956	942,628	790,085	1,335,661	1,370,389	1,584,511	1,584,511	**11,575,132**
	Heavy Vehicle	3,311,564	3,905,043	1,213,153	1,439,972	2,664,900	450,645	2,592,810	2,707,919	578,488	571,630	**19,436,124**
	Total	4,533,006	5,506,124	1,625,020	2,172,928	3,607,528	1,240,730	3,928,471	4,078,308	2,162,999	2,156,141	**31,011,256**

Table 2-10: Backbone Conveyance System Construction VMT Comparison

Category	VMT	% of Daily VMT
SCAG Region Daily VMT [A]	489,645,973	0.01% [C]/[A]
Daily VMT within 1 mile buffer of Backbone Conveyance System [B]	18,879,234	0.32% [C]/[B]
Average Daily Construction VMT [C]	61,200	-

ESTIMATING REASSIGNED VMT

In addition to construction traffic, the other main effect of backbone pipeline construction is potential traffic diversion caused by road closures and lane reductions on the arterial roadways where Roadways CM is used. The SCAG RTP model was used to determine the change in VMT due to traffic diversion. This regional model can comprehensively estimate and assess the extent to which traffic could potentially be diverted and "reassigned" to alternative routes in the highway network as a direct result of reduced roadway capacity and reduced speeds during the construction period.

To evaluate a conservative scenario, it is assumed that peak construction occurs in year 2030 when all eight reaches could potentially be under construction simultaneously. However, the following reaches would not substantially impact traffic:

- Reach 6 would not use Roadways CM.
- Reach 4 has some Roadways CM assumed in the Conveyance System data needs assumptions but the GIS-based backbone alignment for this reach does not traverse any arterial highways where construction could potentially result in diverted traffic.
- Reach 8 also has a small amount of Roadways CM on Live Oak Lane in the City of Irwindale which is a minor local access street serving an industrial estate. Construction on this segment would not have any through traffic that could be diverted due to construction.

As a result, there would be a maximum of five reaches that could potentially cause traffic diversion on any one day. The overall approach for the analysis was as follows:

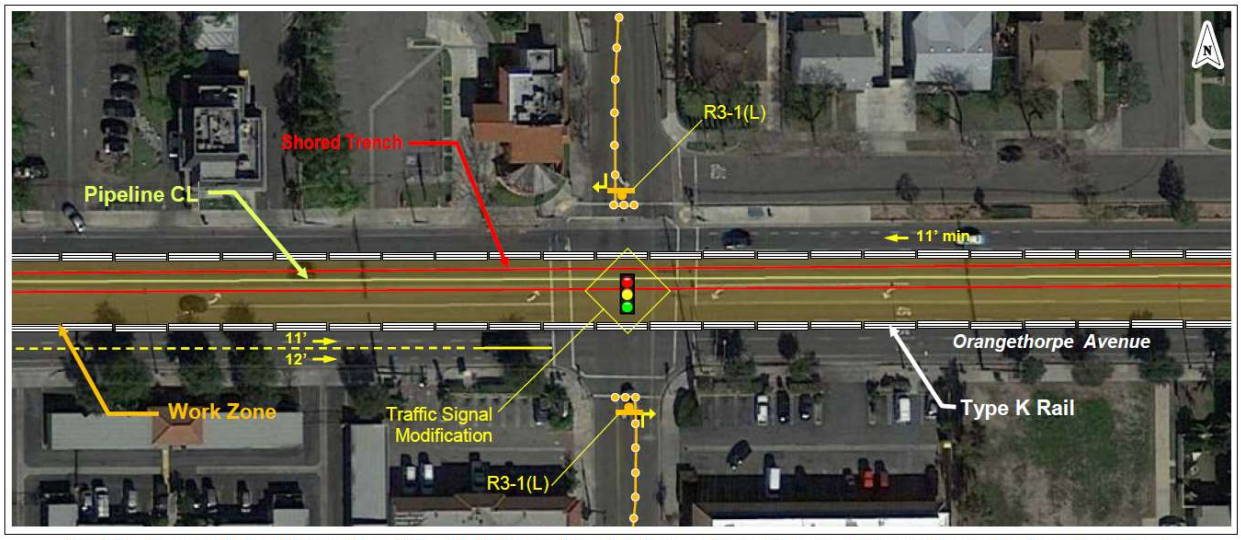
- Identify the busiest roadway segment along the geographic extents of each reach based on a review of volumes in the 2030 SCAG model. The selected segments are shown in **Table 2-11**.
- Code speed and capacity reductions into the SCAG travel demand model's highway network (reduce number of lanes, reduce lane capacity, and reduce speed to 25 miles per hour).
- Reductions are for a minimum of 1,200-foot "rolling work zone" (as noted in Traffic Control Configuration #2 in Appendix B of the Feasibility Level Design Level Report) shown in **Appendix G**. This is the longest of the three arterial traffic control configurations proposed in the preliminary traffic control assessment.
- Assume TCBs (K-rail) are installed at all construction zones so that the construction zone is in place 24 hours/day.

- When trenching goes through an intersection, the through and left turn movements would be restricted according to Traffic Control Configuration #5 shown in **Figure 2-5**.
- Run the 2030 SCAG model with the five reaches represented in the network.
- Calculate daily VMT for roadways within a range of geographic buffer areas of the backbone alignment with and without the work zones. VMT was calculated for light vehicles and light trucks, medium trucks, and heavy trucks separately.

Table 2-11: Assumed Arterial Work Zones for SCAG Model

Reach	Length (mile)	Road Name	From Road	To Road	City
1	0.26	E Sepulveda Boulevard	Panama Avenue	Avalon Boulevard	Carson
2	0.26	W Del Amo Boulevard	Pacific Avenue	Long Beach Boulevard	Long Beach
3	0.50	Palo Verde Avenue	Artesia Avenue	133rd Street	Bellflower
5	0.25	San Gabriel River Parkway	Rose Hills Road	Springland Drive	Industry
7	0.25	Rivergrade Road	Live Oak Avenue	Commerce Drive	Baldwin Park

Figure 2-5: Traffic Control Configuration #5 – Trenching through an Intersection



***Traffic Control Configuration #5* – Half Signalized Intersection Closure (Open Trench Construction)**

To be conservative, it was assumed that all five reaches would be trenching through an intersection concurrently. The SCAG highway network was also updated to incorporate cross-street closures and turn restrictions. Any model centroid connectors at an intersection were relocated to mid-block segments to allow for this localized effect. Transit lines running through the intersection were also re-coded to divert their routes around the intersection under construction. For example, in Reach 1, eight transit lines in the model were re-coded to route around the work zone as shown in **Table 2-12**.

Table 2-12: Reach 1 – Transit Routes Recoded in SCAG Model

Dataview6 - 16r26p_routes:1

Route_ID	Route_Name	TM_ID	TM_ID08	[TM Name]
924	MT2461N	5131	5131	METRO LOCAL LINE 246
994	CA C R	5251	5251	CARSON C
995	CA C1R	5252	5252	CARSON C
1016	CA C2R	5274	5274	CARSON C
2302	MT246 N	5067	5067	METRO LOCAL LINE 246
2330	MT246 S	5151	5151	METRO LOCAL LINE 246
2331	MT2461S	5152	5152	METRO LOCAL LINE 246
3469	MX0031N	5001	5001	MAX 3

Table 2-13 shows the VMT results for automobiles as well as light, medium, and heavy trucks with and without the five road closures in a series of buffer areas from the backbone alignment. The buffer areas are: 0 mile (along the backbone alignment itself), 1 mile, 2 miles, 3 miles, 5 miles, 7 miles, 10 miles, 15 miles, 20 miles, 30 miles, and for the entire SCAG region. The buffer areas are shown graphically in **Figure 2-6**.

Table 2-13 shows a reduction in VMT along the backbone alignment itself of 11.8 percent for

automobiles, 7.8 percent for light trucks, and 7.2 percent for medium trucks as traffic diverts to other roads. Heavy trucks divert to other roads with a lower rate of approximately 1.7 percent VMT reduction along the backbone alignment itself. This is consistent with the typical truck behavior in the SCAG model and the heavy truck category is recognized as being less sensitive to time and more sensitive to distance than autos and light trucks.

At the 1-mile buffer, the net amount of automobile VMT reduction along the backbone alignment itself and automobile VMT increase in the remainder of the 1-mile buffer area almost offset each other so there is close to zero net change in automobile VMT. Beyond the 1-mile buffer from backbone alignment, the amount of additional automobile VMT shifting from backbone alignment increases slightly as the ripple effects of the reassignment spread out, with some automobile trips diverting to longer routes to avoid congestion up to a 15-mile buffer area from the backbone alignment. Beyond the 15-mile buffer, the change in automobile VMT due to construction diminishes.

Trucks and autos have different travel characteristics. Trucks are much less likely to divert to the broader buffer areas and the redistributed truck volume is very low. Beyond the 5-mile buffer, truck diversion is minimal and continues to decline further away from the backbone alignment.

Roadways CM, which is the primary construction method that causes traffic to redistribute, represents 20.5 miles (50.2 percent) out of 40.8 miles for the eight reaches, although only five of the eight reaches could potentially cause traffic diversion to occur. In practice, even if all five of these reaches were under construction concurrently, using the Roadways CM, on many days there would be no trenching through a major intersection at all and it is highly unlikely that more than two reaches would be trenching through an intersection at the same time. Therefore, the increase in temporary construction on a typical construction day can be expected to be minimal.

Even in the scenario when all five reaches are trenching through an intersection at the same time, which represents “peak of the peak” conditions, the maximum percentage change in VMT at the 15-mile buffer would be less than 0.41 percent of background traffic. The five concurrent closures would have a compounding effect, meaning that the cumulative effect of five closures is more than five times a single closure. Hence, if only one intersection was being trenched at a time, it would have less than 1/5 of the effect of five closures combined, so the maximum increase in VMT at the 15-mile buffer would be less than 0.08 percent (0.38 percent divided by five) of background traffic.

Table 2-13: VMT With and Without Road Closures by Buffer Area – SCAG RTP Model

Year 2030 Daily VMT – SCAG Baseline No Project

Mile Buffer	Light Truck VMT	Medium Truck VMT	Heavy Truck VMT	Auto VMT	Total
SCAG	7,111,139	5,504,988	28,165,675	448,864,172	489,645,973
30	4,197,895	3,345,365	14,212,369	292,716,396	314,472,026
20	2,991,839	2,400,841	10,012,679	210,267,654	225,673,012
15	2,170,287	1,764,762	7,209,657	155,635,186	166,779,892
10	1,550,904	1,268,725	5,544,051	107,554,157	115,917,837
7	1,173,625	964,068	4,495,889	80,186,634	86,820,216
5	913,269	752,735	3,735,874	61,411,043	66,812,922
3	601,831	492,674	2,523,453	39,573,824	43,191,782
2	434,066	353,507	1,860,914	28,322,593	30,971,080
1	272,038	217,735	1,174,344	17,215,118	18,879,234
0	4,764	4,007	24,417	414,807	447,995

Difference With Project minus No Project

Mile Buffer	Light Truck VMT	Medium Truck VMT	Heavy Truck VMT	Auto VMT	Total
SCAG	293	-171	515	1,233,777	1,234,413
30	-619	-15	-891	975,701	974,176
20	-1,460	26	-644	772,208	770,129
15	-501	-437	-1,543	630,515	628,034
10	-674	-376	-748	400,370	398,572
7	-317	-114	652	282,267	282,487
5	24	-70	371	209,091	209,416
3	-458	15	1,215	105,996	106,769
2	-585	87	1,292	56,789	57,583
1	-1,104	-140	1,858	9,601	10,215
0	-370	-290	-420	-48,822	-49,902

With Project

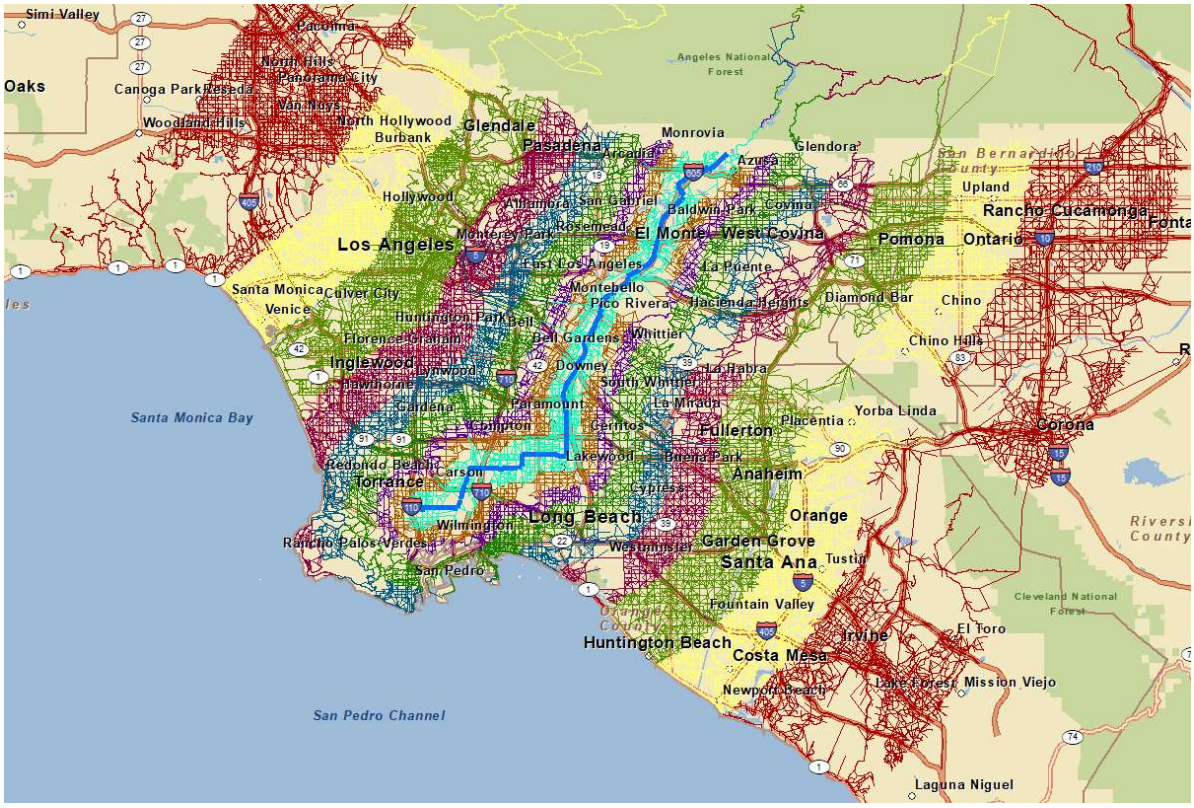
Mile Buffer	Light Truck VMT	Medium Truck VMT	Heavy Truck VMT	Auto VMT	Total
SCAG	7,111,432	5,504,816	28,166,189	450,097,949	490,880,387
30	4,197,276	3,345,350	14,211,478	293,692,098	315,446,202
20	2,990,379	2,400,867	10,012,034	211,039,862	226,443,142
15	2,169,787	1,764,325	7,208,115	156,265,701	167,407,927
10	1,550,230	1,268,348	5,543,304	107,954,527	116,316,408
7	1,173,308	963,954	4,496,541	80,468,901	87,102,703
5	913,293	752,665	3,736,246	61,620,134	67,022,338
3	601,374	492,690	2,524,668	39,679,820	43,298,551
2	433,482	353,594	1,862,206	28,379,382	31,028,663
1	270,933	217,595	1,176,201	17,224,719	18,889,449
0	4,394	3,717	23,996	365,985	398,093

% Difference With Project vs No Project

Mile Buffer	Light Truck VMT	Medium Truck VMT	Heavy Truck VMT	Auto VMT	Total
SCAG	0.00%	0.00%	0.00%	0.27%	0.25%
30	-0.01%	0.00%	-0.01%	0.33%	0.31%
20	-0.05%	0.00%	-0.01%	0.37%	0.34%
15	-0.02%	-0.02%	-0.02%	0.41%	0.38%
10	-0.04%	-0.03%	-0.01%	0.37%	0.34%
7	-0.03%	-0.01%	0.01%	0.35%	0.33%
5	0.00%	-0.01%	0.01%	0.34%	0.31%
3	-0.08%	0.00%	0.05%	0.27%	0.25%
2	-0.13%	0.02%	0.07%	0.20%	0.19%
1	-0.41%	-0.06%	0.16%	0.06%	0.05%
0	-7.77%	-7.24%	-1.72%	-11.77%	-11.14%

[1] Light Heavy Trucks – 8,500 lbs. to 14,000 lbs. gross vehicle weight (GVW), Medium Heavy – 14,001 to 33,000 lbs. GVW, Heavy-Heavy >33,000 lbs. GVW

Figure 2-6: Buffer Areas (0, 1, 2, 3, 5, 7, 10, 15, 20, and 30 Miles) from the Backbone Alignment



Joint Treatment Site (includes one pump station)

The assumptions used to calculate construction VMT for the Joint Treatment Site in the City of Carson are provided in **Appendix H**. The methodology was similar to the backbone pipeline construction VMT calculation, although the Joint Treatment Site construction VMT calculation is simpler since staging is assumed to occur onsite. Onsite staging reduces the need to move equipment back and forth between the staging area and the site. Haulage of spoils is assumed to go directly to the same landfill sites as backbone pipeline construction (Scholl Canyon Landfill for general spoils and Kettleman Hills Landfill for hazardous waste). The Joint Treatment Site would be built in two phases, with the first phase over approximately six and a half years and the second phase over approximately four and a half years. The construction schedule for the Joint Treatment Site is provided in **Appendix I**. **Appendix J** shows the actual number of construction days, which excludes weekends, testing, startup, commissioning, and close out. There are 1,410 construction days in Phase 1 and 875 construction days in Phase 2. Construction VMT for the Joint Treatment Site Pump Station was calculated based on inputs provided in the pump station data needs matrix in **Appendix E**.

The total construction VMT throughout the construction period (including Joint Treatment Site Pump Station, Phase 1, and Phase 2) is approximately 9.4 million heavy vehicles VMT and 24.7 million automobile VMT for a total of 34.2 million VMT as shown in **Table 2-14**. Detailed calculations are provided in **Appendix J**. This is roughly 1.1 times the amount of VMT generated by the pipeline

construction. There are two primary reasons for this:

- The full plant build-out is assumed to take approximately 11 years of elapsed time with many more days of construction than a typical pipeline reach, which generally lasts only 3 to 5 years.
- Depending on the construction method, most reaches would typically employ no more than 100 workers per day while construction of the Joint Treatment Site improvements would on average employ around 250 to 300 workers per day for Phase 1, and around 150 to 200 workers per day for Phase 2.

Table 2-14: ADT and VMT for Joint Treatment Site Construction

ADT (Throughout the Construction Schedule)					
		Joint Treatment Site Pump Station	Phase 1	Phase 2	Total
Construction Worker and Non-Haul Truck ADT	Light Vehicle	52,700	895,169	310,625	1,258,494
	Heavy Vehicle	74	58	22	154
	Total	52,774	895,227	310,647	1,258,648
Haul Truck Trips ADT	Light Vehicle	-	-	-	-
	Heavy Vehicle	12,332	113,688	29,176	155,196
	Total	12,332	113,688	29,176	155,196
Total ADT	Light Vehicle	52,700	895,169	310,625	1,258,494
	Heavy Vehicle	12,406	113,746	29,198	155,350
	Total	65,106	1,008,915	339,823	1,413,844

VMT (Throughout the Construction Schedule)					
		Joint Treatment Site Pump Station	Phase 1	Phase 2	Total
Construction Worker and Non-Haul Truck VMT	Light Vehicle	1,036,027	17,598,073	6,106,561	24,740,661
	Heavy Vehicle	2,220	1,740	660	4,620
	Total	1,038,247	17,599,813	6,107,221	24,745,281
Haul Truck Trips VMT	Light Vehicle	-	-	-	-
	Heavy Vehicle	491,396	6,992,052	1,926,904	9,410,352
	Total	491,396	6,992,052	1,926,904	9,410,352
Total VMT	Light Vehicle	1,036,027	17,598,073	6,106,561	24,740,661
	Heavy Vehicle	493,616	6,993,792	1,927,564	9,414,972
	Total	1,529,643	24,591,865	8,034,125	34,155,633

JOINT TREATMENT SITE CONSTRUCTION VMT

Joint Treatment Site construction VMT includes construction-related VMT for the Joint Treatment Site Pump Station, Phase 1, and Phase 2. The total construction VMT for the Joint Treatment Site for the entire construction period is 34.2 million vehicle miles (72.4 percent auto traffic and 27.6 percent truck traffic), or 14,950 vehicle miles per day on average. For context, the daily VMT in the SCAG region is approximately 490 million vehicle miles, and the daily VMT within a 1-mile buffer of the Joint Treatment Site (without project) is approximately 1.0 million vehicle miles per day. Therefore, the daily construction VMT for the Joint Treatment Site represents only 0.003 percent of daily VMT in the SCAG region, and approximately 1.5 percent of the daily VMT within a 1-mile buffer of the Joint Treatment Site (without project). As such, the construction's contribution to overall VMT represents a small effect over the 10-year construction period. **Table 2-15** shows the Joint Treatment Site construction VMT comparison.

Table 2-15: Joint Treatment Site Construction VMT Comparison

Category	VMT	% of Daily VMT
SCAG Region Daily VMT [A]	489,645,973	0.003% [C]/[A]
Daily VMT within 1 mile buffer of Joint Treatment Site [B]	1,016,517	1.5% [C]/[B]
Average Daily Construction VMT [C]	14,950	-

In summary, construction traffic is temporary, and construction-related VMT represents only a small percentage of overall VMT generated in the area. As stated in the beginning of this section, construction VMT does not have a significance threshold and the analysis is included for disclosure purposes only.

2.4.2 Operations

Due to the nature of the backbone conveyance system, it is anticipated that only a limited number of staff would be on duty during normal operation of backbone pipeline and two pump stations. As such, the long-term operation of backbone conveyance system would be a low VMT generator. Meanwhile, operation of AWP Facility and WTC would generate VMT from AWP Facility workers, chemical deliveries, visitors, and WTC trainees. This section summarizes the long-term operation VMT for backbone conveyance system and Joint Treatment Site.

Backbone Conveyance System (includes both the backbone pipeline and two pump stations)

The backbone pipeline would be located underground. Once the backbone conveyance system is built, it is not anticipated to generate vehicular traffic on a daily basis during regular operation. In addition to the Joint Treatment Site Pump Station, there would be two additional pump stations along the backbone alignment. The WNPS would be located in the vicinity of Peck Road between the San Gabriel River, SR-60, and I-605, in either unincorporated Los Angeles County, the City of Industry, or the City of Pico Rivera. The SFSGPS would be located near the Santa Fe Spreading Grounds in one of the following cities: Azusa, Irwindale, Duarte, or Baldwin Park. For conservative modeling purposes, the analysis of

long-term vehicle trips associated with operations/maintenance of the pump stations, WNPS, and SFSGPS along the backbone alignment assumes some onsite staffing. Although these project components are expected to be primarily monitored and operated from a regional operational control center, with occasional patrolling of facilities for visual inspections and security purposes, one full-time staff person at each pump station was assumed in the VMT calculations to be conservative.

The San Gabriel Valley Council of Governments (SGVCOG) is a regional government planning agency that consists of 31 incorporated cities, unincorporated communities in Los Angeles County Supervisorial Districts 1, and 5, and three San Gabriel Valley Municipal Water Districts. Projects generating less than 110 net new daily vehicle trips could be screened out using the SGVCOG screening methodology for small projects. SGVCOG screening methodology applies to WNPS and SFSGPS separately due to their geographic location in different jurisdictions.

WNPS and SFSGPS are anticipated to only have one member of staff per day producing up to four trips per day as noted in **Appendix E**, so could be screened out as a small project in all of the potential jurisdictions. It is anticipated the long term VMT for WNPS and SFSGPS daily operations would be considered as less than significant and could be screened out from a detailed daily operations VMT analysis. Therefore, VMT due to operation of backbone conveyance system would be considered as less than significant.

Joint Treatment Site (includes one pump station)

The main traffic-generating permanent facilities for the Proposed Project would be the AWP Facility and WTC in the City of Carson. The AWP Facility is located on the west side of Main Street between Sepulveda Boulevard and Lomita Boulevard. The WTC is located on the west side of Main Street, north of Sepulveda Boulevard. It is anticipated that the AWP Facility would have approximately 194 employees, 10 visitors, and 30 chemical deliveries as shown in **Appendix K**. Of the 194 employees, 54 would be operations staff, who are anticipated to work half of the week in 12-hour shifts. As a result, only half of the operations staff (27 employees) would be onsite on any given day. Therefore, there would be no more than 167 employees at the AWP Facility on any given day. The WTC is anticipated to have 31 trainees per work day.

Metropolitan is committed to reducing emissions through measures that incentivize more sustainable commutes, as outlined in its Climate Action Plan (CAP) (May 2022). As shown in **Table 2-16**, which is based on Table 5-3 in the CAP, Metropolitan Phase One Emission Reduction Measure Co-Benefit and Reduction Summary to be implemented between 2020 and 2030 includes three measures directly addressing employee commuting applicable to the Proposed Project.

Table 2-16: Metropolitan Phase One Emission Reduction Measure Co-Benefit and Reduction Summary

Phase	#	Measure	Co-Benefits	Cumulative Emissions Reduction 2020–2030
Scope 3: Other Indirect Emissions				
Strategy 6 – Incentivize More Sustainable Commutes				
1	EC-1	Expand subsidized transit commute program to reduce employee commute miles.	Community Health Operational Resilience	Supportive
1	EC-2	Expand employee use of carbon- free and low carbon transportation by providing education programs on the benefits of commute options including public transportation, EV/ZEV options, and vanpools.	Community Health Operational Resilience	Supportive
1	EC-4	Continue to offer benefits to employees who use alternative modes of transportation (e.g., public transportation, bikes).	Community Health Operational Resilience	Supportive

Based on the application of VMT reduction effectiveness from the Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity (California Air Pollution Control Officers Association - CAPCOA, 2021), the following assumptions were made for vehicle commute reductions for the Proposed Project:

- CAP Measure EC-1: Public Transportation Subsidy: T-9 Implement Subsidized or Discounted Transit Program (Page 95): 5.5% reduction in commute VMT
- CAP Measure EC-2: Vanpool: T-11 Provide Employer-Sponsored Vanpool (Page 104): 10.0% reduction, which is half of the program potential of 20.4% reduction in commute VMT
- CAP Measure EC-4: Alternative Transportation Benefits: T-5 Implement Commute Trip Reduction Program (Voluntary) (Page 83): 4.0% reduction in commute VMT

CEQA VMT Assessment

The permanent AWP Facility and WTC are located in the City of Carson. The City adopted thresholds of significance for purposes of analyzing transportation impacts under CEQA as shown in **Appendix L**. These thresholds include screening criteria by which a project could be presumed to have a less-than-significant impact. The six screening criteria are: project size, locally serving retail, project located in a low VMT area, transit proximity, affordable housing, and transportation facilities.

The “small project” screening criterion used in the City of Carson, measured by number of daily trips generated, is a net increase of 110 or fewer daily vehicle trips. This criterion is consistent with the OPR Technical Advisory on Evaluating Transportation Impacts in CEQA (December 2018).

Using a quantitative assessment of daily vehicle trips generated at the AWP Facility and WTC as shown in **Table 2-17**, the Proposed Project is expected to generate more than 110 new trips per day. After accounting for visitors and deliveries, daily occupancy of the site (less personal time off), Metropolitan's programs for commute reduction, and the resulting level of vehicle usage for commuting, the AWP and WTC are expected to generate 190 round trips per day, including 160 auto round trips (122 staff trips, 10 visitor trips, and 28 WTC trainee trips) and 30 delivery round trips.

Table 2-17: Joint Treatment Site Daily Trips

Average Daily Trips	Daily Staff/Trips
AWP Facility	
AWP Facility Total Staff[1]	194 Staff
Less 50% of 54 operations Staff (on any given day)[2]	(27 Staff)
AWP Facility Daily Staff	167 Staff
Vehicle Occupancy	1.1 Staff/Vehicle
Daily Staff Vehicle Round Trips without CAP Measures	**152 Trips**
CAP Measure Employee Commute-1: Public Transportation Subsidy (5.5%)[3]	(9 Staff)
CAP Measure Employee Commute-2: Vanpool (10%)	(17 Staff)
CAP Measure Employee Commute-4: Alternative Transportation Benefits (4%)	(7 Staff)
Staff Commuting by Auto	134 Staff
Vehicle Occupancy	1.1 Staff/Vehicle
Daily Staff Vehicle Round Trips with CAP Measures	**122 Trips**
Daily Delivery Round Trips[4]	30 Trips
Daily Visitor Round Trips	10 Trips
Daily Delivery and Visitor Vehicle Round Trips	**40 Trips**
Daily AWP Facility Round Trips	**162 Trips**
WTC	
Daily WTC Trainees	31 Trainees
Vehicle Occupancy	1.1 Trainees/Vehicle
Daily WTC Round Trips	**28 Trips**
Total	
Daily Vehicle Round Trips	**190 Trips**
Daily Vehicle One-Way Trips	**380 Trips**

1 Includes staff for the AWP Facility pump station.
2 Half of the 54 operations staff are onsite on any given day.
3 Based on the American Community Survey 2021, US Census Bureau, approximately 5 percent of commuters use transit for commute trips in Los Angeles County. CAP measure reductions are applied to the AWP Facility 167 Daily Staff.
4 30 delivery trucks per day are not included for VMT calculation purposes.

Therefore, the Proposed Project could not be screened out using the "small project" screening criterion. As such, the Proposed Project must be assessed using the City of Carson's VMT methodology, which compares a project's average VMT per employee with the average VMT per employee for the City of Carson and/or the SCAG region as shown in **Appendix L**. The VMT impact of the Proposed Project could be considered as less than significant if the project's average VMT per employee is at least 15 percent below the City's or regional average. For example, if the City's or regional average VMT per employee is 100, the project's average VMT per employee must be 85 or less in order to be considered as less than

significant.

The exisiting year (2018) VMT per employee was calculated for the City of Carson as a whole and for the SCAG model Traffic Analysis Zone (TAZ) 21327000, which is the SCAG model zone containing the AWP facility and WTC. VMT is calculated from the model by summing up the length of all trips either originating within a geographic area or ending in that geographic area. This is then divided by the number of employees within the TAZ to calculate the VMT for TAZ 21327000, which is 22.4 VMT per employee.

The average VMT per employee for the City of Carson was calculated to be 23.1 VMT per employee. CEQA analysis requires a project's VMT to be compared to an average for the surrounding area. The City of Carson's VMT Guidelines (approved in October 2022) considers the baseline VMT as the average VMT for the City of Carson represented by City of Carson as measured by VMT per capita. Therefore, the project's operation VMT per employee is compared against the City of Carson VMT per employee. The average VMT per employee in the TAZ containing the proposed AWP Facility and WTC was calculated to be 22.4 VMT per employee, approximately three percent below the Citywide average.

The SCAG travel demand model accounts for employee vacation time and commuting by public transit, but does not account for employees utilizing walking and bicycle commute options supported through the Metropolitan's emission reductions measures to incentivize more sustainable commutes.

Table 2-18 provides a VMT calculation that takes into account Metropolitan's programs for commute reduction and trip reduction from vehicle occupancy. Based on the number of trips for workers, trainees, and visitors per day, and VMT per employee, per trainee, and per visitor, the AWP Facility and WTC would be expected to generate 3,584 VMT per day. It should be noted that trucks are not included for the purpose of VMT calculations since these are excluded from VMT CEQA requirements under SB 743.

The amount of daily trips from employees would be expected to be 122 auto commute trips (167 worker trips minus CAP Measure reductions and trip reductions due to vehicle occupancy from **Table 2-17** or 45 worker trips). The amount of daily trips from trainees would be expected to be 28 auto commute trips (31 trainee trips minus trip reductions due to vehicle occupancy from **Table 2-17** or 3 trainee trips). Additionally, there are 10 auto trips by visitors daily. The VMT per auto commute trip is 22.4, which is based on the average VMT per employee in the TAZ containing the proposed AWP Facility and WTC. The total auto commute VMT is the product of VMT per auto commute and number of auto commute trips. Hence, 122 worker commute trips, 10 visitor trips, and 28 trainee commute trips would generate 3,584 VMT.

VMT per employee is calculated by adding vehicle miles traveled from all automobile trips then dividing by the total number of employees, regardless of their commute mode. When the 3,584 VMT is divided by the 167 daily onsite workers, 10 visitors, and 31 trainees, the automobile VMT per employee[1] value is 17.23, which is 25.4 percent below the average VMT per employee for the City of Carson. Based on the City of Carson project VMT threshold of at least 15 percent below the applicable baseline VMT rate, the long term VMT for Pure Water operations would have a less-than-significant impact under CEQA

[1] For purposes of this calculation, workers, visitors, and trainees are all characterized as employees.

Guidelines Section 15064.3 with Metropolitan's vehicle commute reduction program and trip reductions from vehicle occupancy.

Table 2-18: Joint Treatment Site Daily VMT per Employee with Commute Reduction Program

Category[1]	AWP Worker	AWP Visitor	WTC Trainee	Total
Average Auto VMT per employee (SCAG Model)	*22.4*			
Before Commute Reduction Program and Vehicle Occupancy Trip Reduction				
# of Employees	*167*	*10*	*31*	*208*
Auto VMT	*3,741*	*224*	*694*	*4,659*
After Commute Reduction Program and Vehicle Occupancy Trip Reduction				
# of Auto Trips	*122*	*10*	*28*	*160*
Auto VMT	*2,733*	*224*	*627*	*3,584*
Total Auto VMT [A]				***3,584***
Total # of Employees[2] [B]				***208***
Average Automobile VMT per Employee [A]/[B]				***17.23***
City of Carson Average VMT per Employee				*23.1*
VMT Threshold (15% below City Average)				*19.6*
Percent of Average Automobile VMT per Employee below City Average				*25.4%*
Significant Impact Based on City of Carson Guidelines				***No***

Note:

1. *For VMT calculation purposes, delivery trucks are not included*
2. *For purposes of this calculation, workers, visitors, and trainees are all characterized as employees*

As part of the Joint Treatment Site, staff for the Joint Treatment Site Pump Station is included in the staffing for the Joint Treatment Site as shown in **Table 2-17**. The daily operations VMT of the Joint Treatment Site including Joint Treatment Site Pump Station staff are included in **Table 2-18**.

3 SUMMARY AND CONCLUSIONS

3.1 Summary

3.1.1 Conflict with Program, Plan, Ordinance or Policy

- Potential construction impacts associated with consistency with programs, plans, ordinances, and policies would be below a level of significance through the preparation and implementation of a TCP and/or TMP as required by the AHJ.
- Permanent long-term operation of the Proposed Project facilities would not generate an amount of vehicle traffic that would result in conflict with programs, plans, ordinances, or policies addressing the circulation system; therefore, impacts would be less than significant.

3.1.2 Hazards

- Potential construction impacts associated with design hazards would be below a level of significance through the preparation and implementation of a TCP and/or TMP as required by the AHJ.
- Permanent long-term operation of the Proposed Project facilities would not increase hazards due to geometric design features or incompatible uses; therefore, long-term operation impacts related to traffic hazards would be less than significant.

3.1.3 Emergency Access

- Potential construction impacts associated with emergency access would be below a level of significance through the preparation and implementation of a TCP and/or TMP as required by the AHJ.
- Permanent long-term operation of the Proposed Project facilities would not result in inadequate emergency access since regular daily operation of the Proposed Project would not interfere with potential detours, lane closures, street closures, or intersection closures; therefore, long-term operation impacts related to inadequate emergency access would be less than significant.

3.1.4 VMT

Construction Traffic

- **Backbone Conveyance System VMT-** Backbone conveyance system construction VMT includes construction-related VMT for the backbone pipeline, WNPS, and SFSGPS. The total construction VMT for the backbone conveyance system for the entire construction period is 31.0 million vehicle miles (62.7 percent truck traffic and 37.3 percent auto traffic), or 61,200 vehicle miles per day. This daily construction VMT for the backbone conveyance system of 61,200 vehicle miles represents only 0.01 percent of daily VMT in the SCAG region, and 0.3 percent of the daily VMT within a 1-mile buffer of the backbone alignment (without project).
    - **Backbone Pipeline** - The pipeline construction is forecasted to generate a relatively small VMT compared to the SCAG region and the amount of VMT within a 1-mile buffer of the pipeline.

    - **Backbone Pipeline construction redistributed traffic** - Even in a very conservative scenario with all reaches under construction concurrently and five reaches trenching through intersections using the Roadways CM at the same time, the effects as a percentage of overall traffic would be small. In reality, for the vast majority of backbone construction period, it is expected that the redistribution effects would be much lower than in this conservative scenario.
    - **Backbone Pump Stations -** The WNPS and SFSGPS along the backbone conveyance system would generate a total construction VMT of roughly 11 percent of the total construction VMT from the backbone conveyance system.
- **Joint Treatment Site Total VMT**– Joint Treatment Site construction VMT includes construction-related VMT for the Joint Treatment Site Pump Station, Phase 1, and Phase 2. The total construction VMT for the Joint Treatment Site for the entire construction period is 34.2 million vehicle miles (72.4 percent auto traffic and 27.6 percent truck traffic), or 14,950 vehicle miles per day on average. This daily construction VMT for the Joint Treatment Site of 14,950 vehicle miles represents only 0.003 percent of daily VMT in the SCAG region, and 1.5 percent of the daily VMT within a 1-mile buffer of the Joint Treatment Site (without project).
- The addition of Joint Treatment Site construction VMT therefore represents a small effect over the 10-year construction period. Total construction VMT for the Joint Treatment Site spread over 10 years of construction would represent less than seven percent of daily VMT in the SCAG region.
- **Overall Project -** Total construction VMT for the entire project would represent less than 14 percent of one day's VMT (less than 4 hours of VMT) in the SCAG region.

Table 3-1 summarizes the construction VMT comparison for backbone conveyance system and Joint Treatment Site.

Table 3-1: Construction VMT Comparison Summary

Category	VMT	% of Daily VMT
Backbone Conveyance System		
SCAG Region Daily VMT [A]	489,645,973	0.01% [C]/[A]
Daily VMT within 1 mile buffer of Backbone Conveyance System [B]	18,879,234	0.32% [C]/[B]
Average Daily Construction VMT [C]	61,200	-
Joint Treatment Site		
SCAG Region Daily VMT [A]	489,645,973	0.003% [E]/[A]
Daily VMT within 1 mile buffer of Joint Treatment Site [D]	1,016,517	1.47% [E]/[D]
Average Daily Construction VMT [E]	14,950	-
Total		
SCAG Region Daily VMT [A]	489,645,973	0.016% [G]/[A]
Daily VMT within 1 mile buffer of Backbone Conveyance System and Joint Treatment Site [F]	19,895,751	0.38% [G]/[F]
Average Daily Construction VMT [G]	76,150	-

Permanent Facilities Operations

- **Backbone Conveyance System** – After construction is completed, the backbone conveyance system is not anticipated to generate substantial vehicular traffic on a daily basis. WNPS and SFSGPS are typically expected to be staffed by a single employee, unless major non-routine maintenance is being performed. It is anticipated that VMT due to long-term operation of the backbone conveyance system would be less than significant.
- **Joint Treatment Site** – VMT for daily operations of the Joint Treatment Site (including AWP Facility, Joint Treatment Site Pump Station, and WTC) could not be screened out under CEQA as a small project using City of Carson's screening criteria. However, by using analysis developed from the SCAG RTP model and applying VMT reduction rates from CAPCOA with corresponding Metropolitan CAP emission reduction measures, it could be concluded that the operational VMT associated with the Joint Treatment Site (including AWP Facility, Joint Treatment Site Pump Station, and WTC) would have a less-than-significant impact using City of Carson criteria.

3.2 Conclusions

Construction: Provided that Metropolitan implements a comprehensive TCP and/or TMP, as required by the AHJ, to effectively manage traffic during construction and coordinate with local jurisdictions, Caltrans, and other relevant stakeholders, then the construction of Pure Water would:

- Not conflict with a program, plan, ordinance, or policy addressing the circulation system;
- Not increase hazards due to a geometric design feature;

- Not result in inadequate emergency access; and
- Not conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b).

Since there are no available criteria for significance thresholds for temporary construction VMT, this information is provided for informational purposes only and is not required under CEQA.

Therefore, the construction of Pure Water would have a less-than-significant impact on transportation under CEQA.

Permanent Facilities Operations: The daily operation of Pure Water would:

- Not conflict with a program, plan, ordinance, or policy addressing the circulation system;
- Not increase hazards due to a geometric design feature;
- Not result in inadequate emergency access; and
- Not conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b).

With implementation of the three VMT-reducing policies outlined in **Table 2-16** (or Table 5-3 of Metropolitan's Climate Action Plan), the VMT impact of Pure Water's permanent facilities would be less than significant.

Therefore, the operation of Pure Water would have a less-than-significant impact on transportation under CEQA.

Table 3-2 summarizes the potential impacts by facility:

Table 3-2: Potential Impacts by Facility

	Permanent Facilities Operations		Construction Activities	
Potential Impact	**Backbone Conveyance System**	**Joint Treatment Site**	**Backbone Conveyance System**	**Joint Treatment Site**
1 - Consistency with Programs, Plans, Ordinances, and Policies	Less-than-significant impact	Less-than-significant impact	Less-than-significant impact	Less-than-significant impact
2 - Design Hazards	Less-than-significant impact	Less-than-significant impact	Less-than-significant impact	Less-than-significant impact
3 - Emergency Access	Less-than-significant impact	Less-than-significant impact	Less-than-significant impact	Less-than-significant impact
4 - VMT	Less-than-significant impact	Less-than-significant impact	N/A	N/A

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1700 Carnegie Avenue, Suite 100
Santa Ana, CA 92705

iteris.com

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METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Pure Water Southern California

Traffic Analysis Report – Technical Appendices

Draft | Version 1.9

Submitted to:

Project # 11690

February 18, 2025 | Prepared by **Iteris, Inc.**

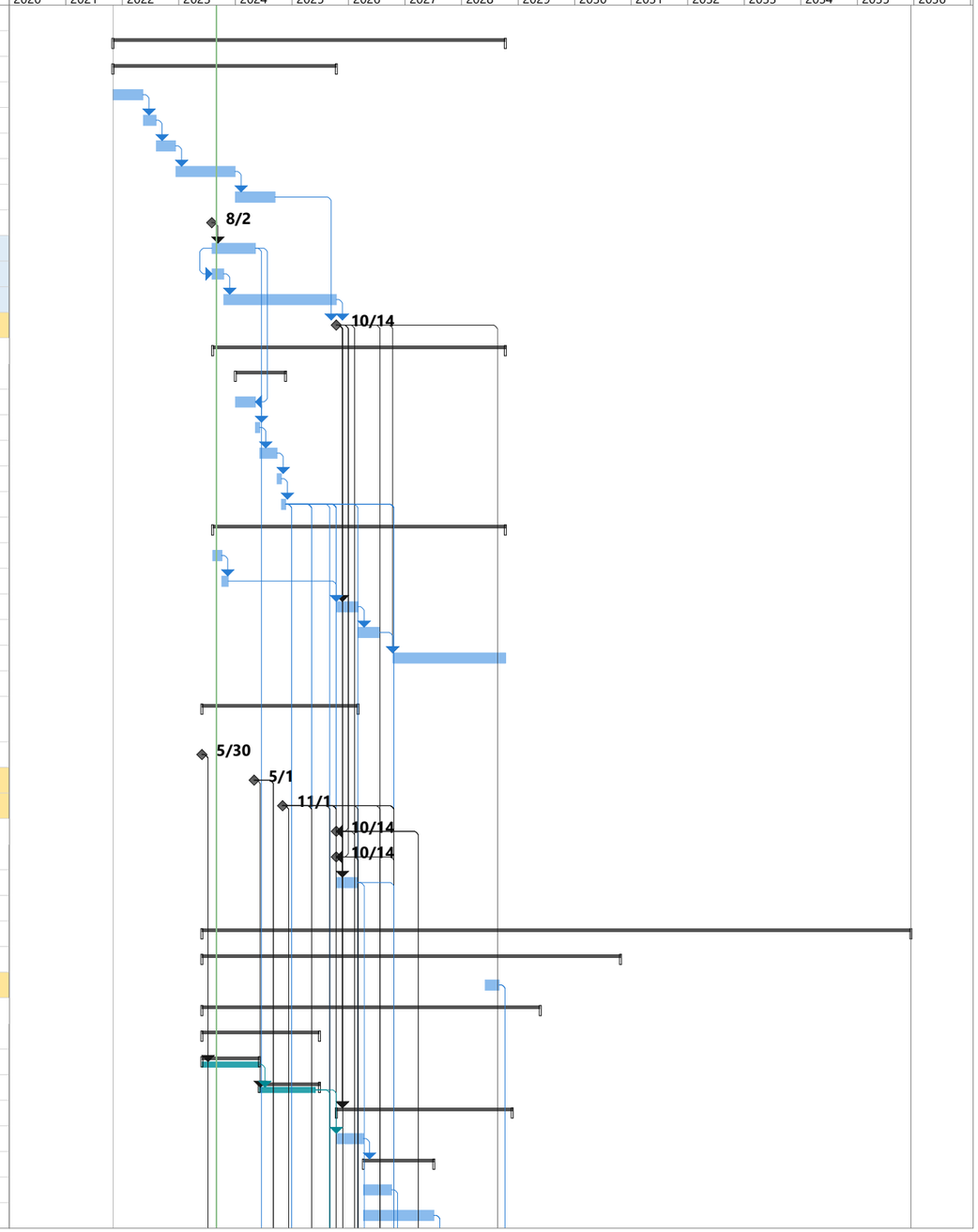
APPENDIX A – PROGRAMMATIC SCHEDULE FOR PIPELINE CONSTRUCTION

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

PURE WATER SOUTHERN CALIFORNIA - PROGRAMMATIC CONVEYANCE SYSTEM SCHEDULE

Fri 9/1/23

ID	Task Name	Duration	Start	Finish	Predecessors
1					
2	**ENVIRONMENTAL PLANNING PHASE**	**1811 days?**	**Mon 11/1/21**	**Mon 10/9/28**	
3	**PEIR Development, Review Process, and Certification**	**1031 days?**	**Mon 11/1/21**	**Tue 10/14/25**	
4	Engineering provides CEQA quantities to Environmental Team (EPS)	140 days?	Mon 11/1/21	Fri 5/13/22	
5	EPS Prepares NOP & initiates desktop research, surveys, tech studies, etc.	60 days	Mon 5/16/22	Fri 8/5/22	4
6	NOP, Scoping Meetings, Public Review Period	90 days	Mon 8/8/22	Fri 12/9/22	5
7	Draft PEIR development	275 days	Mon 12/12/22	Fri 12/29/23	6
8	Final PEIR development	184 days	Mon 1/1/24	Thu 9/12/24	7
9	**Program Scope Change: Upsize Backbone Pipeline to 9 Ft for potential future flows**	**0 days**	**Wed 8/2/23**	**Wed 8/2/23**	
10	Additional Engineering Evaluations to Confirm Alignment for Upsize to 9 Ft	200 days	Thu 8/3/23	Wed 5/8/24	9
11	Update CEQA Quantities for Upsize to 9 Ft	53 days	Thu 8/3/23	Mon 10/16/23	10SS
12	EPS Revises environmental documentation for Upsize to 9 Ft	520 days	Tue 10/17/23	Mon 10/13/25	11
13	**Board Action to Authorize CEQA Certification of Program**	**0 days**	**Tue 10/14/25**	**Tue 10/14/25**	**12,8**
14					
15	**Conceptual Design Report**	**233 days**	**Mon 1/1/24**	**Wed 11/20/24**	
16	Prepare Initial Draft Conceptual Design Report	93 days	Mon 1/1/24	Wed 5/8/24	10FF
17	Metropolitan Review	20 days	Thu 5/9/24	Wed 6/5/24	16
18	Prepare Draft Final Conceptual Design Report	80 days	Thu 6/6/24	Wed 9/25/24	17
19	Metropolitan Review	20 days	Thu 9/26/24	Wed 10/23/24	18
20	Prepare Final Conceptual Design Report	20 days	Thu 10/24/24	Wed 11/20/24	19
21	**Sectionalizing and Large Valve MFE Pre-Procurement**	**1351 days**	**Mon 8/7/23**	**Mon 10/9/28**	
22	Request for Qualifications	42 days	Mon 8/7/23	Tue 10/3/23	
23	Metropolitan Review and Selection	30 days	Wed 10/4/23	Tue 11/14/23	22
24	Request for Proposals	100 days	Tue 10/14/25	Mon 3/2/26	23,13
25	Metropolitan Review and Selection	100 days	Tue 3/3/26	Mon 7/20/26	24
26	Equipment Fabrication and Delivery	520 days	Tue 10/13/26	Mon 10/9/28	25FS+3 mons,13
27					
28	**MISCELLANEOUS PROGRAM MILESTONES (METROPOLITAN BOARD ACTIONS/FUNDING/ AGREEMENTS, ETC.)**	**720 days**	**Tue 5/30/23**	**Mon 3/2/26**	
29	Receive $80M State Funding for R1 and R2 Preliminary Design	0 days	Tue 5/30/23	Tue 5/30/23	
30	Receive Additional Funding to proceed with R1 and R2 Final Design	0 days	**Wed 5/1/24**	**Wed 5/1/24**	
31	Receive Additional Funding to proceed with Phase 1 Design for all subsequent reaches	0 days	**Fri 11/1/24**	**Fri 11/1/24**	
32					
33	Agreement with SGVMWD for use & assessment of Azusa Pipeline	0 days	Tue 10/14/25	Tue 10/14/25	13FF
34	Azusa Pipeline Condition Assessment	100 days	Tue 10/14/25	Mon 3/2/26	33
35					
36	**DESIGN AND CONSTRUCTION PHASE**	**3272 days**	**Tue 5/30/23**	**Wed 12/12/35**	
37	**PHASE 1 - PIPELINE REACHES 1 & 2**	**1932 days**	**Tue 5/30/23**	**Wed 10/23/30**	
38	**2028 Olympics - AVOID CONSTRUCTION DURING THIS PERIOD**	**65 days**	**Thu 6/1/28**	**Wed 8/30/28**	
39					
40	**Preliminary and Final Design, Permitting**	**544 days**	**Tue 5/30/23**	**Fri 6/27/25**	
41	Preliminary Design and Initial Permitting (11 mos)	**265 days**	**Tue 5/30/23**	**Mon 6/3/24**	**29**
44	Final Design and Permitting (12 mos)	**280 days**	**Mon 6/3/24**	**Fri 6/27/25**	**30,41**
47	**Construction**	**812 days**	**Tue 10/14/25**	**Wed 11/22/28**	**13,32**
48	Bid & Award thru NTP (6 mos)	125 days	Tue 10/14/25	Mon 4/6/26	44
49	**Mobilize, Submittals, Material Procurement, Site & Portal Prep**	**325 days**	**Tue 4/7/26**	**Mon 7/5/27**	**48**
50	Pipeline Material Procurement (6 mos)	130 days	Tue 4/7/26	Mon 10/5/26	
51	TBM & Trenchless/Tunneling Material Procurement & Site/Portal Prep (15 mos)	325 days	Tue 4/7/26	Mon 7/5/27	

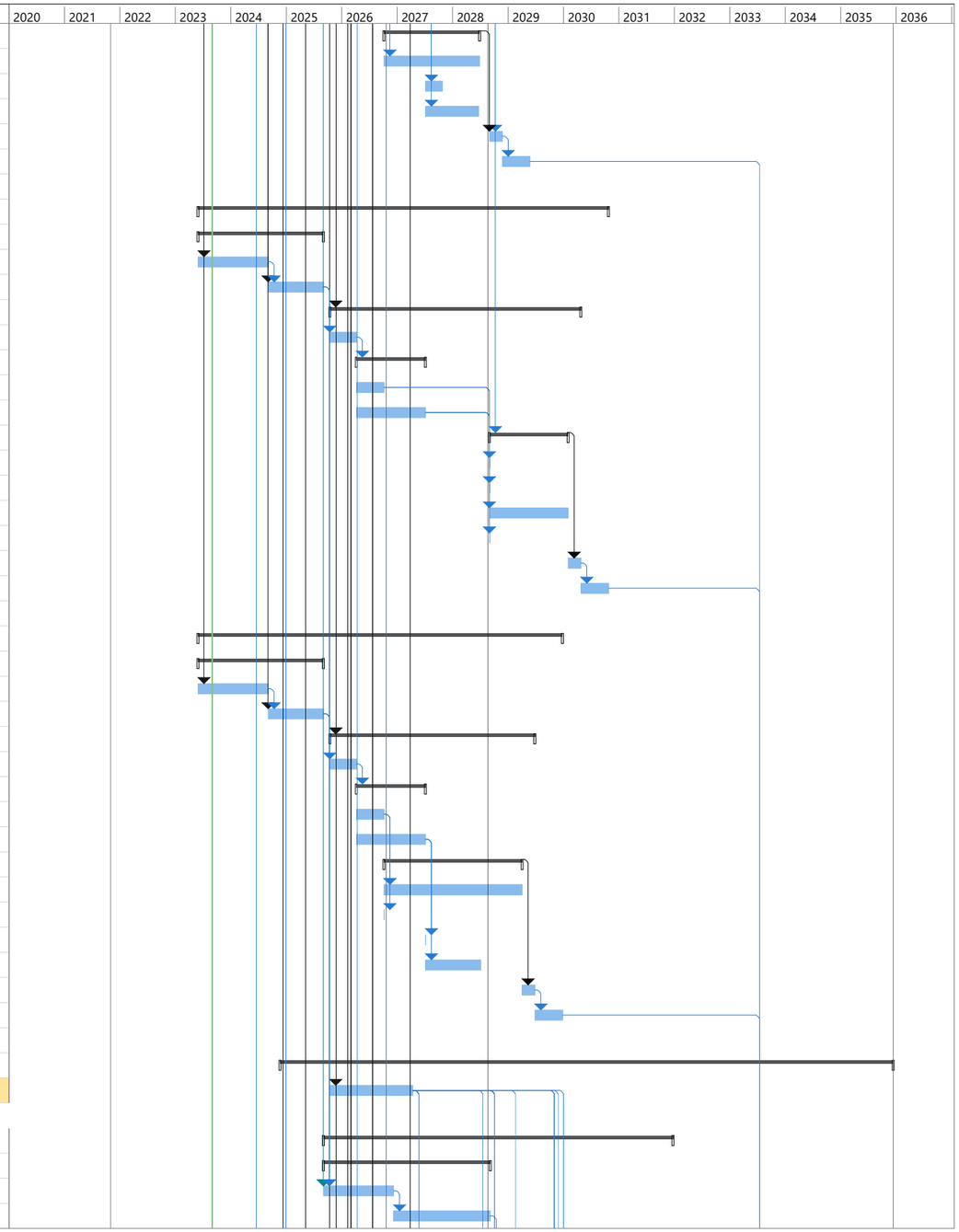


METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

PURE WATER SOUTHERN CALIFORNIA - PROGRAMMATIC CONVEYANCE SYSTEM SCHEDULE

Fri 9/1/23

ID	Task Name	Duration	Start	Finish	Predecessors
52	**Installation**	**450 days**	**Tue 10/6/26**	**Mon 6/26/28**	
53	Open Trench - City Streets (26,800 LF)	450 days	Tue 10/6/26	Mon 6/26/28	50
54	Major Trenchless/Tunneling (1 @ 810 LF)	80 days	Tue 7/6/27	Mon 10/25/27	51
55	Minor Trenchless (11 @ 2,536 LF total)	250 days	Tue 7/6/27	Mon 6/19/28	51
56	**Commissioning & Final Site Restoration (12 weeks)**	**60 days**	**Thu 8/31/28**	**Wed 11/22/28**	**52,38**
57	**Construction Completion with Construction Contingency (6 mos)**	**130 days**	**Thu 11/23/28**	**Wed 5/23/29**	**56**
58					
59	**REACH 2A - LA RIVER TUNNEL CROSSING**	**1932 days**	**Tue 5/30/23**	**Wed 10/23/30**	
60	**Preliminary and Final Design, Permitting**	**590 days**	**Tue 5/30/23**	**Mon 9/1/25**	
61	Preliminary Design and Initial Permitting (15 mos)	330 days	Tue 5/30/23	Mon 9/2/24	29
62	Final Design & Permitting (12 mos)	260 days	Tue 9/3/24	Mon 9/1/25	61,30
63	**Construction**	**1182 days**	**Tue 10/14/25**	**Wed 4/24/30**	13
64	Bid & Award (6 mos)	125 days	Tue 10/14/25	Mon 4/6/26	62
65	**Mobilize, Submittals, Material Procurement, Site & Portal Prep**	**325 days**	**Tue 4/7/26**	**Mon 7/5/27**	**64**
66	Pipeline Material Procurement (6 mos)	130 days	Tue 4/7/26	Mon 10/5/26	
67	TBM & Trenchless/Tunneling Material Procurement (15 mos)	325 days	Tue 4/7/26	Mon 7/5/27	
68	**Installation**	**370 days**	**Thu 8/31/28**	**Wed 1/30/30**	38
69	Open Trench - Street (nil)	1 day	Thu 8/31/28	Thu 8/31/28	66
70	Open Trench - Easement (nil)	1 day	Thu 8/31/28	Thu 8/31/28	66
71	Major Trenchless/Tunneling (2 @ 3,689 LF total)	370 days	Thu 8/31/28	Wed 1/30/30	67
72	Minor Trenchless (nil)	1 day	Thu 8/31/28	Thu 8/31/28	67
73	**Commissioning & Final Site Restoration (12 weeks)**	**60 days**	**Thu 1/31/30**	**Wed 4/24/30**	**68**
74	**Construction Completion with Construction Contingency (6 mos)**	**130 days**	**Thu 4/25/30**	**Wed 10/23/30**	73
75					
76	**REACH 2B - CITIES OF LONG BEACH & LAKEWOOD**	**1715 days**	**Tue 5/30/23**	**Mon 12/24/29**	
77	**Preliminary and Final Design, Permitting**	**590 days**	**Tue 5/30/23**	**Mon 9/1/25**	
78	Preliminary Design and Initial Permitting (15 mos)	330 days	Tue 5/30/23	Mon 9/2/24	29
79	Final Design & Permitting (12 mos)	260 days	Tue 9/3/24	Mon 9/1/25	78,30
80	**Construction**	**965 days**	**Tue 10/14/25**	**Mon 6/25/29**	13,32
81	Bid & Award (6 mos)	125 days	Tue 10/14/25	Mon 4/6/26	79
82	**Mobilize, Submittals, Material Procurement, Site & Portal Prep**	**325 days**	**Tue 4/7/26**	**Mon 7/5/27**	**81**
83	Pipeline Material Procurement (6 mos)	130 days	Tue 4/7/26	Mon 10/5/26	
84	TBM & Trenchless/Tunneling Material Procurement (15 mos)	325 days	Tue 4/7/26	Mon 7/5/27	
85	**Installation**	**650 days**	**Tue 10/6/26**	**Mon 4/2/29**	
86	Open Trench - Street (32,433 LF)	650 days	Tue 10/6/26	Mon 4/2/29	83
87	Open Trench - Easement (nil)	1 day	Tue 10/6/26	Tue 10/6/26	83
88	Major Trenchless/Tunneling (nil)	1 day	Tue 7/6/27	Tue 7/6/27	84
89	Minor Trenchless (12 @ 2,611 LF total)	260 days	Tue 7/6/27	Mon 7/3/28	84
90	**Commissioning & Final Site Restoration (12 weeks)**	**60 days**	**Tue 4/3/29**	**Mon 6/25/29**	**85**
91	**Construction Completion with Construction Contingency (6 mos)**	130 days	Tue 6/26/29	Mon 12/24/29	90
92					
93	**PHASE 1 - REMAINING BACKBONE REACHES**	**2885 days**	**Thu 11/21/24**	**Wed 12/12/35**	
94	SUPPLEMENTAL CEQA PROCESS (18 mos)	390 days	Tue 10/14/25	Mon 4/12/27	13
95					
96	**REACH 3 - CITIES OF CERRITOS & BELLFLOWER**	**1645 days**	**Tue 9/2/25**	**Mon 12/22/31**	
97	**Preliminary and Final Design, Permitting**	**785 days**	**Tue 9/2/25**	**Mon 9/4/28**	
98	Preliminary Design & Initial Permitting (15 mos)	330 days	Tue 9/2/25	Mon 12/7/26	20,31,62,79,44
99	Final Design & Permitting (21 mos)	455 days	Tue 12/8/26	Mon 9/4/28	98

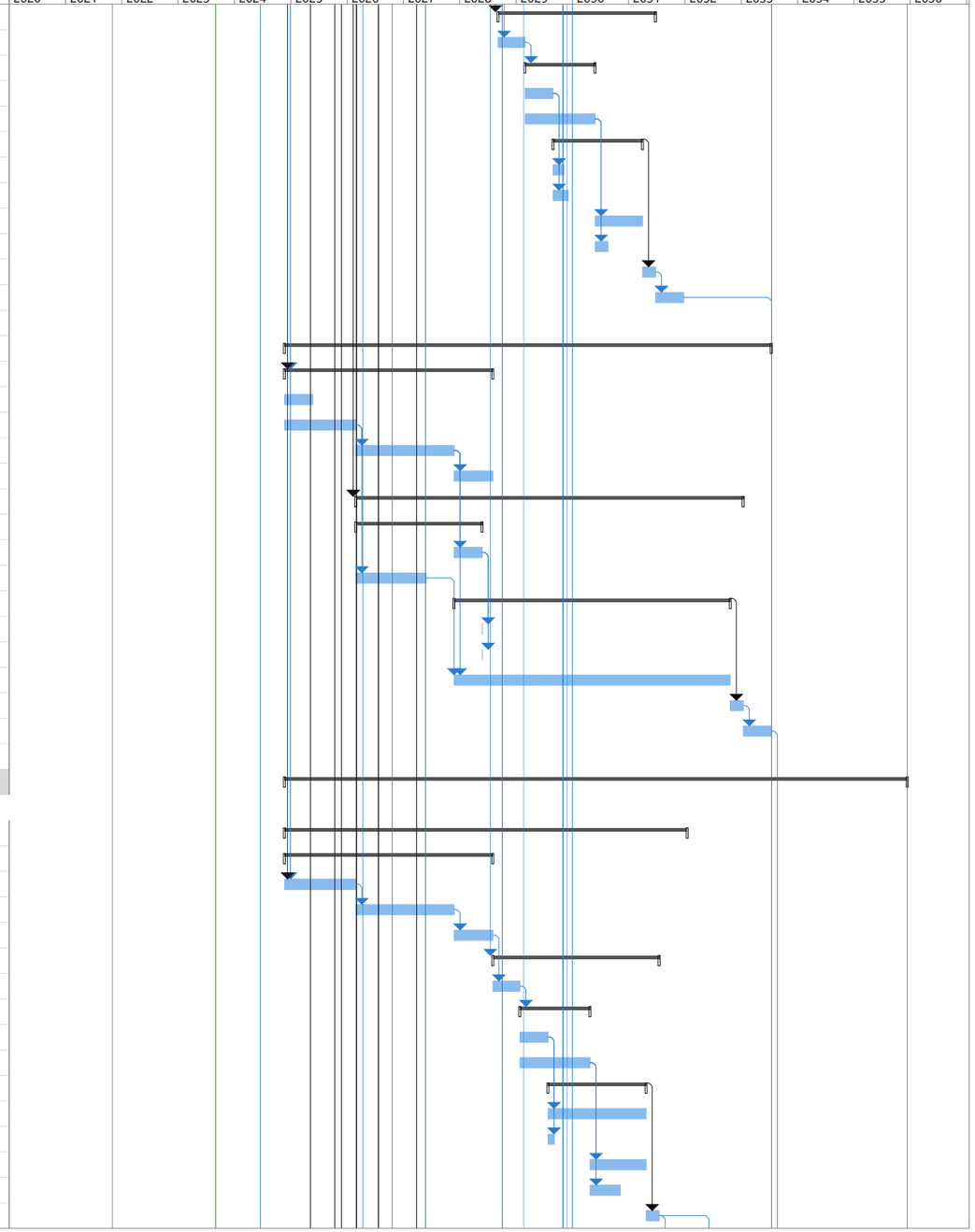


METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

PURE WATER SOUTHERN CALIFORNIA - PROGRAMMATIC CONVEYANCE SYSTEM SCHEDULE

Fri 9/1/23

ID	Task Name	Duration	Start	Finish	Predecessors
100	**Construction**	**730 days**	**Tue 9/5/28**	**Mon 6/23/31**	13
101	Bid & Award (6 mos)	125 days	Tue 9/5/28	Mon 2/26/29	99
102	**Mobilize, Submittals, Material Procurement, Site & Portal Prep**	**325 days**	**Tue 2/27/29**	**Mon 5/27/30**	**101**
103	Pipeline Material Procurement (6 mos)	130 days	Tue 2/27/29	Mon 8/27/29	
104	TBM & Trenchless/Tunneling Material Procurement (15 mos)	325 days	Tue 2/27/29	Mon 5/27/30	
105	**Installation**	**415 days**	**Tue 8/28/29**	**Mon 3/31/31**	
106	Open Trench - Street (2590 LF)	50 days	Tue 8/28/29	Mon 11/5/29	103
107	Open Trench - Easement (12075 LF)	70 days	Tue 8/28/29	Mon 12/3/29	103
108	Major Trenchless/Tunneling (1 @ 2220 LF total)	220 days	Tue 5/28/30	Mon 3/31/31	104
109	Minor Trenchless (2 @ 626 LF total)	60 days	Tue 5/28/30	Mon 8/19/30	104
110	**Commissioning & Final Site Restoration (12 weeks)**	**60 days**	**Tue 4/1/31**	**Mon 6/23/31**	**105**
111	**Construction Completion with Construction Contingency (6 mos)**	130 days	Tue 6/24/31	Mon 12/22/31	110
112					
113	**REACH 4 - SAN GABRIEL RIVER TUNNEL (WITH ALTERNATIVE DELIVERY)**	**2255 days**	**Thu 11/21/24**	**Wed 7/13/33**	
114	**Preliminary and Final Design, Permitting**	**965 days**	**Thu 11/21/24**	**Wed 8/2/28**	**20,31**
115	Geotechnical Prep Work (Field Plan, Exploration, Permitting)	130 days	Thu 11/21/24	Wed 5/21/25	
116	Preliminary Design & Initial Permitting (15 mos)	330 days	Thu 11/21/24	Wed 2/25/26	
117	Final Design & Permitting (21 mos)	455 days	Thu 2/26/26	Wed 11/24/27	116
118	Additional Permitting Contingency - USACE/LACFCD (9 mos)	180 days	Thu 11/25/27	Wed 8/2/28	117
119	**Construction**	**1795 days**	**Thu 2/26/26**	**Wed 1/12/33**	**32,13**
120	**Mobilize, Submittals, Material Procurement, Site & Portal Prep**	**585 days**	**Thu 2/26/26**	**Wed 5/24/28**	
121	Pipeline Material Procurement (6 mos)	130 days	Thu 11/25/27	Wed 5/24/28	117
122	TBM & Trenchless/Tunneling Material Procurement (15 mos)	325 days	Thu 2/26/26	Wed 5/26/27	116
123	**Installation**	**1280 days**	**Thu 11/25/27**	**Wed 10/20/32**	
124	Open Trench - Street (nil)	1 day	Thu 5/25/28	Thu 5/25/28	121
125	Open Trench - Easement (nil)	1 day	Thu 5/25/28	Thu 5/25/28	121
126	Major Trenchless/Tunneling (1 @ 25,627 LF total) (assumes 2 headings)	1280 days	Thu 11/25/27	Wed 10/20/32	122,117
127	**Commissioning & Final Site Restoration (12 weeks)**	**60 days**	**Thu 10/21/32**	**Wed 1/12/33**	**123**
128	**Construction Completion with Construction Contingency (6 mos)**	130 days	Thu 1/13/33	**Wed 7/13/33**	127
129					
130	**REACH 4 - SAN GABRIEL RIVER TUNNEL (WITH DESIGN-BID-BUILD DELIVERY- NOT USED)**	**2885 days**	**Thu 11/21/24**	**Wed 12/12/35**	
146					
147	**REACH 5 - CITY OF PICO RIVERA**	**1865 days**	**Thu 11/21/24**	**Wed 1/14/32**	
148	**Preliminary and Final Design, Permitting**	**965 days**	**Thu 11/21/24**	**Wed 8/2/28**	
149	Preliminary Design & Initial Permitting (15 mos)	330 days	Thu 11/21/24	Wed 2/25/26	20,31
150	Final Design & Permitting (21 mos)	455 days	Thu 2/26/26	Wed 11/24/27	149
151	Additional Permitting Contingency - USACE/LACFCD (9 mos)	180 days	Thu 11/25/27	Wed 8/2/28	150
152	**Construction**	**770 days**	**Thu 8/3/28**	**Wed 7/16/31**	94
153	Bid & Award (6 mos)	125 days	Thu 8/3/28	Wed 1/24/29	151
154	**Mobilize, Submittals, Material Procurement, Site & Portal Prep**	**325 days**	**Thu 1/25/29**	**Wed 4/24/30**	**153**
155	Pipeline Material Procurement (6 mos)	130 days	Thu 1/25/29	Wed 7/25/29	
156	TBM & Trenchless/Tunneling Material Procurement (15 mos)	325 days	Thu 1/25/29	Wed 4/24/30	
157	**Installation**	**455 days**	**Thu 7/26/29**	**Wed 4/23/31**	
158	Open Trench - Street (22,731 LF)	454 days	Thu 7/26/29	Tue 4/22/31	155
159	Open Trench - Easement (3,828 LF)	30 days	Thu 7/26/29	Wed 9/5/29	155
160	Major Trenchless/Tunneling (3,390 LF total, 1 segment)	260 days	Thu 4/25/30	Wed 4/23/31	156
161	Minor Trenchless (1,352 LF total, 5 segments)	140 days	Thu 4/25/30	Wed 11/6/30	156
162	**Commissioning & Final Site Restoration (12 weeks)**	**60 days**	**Thu 4/24/31**	**Wed 7/16/31**	**157**

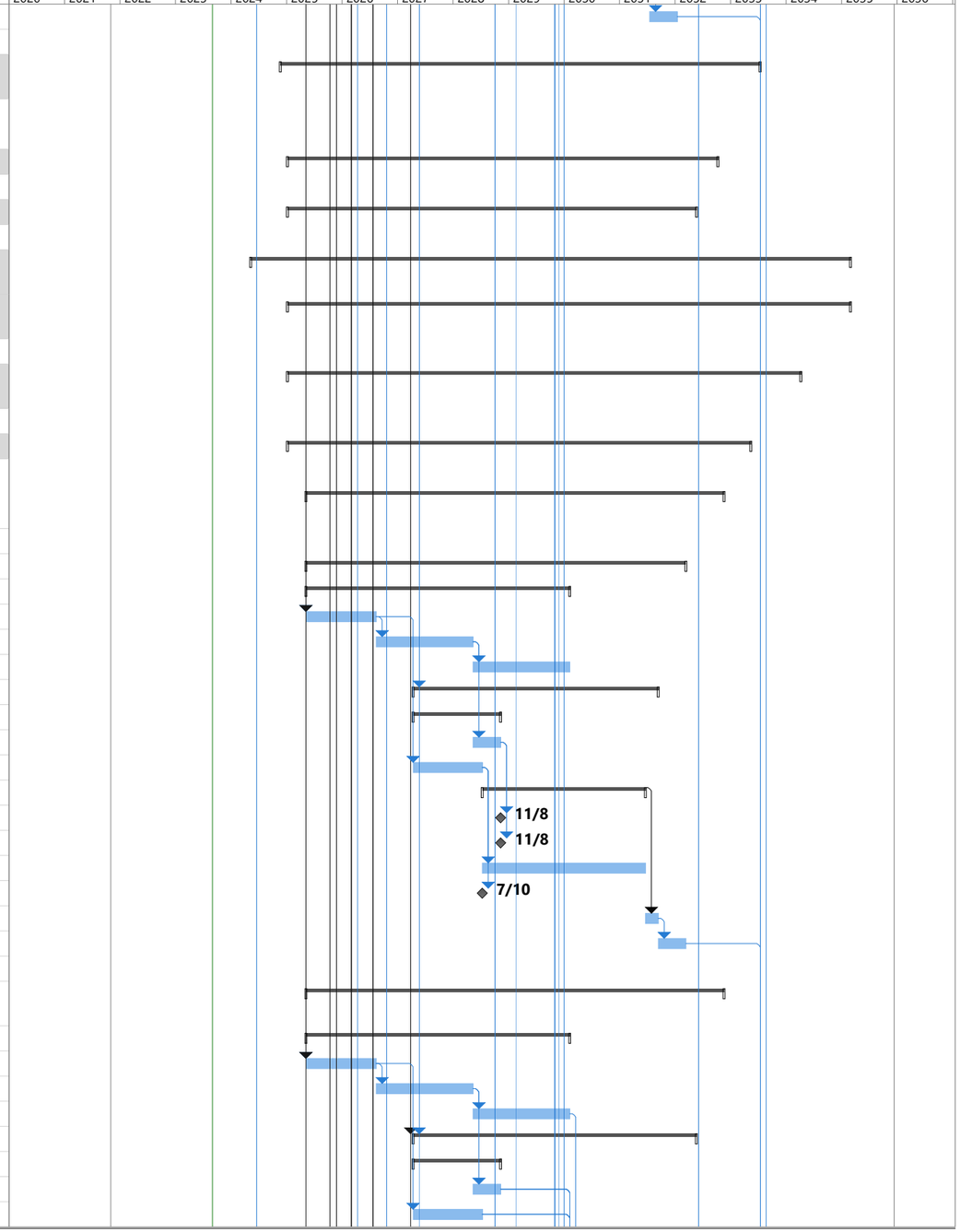


METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

PURE WATER SOUTHERN CALIFORNIA - PROGRAMMATIC CONVEYANCE SYSTEM SCHEDULE

Fri 9/1/23

ID	Task Name	Duration	Start	Finish	Predecessors
163	**Construction Completion with Construction Contingency (6 mos)**	130 days	Thu 7/17/31	Wed 1/14/32	162
164					
165	**ALTERNATIVE CITY STREET ALIGNMENT - LAKEWOOD/ROSEMEAD BLVD IN LIEU OF LONG TUNNEL AT SAN GABRIEL RIVER (NOT USED)**	**2255 days**	**Thu 11/21/24**	**Wed 7/13/33**	
183					
201					
202	**REACH 6 - CITIES OF WHITTIER & EL MONTE (NOT USED)**	**2025 days**	**Mon 1/6/25**	**Fri 10/8/32**	
219					
220	**REACH 7 - CITIES OF IRWINDALE, DUARTE, AZUSA (NOT USED)**	**1925 days**	**Mon 1/6/25**	**Fri 5/21/32**	
237					
238	**REVISED SCHEDULE FOR UPSIZED PIPELINE TO 9FT TO ACCOMMODATE FUTURE FLOWS (NOT USED)**	**2820 days**	**Thu 5/9/24**	**Wed 2/28/35**	
239	**REACH 6 - WHITTIER NARROWS LONG TUNNEL (UPSIZED TO 9 FT DIAMETER PIPELINE) (NOT USED)**	**2648 days**	**Mon 1/6/25**	**Wed 2/28/35**	
256					
257	**REACH 7 - CITIES OF EL MONTE, BALDWIN PARK, IRWINDALE (UPSIZED TO 9 FT DIAMETER PIPELINE) (NOT USED)**	**2415 days**	**Mon 1/6/25**	**Fri 4/7/34**	
274					
275	**REACH 8 - CITIES OF DUARTE, AZUSA (UPSIZED TO 9 FT DIAMETER PIPELINE) (NOT USED)**	**2180 days**	**Mon 1/6/25**	**Fri 5/13/33**	
292					
293	**REVISED SCHEDULE FOR UPSIZED PIPELINE TO 9FT TO ACCOMMODATE FUTURE FLOWS (ALTERNATIVE DELIVERY OPTION)**	**1965 days**	**Thu 5/8/25**	**Wed 11/17/32**	
294					
295	**REACH 6 - WHITTIER NARROWS LONG TUNNEL (UPSIZED TO 9 FT DIAMETER PIPELINE)**	**1786 days**	**Thu 5/8/25**	**Thu 3/11/32**	
296	**Preliminary and Final Design, Permitting**	**1240 days**	**Thu 5/8/25**	**Wed 2/6/30**	
297	Preliminary Design & Initial Permitting (15 mos)	330 days	Thu 5/8/25	Wed 8/12/26	20FS+120 days,31
298	Final Design & Permitting (21 mos)	455 days	Thu 8/13/26	Wed 5/10/28	297
299	Additional Permitting Contingency - USACE/LACFCD (21 mos)	455 days	Thu 5/11/28	Wed 2/6/30	298
300	**Construction**	**1153 days**	**Tue 4/13/27**	**Thu 9/11/31**	**94**
301	**Mobilize, Submittals, Material Procurement, Site & Portal Prep**	**412 days**	**Tue 4/13/27**	**Wed 11/8/28**	
302	Pipeline Material Procurement (6 mos)	130 days	Thu 5/11/28	Wed 11/8/28	298
303	TBM & Trenchless/Tunneling Material Procurement (15 mos)	325 days	Tue 4/13/27	Mon 7/10/28	297
304	**Installation**	**768 days**	**Mon 7/10/28**	**Thu 6/19/31**	
305	Open Trench - Street (nil)	0 days	Wed 11/8/28	Wed 11/8/28	302
306	Open Trench - Easement (nil)	0 days	Wed 11/8/28	Wed 11/8/28	302
307	Major Trenchless/Tunneling (13,112 LF, assume 2 headings)	768 days	Tue 7/11/28	Thu 6/19/31	303
308	Minor Trenchless (nil)	0 days	Mon 7/10/28	Mon 7/10/28	303
309	**Commissioning & Final Site Restoration (12 weeks)**	**60 days**	**Fri 6/20/31**	**Thu 9/11/31**	**304**
310	**Construction Completion with Construction Contingency (6 mos)**	130 days	Fri 9/12/31	Thu 3/11/32	309
311					
312	**REACH 7 - CITIES OF EL MONTE, BALDWIN PARK, IRWINDALE (UPSIZED TO 9 FT DIAMETER PIPELINE - ALT DELIVERY OPTION)**	**1965 days**	**Thu 5/8/25**	**Wed 11/17/32**	
313	**Preliminary and Final Design, Permitting**	**1240 days**	**Thu 5/8/25**	**Wed 2/6/30**	
314	Preliminary Design & Initial Permitting (15 mos)	330 days	Thu 5/8/25	Wed 8/12/26	20FS+120 days,31
315	Final Design & Permitting (21 mos)	455 days	Thu 8/13/26	Wed 5/10/28	314
316	Additional Permitting Contingency - USACE/LACFCD (21 mos)	455 days	Thu 5/11/28	Wed 2/6/30	315
317	**Construction**	**1332 days**	**Tue 4/13/27**	**Wed 5/19/32**	**94,32**
318	**Mobilize, Submittals, Material Procurement, Site & Portal Prep**	**412 days**	**Tue 4/13/27**	**Wed 11/8/28**	
319	Pipeline Material Procurement (6 mos)	130 days	Thu 5/11/28	Wed 11/8/28	315
320	TBM & Trenchless/Tunneling Material Procurement (15 mos)	325 days	Tue 4/13/27	Mon 7/10/28	314

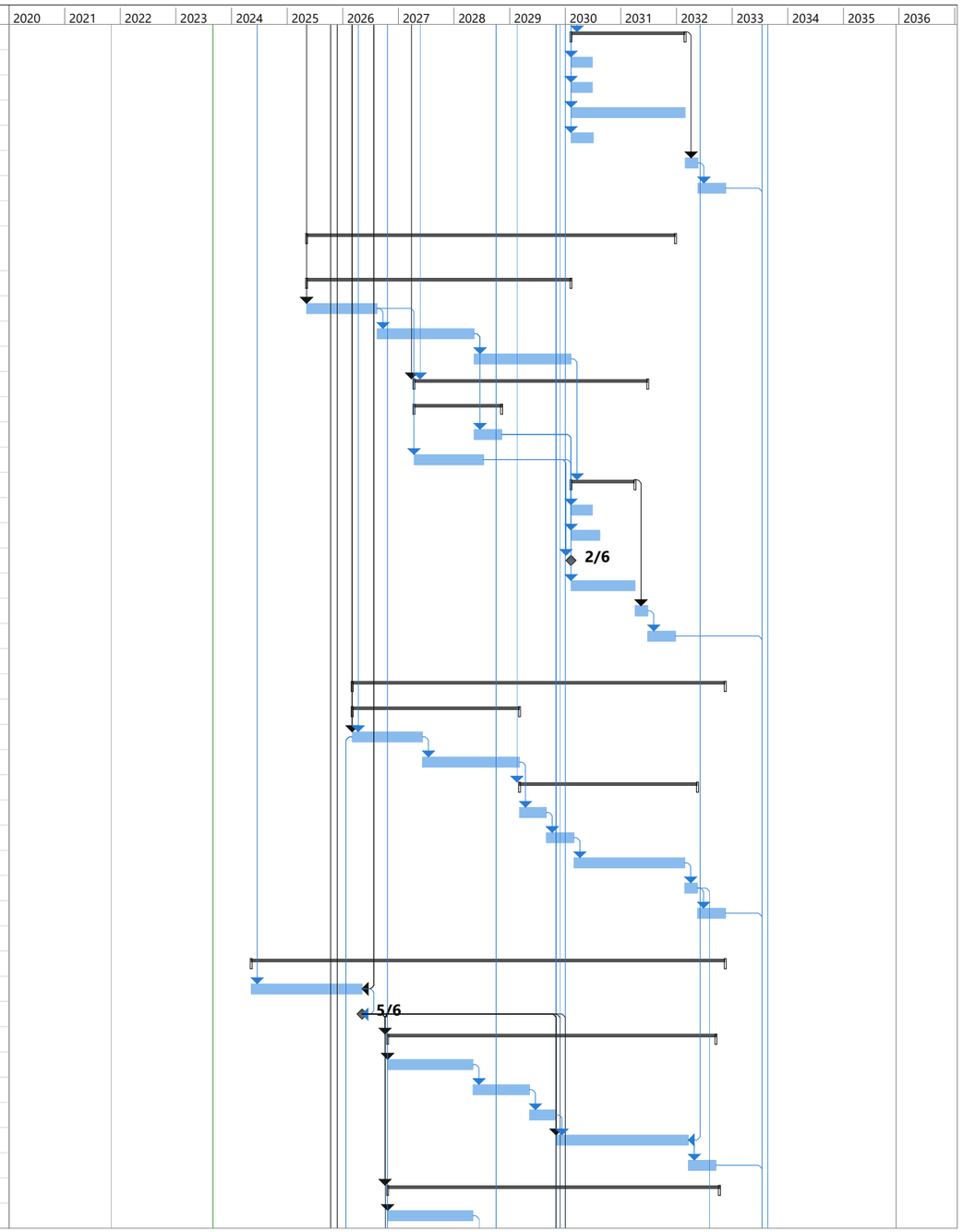


METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

PURE WATER SOUTHERN CALIFORNIA - PROGRAMMATIC CONVEYANCE SYSTEM SCHEDULE

Fri 9/1/23

ID	Task Name	Duration	Start	Finish	Predecessors
321	**Installation**	**535 days**	**Thu 2/7/30**	**Wed 2/25/32**	**316**
322	Open Trench - Street (4,740 LF)	100 days	Thu 2/7/30	Wed 6/26/30	319
323	Open Trench - Easement (17,710 LF)	100 days	Thu 2/7/30	Wed 6/26/30	319
324	Major Trenchless/Tunneling (6,959 LF total, 2 segments)	535 days	Thu 2/7/30	Wed 2/25/32	320
325	Minor Trenchless (1,044 LF total, 6 segments)	104 days	Thu 2/7/30	Tue 7/2/30	320
326	**Commissioning & Final Site Restoration (12 weeks)**	**60 days**	**Thu 2/26/32**	**Wed 5/19/32**	**321**
327	**Construction Completion with Construction Contingency (6 mos)**	130 days	Thu 5/20/32	**Wed 11/17/32**	326
328					
329	**REACH 8 - CITIES OF IRWINDALE, DUARTE, AZUSA (UPSIZED TO 9 FT DIAMETER PIPELINE - ALT DELIVERY OPTION)**	**1730 days**	**Thu 5/8/25**	**Wed 12/24/31**	
330	**Preliminary and Final Design, Permitting**	**1240 days**	**Thu 5/8/25**	**Wed 2/6/30**	
331	Preliminary Design & Initial Permitting (15 mos)	330 days	Thu 5/8/25	Wed 8/12/26	20FS+120 days,31
332	Final Design & Permitting (21 mos)	455 days	Thu 8/13/26	Wed 5/10/28	331
333	Additional Permitting Contingency - USACE/LACFCD (21 mos)	455 days	Thu 5/11/28	Wed 2/6/30	332
334	**Construction**	**1097 days**	**Tue 4/13/27**	**Wed 6/25/31**	94,32
335	**Mobilize, Submittals, Material Procurement, Site & Portal Prep**	**412 days**	**Tue 4/13/27**	**Wed 11/8/28**	
336	Pipeline Material Procurement (6 mos)	130 days	Thu 5/11/28	Wed 11/8/28	332
337	TBM & Trenchless/Tunneling Material Procurement (15 mos)	325 days	Tue 4/13/27	Mon 7/10/28	331
338	**Installation**	**300 days**	**Wed 2/6/30**	**Wed 4/2/31**	333
339	Open Trench - Street (4,707 LF)	100 days	Thu 2/7/30	Wed 6/26/30	336
340	Open Trench - Easement (24,287 LF)	135 days	Thu 2/7/30	Wed 8/14/30	336
341	Major Trenchless/Tunneling (nil)	0 days	Wed 2/6/30	Wed 2/6/30	337
342	Minor Trenchless (6,029 LF total, 8 segments, assume 2 headings)	300 days	Thu 2/7/30	Wed 4/2/31	337
343	**Commissioning & Final Site Restoration (12 weeks)**	**60 days**	**Thu 4/3/31**	**Wed 6/25/31**	**338**
344	**Construction Completion with Construction Contingency (6 mos)**	130 days	Thu 6/26/31	Wed 12/24/31	343
345					
346	**AZUSA PIPELINE MODIFICATIONS**	**1750 days**	**Tue 3/3/26**	**Mon 11/15/32**	
347	**Preliminary and Final Design, Permitting**	**785 days**	**Tue 3/3/26**	**Mon 3/5/29**	
348	Preliminary Design & Initial Permitting (15 mos)	330 days	Tue 3/3/26	Mon 6/7/27	20,31,33,34
349	Final Design & Permitting (21 mos)	455 days	Tue 6/8/27	Mon 3/5/29	348
350	**Construction**	**835 days**	**Tue 3/6/29**	**Mon 5/17/32**	**94**
351	Bid & Award (6 mos)	125 days	Tue 3/6/29	Mon 8/27/29	349
352	Mobilize, Submittals, Material Procurement, Site Prep (6 mos)	130 days	Tue 8/28/29	Mon 2/25/30	351
353	Construction	520 days	Tue 2/26/30	Mon 2/23/32	352
354	**Commissioning & Final Site Restoration (12 weeks)**	60 days	Tue 2/24/32	Mon 5/17/32	353
355	**Construction Completion with Construction Contingency (6 mos)**	130 days	Tue 5/18/32	Mon 11/15/32	354
356					
357	**BACKBONE PUMP STATIONS**	**2223 days**	**Thu 5/9/24**	**Mon 11/15/32**	
358	Initiate discussions for land acquisition	520 days	Thu 5/9/24	Wed 5/6/26	31FF,13FF+6 mons,10
359	Land Acquisition Purchase Agreement	0 days	Wed 5/6/26	Wed 5/6/26	358FF
360	**Whittier Narrows Pump Station (Reach 5)**	**1540 days**	**Thu 10/22/26**	**Wed 9/15/32**	**359FS+6 mons**
361	Preliminary Design	400 days	Thu 10/22/26	Wed 5/3/28	20,31
362	Final Design	265 days	Thu 5/4/28	Wed 5/9/29	361
363	Bid & Award	125 days	Thu 5/10/29	Wed 10/31/29	362
364	Construction	620 days	Thu 11/1/29	Wed 3/17/32	363,359,94,162FF
365	**Construction Completion with Construction Contingency (6 mos)**	130 days	Thu 3/18/32	Wed 9/15/32	364
366	**Santa Fe Spreading Grounds Pump Station - A (Reach 7)**	**1557 days**	**Thu 10/22/26**	**Fri 10/8/32**	**359FS+6 mons**
367	Preliminary Design	400 days	Thu 10/22/26	Wed 5/3/28	20,31

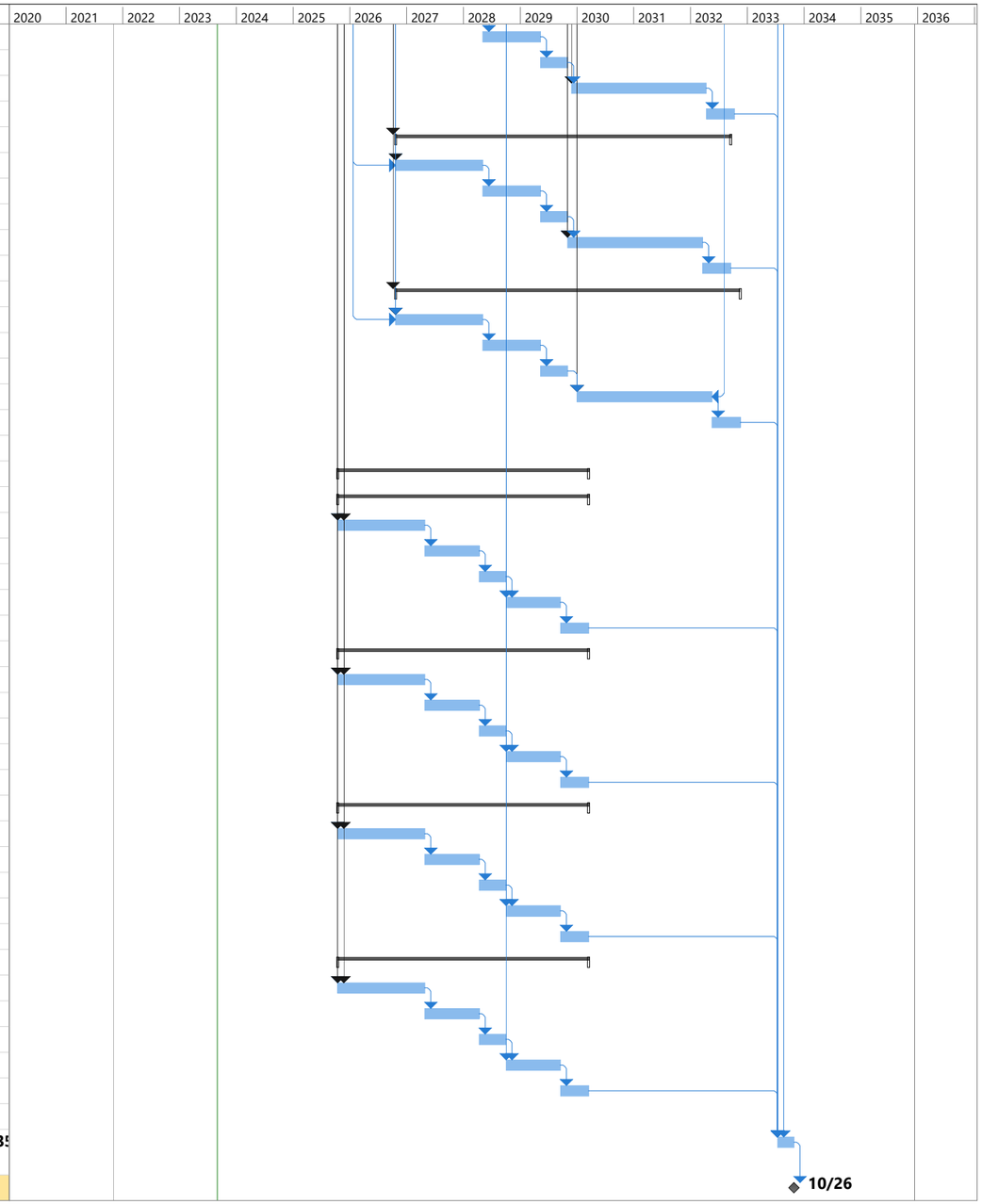


METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

PURE WATER SOUTHERN CALIFORNIA - PROGRAMMATIC CONVEYANCE SYSTEM SCHEDULE

Fri 9/1/23

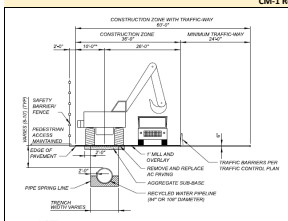
ID	Task Name	Duration	Start	Finish	Predecessors
368	Final Design	265 days	Thu 5/4/28	Wed 5/9/29	367
369	Bid & Award	125 days	Thu 5/10/29	Wed 10/31/29	368
370	Construction	620 days	Mon 11/26/29	Fri 4/9/32	369,359,94,217FF
371	**Construction Completion with Construction Contingency (6 mos)**	130 days	Mon 4/12/32	Fri 10/8/32	370
372	**San Gabriel Canyon Spreading Grounds Pump Station (Reach 7 / Azusa Pipeline)**	**1540 days**	**Thu 10/22/26**	**Wed 9/15/32**	**359FS+6 mons**
373	Preliminary Design	400 days	Thu 10/22/26	Wed 5/3/28	20,31,348SS
374	Final Design	265 days	Thu 5/4/28	Wed 5/9/29	373
375	Bid & Award	125 days	Thu 5/10/29	Wed 10/31/29	374
376	Construction	620 days	Thu 11/1/29	Wed 3/17/32	375,359,94,235FF
377	**Construction Completion with Construction Contingency (6 mos)**	130 days	Thu 3/18/32	Wed 9/15/32	376
378	**Big Dalton Pump Station (Azusa Pipeline)**	**1583 days**	**Thu 10/22/26**	**Mon 11/15/32**	**359FS+6 mons**
379	Preliminary Design	400 days	Thu 10/22/26	Wed 5/3/28	20,31,33,34,348SS
380	Final Design	265 days	Thu 5/4/28	Wed 5/9/29	379
381	Bid & Award	125 days	Thu 5/10/29	Wed 10/31/29	380
382	Construction	620 days	Tue 1/1/30	Mon 5/17/32	381,359,354FF,94
383	**Construction Completion with Construction Contingency (6 mos)**	130 days	Tue 5/18/32	Mon 11/15/32	382
384					
385	**RECHARGE/DELIVERY FACILITIES**	**1154 days**	**Tue 10/14/25**	**Fri 3/15/30**	
386	**San Gabriel Coastal Spreading Grounds/Rio Hondo (Reaches 4 &5)**	**1154 days**	**Tue 10/14/25**	**Fri 3/15/30**	
387	Preliminary Design	400 days	Tue 10/14/25	Mon 4/26/27	20,31,32
388	Final Design	250 days	Tue 4/27/27	Mon 4/10/28	387
389	Bid& Award	124 days	Tue 4/11/28	Fri 9/29/28	388
390	Construction	250 days	Mon 10/2/28	Fri 9/14/29	389,94
391	**Construction Completion with Construction Contingency (6 mos)**	130 days	Mon 9/17/29	Fri 3/15/30	390
392	**Santa Fe Spreading Grounds (Reach 7)**	**1154 days**	**Tue 10/14/25**	**Fri 3/15/30**	
393	Preliminary Design	400 days	Tue 10/14/25	Mon 4/26/27	20,31,32
394	Final Design	250 days	Tue 4/27/27	Mon 4/10/28	393
395	Bid& Award	124 days	Tue 4/11/28	Fri 9/29/28	394
396	Construction	250 days	Mon 10/2/28	Fri 9/14/29	395,94
397	**Construction Completion with Construction Contingency (6 mos)**	130 days	Mon 9/17/29	Fri 3/15/30	396
398	**United Rock Pit Conversion to Recharge Basin (Reach 7)**	**1154 days**	**Tue 10/14/25**	**Fri 3/15/30**	
399	Preliminary Design	400 days	Tue 10/14/25	Mon 4/26/27	20,31,32
400	Final Design	250 days	Tue 4/27/27	Mon 4/10/28	399
401	Bid& Award	124 days	Tue 4/11/28	Fri 9/29/28	400
402	Construction	250 days	Mon 10/2/28	Fri 9/14/29	401,94
403	**Construction Completion with Construction Contingency (6 mos)**	130 days	Mon 9/17/29	Fri 3/15/30	402
404	**San Gabriel Canyon Spreading Grounds (Reach 7)**	**1154 days**	**Tue 10/14/25**	**Fri 3/15/30**	
405	Preliminary Design	400 days	Tue 10/14/25	Mon 4/26/27	20,31,32
406	Final Design	250 days	Tue 4/27/27	Mon 4/10/28	405
407	Bid& Award	124 days	Tue 4/11/28	Fri 9/29/28	406
408	Construction	250 days	Mon 10/2/28	Fri 9/14/29	407,94
409	**Construction Completion with Construction Contingency (6 mos)**	130 days	Mon 9/17/29	Fri 3/15/30	408
410					
411	**OVERALL SYSTEM START-UP AND COMMISSIONING (3 MOS) - Upsized to 9 ft for future flows**	**75 days**	**Thu 7/14/33**	**Wed 10/26/33**	**57,74,91,111,128,163,35**
412	**PHASE 1 COMPLETE - WITH UPSIZE TO 9 FT (HYBRID SCHEDULE W/ ALTERNATIVE DELIVERY)**	**0 days**	**Wed 10/26/33**	**Wed 10/26/33**	**411**



APPENDIX B – CONVEYANCE SYSTEM DATA NEEDS

Reach 1, Preferred Alignment CEQA Responses, MWD RRWP (7 feet Diameter Pipeline)

CM-1 Roadways



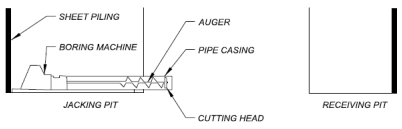
NOTE:

1. MEDIUM IMPACTS (IF APPLICABLE) ARE COVERED IN COST ADDERS.

CONSTRUCTION METHOD 1 - ROADWAY

1" = 10'-0"

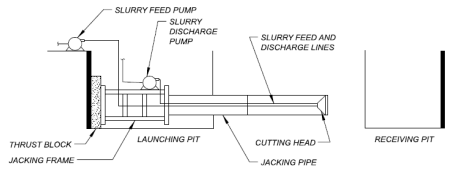
CM-4A Pipe Jacking



CONSTRUCTION METHOD 4A - JACK & BORE

NTS

CM-4B Microtunneling



CONSTRUCTION METHOD 4B - MICRO-TUNNELING (SLURRY FACE TBM W/ PIPE JACKING)

NTS

Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
1	1	520
1	3	3,194
1,2	5	2,454
2	7	571
2, 3	9	4,963
3, 4	11	725
4	13	156
4	15	2,166
5, 6	17	2,885
6	19	2,520
6, 7, 8	21	7,168
8	23	1,251
	Total	**28,574**

Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
1	2	162
1	4	111
2	6	810
2	8	265
5, 6	18	324
6	20	306
8	22	68
	Total	**2,045**

14 shafts

Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
3, 4	10	123
4	12	492
4	14	54
4, 5	16	635
	Total	**1,303**

8 shafts

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	450
Daily Crew Production (FT per day)	30
Estimated Number of Pipeline Crews Per Day	2.12
Number of Pipeline Crews	3
Pipeline Construction Crews	1
Workers per crew	7
Shoring Crews	0.2
Workers per Crew	3
Saw Cut Crew	0.05
Workers per crew	3
Demolition Crew	0.05
Workers per crew	3
Paving Crew	0.2
Workers per crew	5
Utility Relocation Crew	0.1
Workers per crew	6
Traffic Control	0.15
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**30.30**
Total Workers per Day (Average Throughout Construction Schedule)	**21.38**
Fiber Optic Duct Bank	
Construction Schedule (working days)	450
Daily Crew Production (FT per day)	200
Estimated Number of Combined Fiber Optic Crews Per Day	0.32
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0.1
Workers per crew	5
Total Workers per Day (Average Throughout Fiber Optic Construction)	**8.30**
Total Workers per Day (Average Throughout Construction Schedule)	**2.64**

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	450
Feet of Tunnel Construction needed per day	4.54
Estimated Number of Tunnel Crews Per Day (based on 10 feet per day per crew)	0.45
Estimated Number of Pipeline Crews Per Day (based on 40 feet per day per crew)	0.11
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	2.8
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	7
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**27.70**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	450
Feet of Tunnel Construction needed per day	2.90
Estimated Number of Tunnel Crews Per Day (based on 20 feet per day per crew)	0.14
Estimated Number of Pipeline Crews Per Day (based on 40 feet per day per crew)	0.07
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	2
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	15
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**16.43**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	21.38
One-Way Trips per Day (50 miles)	42.76
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**44.8**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule)	2.64
One-Way Trips per Day (50 miles)	5.27
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**7.3**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	

Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	78.00
One-Way Trips per Day (50 miles)	156.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	8
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**164.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	
Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	17.00
One-Way Trips per Day (50 miles)	34.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**36.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	27.70
One-Way Trips per Day (50 miles)	55.40
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**57.4**
* Assumes maximum of 15 workers per shuttle.	

Total Workers per Day (Maximum During Construction Schedule)	47.00
One-Way Trips per Day (50 miles)	94.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**96.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	16.43
One-Way Trips per Day (50 miles)	32.86
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	4
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**36.9**
* Assumes maximum of 15 workers per shuttle.	

Total Workers per Day (Maximum Throughout Construction Schedule)	50.00
One-Way Trips per Day (50 miles)	100.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	6
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**106.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	21.38
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**15.0**
Total Workers per Day (Maximum During Construction Schedule)	78.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**54.6**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	2.64
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**1.8**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	27.70
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**19.4**
Total Workers per Day (Maximum During Construction Schedule)	47.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**32.9**

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	16.43
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.5**
Total Workers per Day (Maximum During Construction Schedule)	50.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**35.0**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 200 miles.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

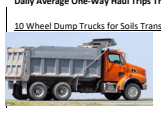
Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (16' W x 19' D) (includes paving debris)	304.0
Volume of Excavate (CY) per Ft of Trench (16' W x 19' D) (includes paving debris)	11.26
Volume Excavate (CY) per FT Including Swell of 15%	12.95
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.29
Estimated Length of Trench per Day Per Crew (ft)	30.0
Number of Haul Trucks per Crew per Daily Production	38.8
Total One-Way Haul Trips from Site to Staging/Storage and return	**77.7**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline (4.75' H x 16' W minus (0.5*3.14*7.25^2)/4)	55.37
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.05
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.36
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.24
Estimated Length of Trench per Day Per Crew (ft)	30
Number of Pipe Bedding Import Trucks per Day	7.1
Total One-Way Haul Trips of Pipe Bedding Import to Site	**14.1**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**14.1**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**52.9**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**22.3**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**2.5**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**1.5**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**1.5**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**1.1**
(Assumes 3" thick above 20' wide at trench plus 40' full overlay for half the full road wide)	
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**187.8**
Daily One-Way Haul Trips During the Pipeline Construction (Three Crews)	**563.3**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**397.4**

10 Wheel Dump Trucks for Soils Transport:



18 Wheel Flatbed Trucks for Hauling Pipe

Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	200
One-Way Spoils Haul Trips from Site to Storage Site and return	**8.89**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**16.0**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**1.8**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.5**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.5**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	800
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	22.0
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**5.5**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.4**
(Assumes 3" thick above 2' wide at trench)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**36.1**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**11.5**

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	2,045
Excavation Diameter (ft)	9
Tunnel Volume (in-situ) (cu-yds)*	5,541
Shaft Volume (cu-yds)*	6,398
Total Volume of Shafts and Tunnel (cu-yds)*	11,939
Total Number of Truck Trips for Soil Removal	1,194
Total Number of Truck Trips for Piping and Casing	164
Total Number of Truck Trips for Shaft Construction	5,040
Disturbed Pavement (sq-ft)	4,935
Paving Replacement Import (18" thick) (cu-ft)	7,403
Paving Replacement Import (18" thick) (cu-yds)	274
Total Number of Truck Trips for Replacing Paving	27
Total Truck Trips During Construction	**6,425**
Number of Truck Trip per day on Average	14.28
*Assumes a 1.15 bulking factor	
10 CY loads in 12 CY dump trucks	

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	1,303
Excavation Diameter (ft)	9
Tunnel Volume (in-situ) (cu-yds)*	3,531
Shaft Volume (cu-yds)*	3,656
Total Volume of Shafts and Tunnel (cu-yds)*	7,187
Total Number of Truck Trips for Soil Removal	719
Total Number of Truck Trips for Piping and Casing	104
Total Number of Truck Trips for Shaft Construction	2,880
Disturbed Pavement (sq-ft)	2,820
Paving Replacement Import (18" thick) (cu-ft)	4,230
Paving Replacement Import (18" thick) (cu-yds)	157
Total Number of Truck Trips for Replacing Paving	16
Total Truck Trips During Construction	**3,719**
Number of Truck Trip per day on Average	8.26
*Assumes a 1.15 bulking factor	
10 CY loads in 12 CY dump trucks	

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils,Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction

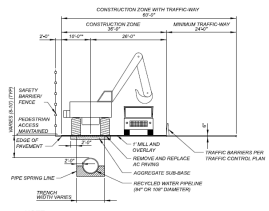
Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils,Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils,Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**1165.3**	Total Volume of Shafts and Tunnel (cu-yds) 11,939 Paving Replacement Import (18" thick) (cu-yds) 274 Total Exported Material (cu-yds) 12,213 11,939	Total Volume of Shafts and Tunnel (cu-yds) 7,187 Paving Replacement Import (18" thick) (cu-yds) 157 Total Exported Material (cu-yds) 7,344 7,187
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**793.6**		
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**334.6**		
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**37.2**		
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**212.2**		
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**212.2**		
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**137.5**		
Volume of Pipe Hauled to the Site from Storage per day (CY)	**137.5**		
Volume of Paving Material Imported to the Site per day (CY)	**28.7**		
Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.			
Fiber Optic Duct Bank			
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**51.1**		
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**		
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**46.0**		
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.1**		
Volume of Imported Soil to Storage from Supplier per day (CY)	**7.4**		
Volume of Imported Soil from Storage to the Site per day (CY)	**7.4**		
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**800**		
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**800**		
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**22.0**		
Volume of Paving Material Imported to the Site per day (CY)	**3.7**		
Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.			
Special Access Routes in the Riverbed or for Oversized Materials or Equipment		**Special Access Routes in the Riverbed or for Oversized Materials or Equipment**	**Special Access Routes in the Riverbed or for Oversized Materials or Equipment**
This does not apply to this construction method.		Not applicable.	Not applicable.
Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater		**Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater**	**Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater**
Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.		Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.	Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.
Temporary Lighting		**Temporary Lighting**	**Temporary Lighting**
There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.		Temporary lighting requirements: One 0.1 KW light inside tunnel per 25 feet. Two 10 KW post lights per shaft site.	Temporary lighting requirements: One 0.1 KW light inside tunnel per 25 feet. Two 10 KW post lights per shaft site.
Water Supply (Hydrants? Water Trucks?)		**Water Supply (Hydrants? Water Trucks?)**	**Water Supply (Hydrants? Water Trucks?)**
Water for construction will likely to obtained from local hydrants per an agreement with the local authority.		Water for construction will likely to obtained from local hydrants per an agreement with the local authority.	Water for construction will likely to obtained from local hydrants per an agreement with the local authority.
Temporary or Permanent Right-of-Way/Easements		**Temporary or Permanent Right-of-Way/Easements**	**Temporary or Permanent Right-of-Way/Easements**
It appears the pipeline is within the MWD service area for this construction method does not deviate into private property where a permanent easement would be required. It is not anticipated that temporary construction easements will be needed.		For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.	For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.
Demolition?		**Demolition?**	**Demolition?**
Paving will be demolished to a width of 16 feet along the pipeline and will extend 2 ft to either side of the 12' wide trench. In some locations additioanl hardscape, curbs, gutters, sidewalks and concrete medians will need to be demolished during the construction. All demolished items will be replaced to existing conditions.		There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.	There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.
Access Pits/Locations and Spacing		**Access Pits/Locations and Spacing**	**Access Pits/Locations and Spacing**
The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.		Shafts will be located at each end of each crossing.	Shafts will be located at each end of each crossing.
Traffic Control Requirements		**Traffic Control Requirements**	**Traffic Control Requirements**
Traffic control will be required throughout virtually all pipeline reaches for this construction method CM-1. A Construction Zone with traffic way will be used by taking out of service one side of the street as a will be used by taking out of service one side of the street as a Construction Zone and maintaining a Traffic Way on the other side of the street.		There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.	There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.
Generator Requirements		**Generator Requirements**	**Generator Requirements**
Large Generator Set 45kw for Night Lighting Standby Large Generator Set 45kw for Night Lighting Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)		Included in equipment list - see tab "Equipment - CM-4A through CM-4F"	Included in equipment list - see tab "Equipment - CM-4A through CM-4F"
Ventilation Requirements		**Ventilation Requirements**	**Ventilation Requirements**
Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)		100 HP Ventilation fan for each tunnel 40 HP Ventilation fan per shaft Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day	100 HP Ventilation fan for each tunnel 40 HP Ventilation fan per shaft Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day
Equipment Usage		**Equipment Usage**	**Equipment Usage**
See attached worksheet "Equipment - CM-1, CM-2, CM-3A"		See attached worksheet "Equipment - CM-4A through CM-4F"	See attached worksheet "Equipment - CM-4A through CM-4F"
CM-1 Roadways (Cut & Cover) - Excavation/Trenching			
Pipeline Construction Typical Trench dimensions are: 16 ft wide X 19 ft deep Total Length (ft) 28,574 Total Excavation (cu-ft) 8,686,515 **Total Excavation (cu-yds) 321,723** **(This does not include swelling of the soil once removed.)** **Fiber Optic Duct Bank** Typical Trench dimensions are: 2 ft wide X 5 ft deep Total Length (ft) 28,574 Total Excavation (cu-ft) 285,741 **Total Excavation (cu-yds) 10,583** **(This does not include swelling of the soil once removed.)**			
CM-1 Roadways - Pavement/Concrete Replacement or Rehabilitation			
Pipeline Construction Trench Width Pavement (sq-ft) 571,481 (20 feet wide through length of pipeline) Trench Width Pavement (sq-yds) 63,498 Finished Coat on half of Roadways (sq-yds) 1,142,962 (40 feet wide through length of pipeline - covering half of full roadway) **Fiber Optic Ductbank** Trench Width Pavement (sq-ft) 57,148 (2 feet wide through length of pipeline) Trench Width Pavement (sq-yds) 6,350			
CM-1 Roadways (Cut & Cover) - Temporary Median Removal			
Median Locations: None this Contract			

Reach 2, Preferred Alignment CEQA Responses, MWD RRWP (7 feet Diameter Pipeline)

CM-1 Roadways



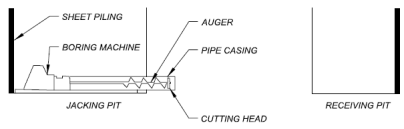
NOTE:

1. MEDIUM IMPACTS (IF APPLICABLE) ARE COVERED IN COST ADDERS.

CONSTRUCTION METHOD 1 - ROADWAY

1"= 10'-0"

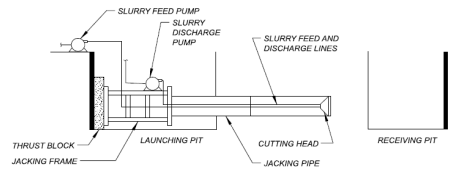
CM-4A Pipe Jacking



CONSTRUCTION METHOD 4A - JACK & BORE

NTS

CM-4B Microtunneling



CONSTRUCTION METHOD 4B - MICRO-TUNNELING (SLURRY FACE TBM W/ PIPE JACKING)

NTS

Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
9	25	1,010
9, 10	27	3,209
10	29	448
10, 11, 12	31	5,104
12	33	722
12	35	1,192
12	37	608
12, 13	39	3,915
13	41	2,386
13, 14, 15	43	4,948
15	45	1,678
15, 16, 17	47	2,266
16, 17	49	1,426
16, 17	51	3,478
	Total	**32,390**

Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
9	26	106
	Total	**106**

2 shafts

Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
8, 9	24	2,754
10	28	275
10	30	267
11, 12	32	346
12	34	128
12	36	83
12	38	109
13	40	109
13	42	363
15	44	934
15, 16	46	374
16, 17	48	361
16, 17	50	132
	Total	**6,237**

26 shafts

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	650
Daily Crew Production (FT per day)	30
Estimated Number of Pipeline Crews Per Day	1.66
Number of Pipeline Crews	2
Pipeline Construction Crews	1
Workers per crew	7
Shoring Crews	0.2
Workers per Crew	3
Saw Cut Crew	0.05
Workers per crew	3
Demolition Crew	0.05
Workers per crew	3
Paving Crew	0.2
Workers per crew	5
Utility Relocation Crew	0.1
Workers per crew	6
Traffic Control	0.15
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**20.20**
Total Workers per Day (Average Throughout Construction Schedule)	**16.78**
Fiber Optic Duct Bank	
Construction Schedule (working days)	650
Daily Crew Production (FT per day)	200
Estimated Number of Combined Fiber Optic Crews Per Day	0.25
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0.1
Workers per crew	5
Total Workers per Day (Average Throughout Fiber Optic Construction)	**8.30**
Total Workers per Day (Average Throughout Construction Schedule)	**2.07**

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	650
Feet of Tunnel Construction needed per day	0.16
Estimated Number of Tunnel Crews Per Day (based on 10 feet per day per crew)	0.02
Estimated Number of Pipeline Crews Per Day (based on 40 feet per day per crew)	0.00
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	0.28
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	7
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**2.69**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	650
Feet of Tunnel Construction needed per day	9.59
Estimated Number of Tunnel Crews Per Day (based on 20 feet per day per crew)	0.48
Estimated Number of Pipeline Crews Per Day (based on 40 feet per day per crew)	0.24
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	4
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	15
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**40.13**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	16.78
One-Way Trips per Day (50 miles)	33.55
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**35.6**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule)	2.07
One-Way Trips per Day (50 miles)	4.14
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**6.1**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	52.00
One-Way Trips per Day (50 miles)	104.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	6
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**110.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	
Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	17.00
One-Way Trips per Day (50 miles)	34.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**36.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	2.69
One-Way Trips per Day (50 miles)	5.39
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**7.4**
* Assumes maximum of 15 workers per shuttle.	
Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	16.00
One-Way Trips per Day (50 miles)	32.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**34.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	40.13
One-Way Trips per Day (50 miles)	80.27
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	4
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**84.3**
* Assumes maximum of 15 workers per shuttle.	
Pipeline Construction	
Total Workers per Day (Maximum Throughout Construction Schedule)	66.00
One-Way Trips per Day (50 miles)	132.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	6
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**138.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	16.78
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.7**
Total Workers per Day (Maximum During Construction Schedule)	52.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**36.4**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	2.07
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**1.4**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	2.69
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**1.9**
Total Workers per Day (Maximum During Construction Schedule)	16.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.2**

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	40.13
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**28.1**
Total Workers per Day (Maximum During Construction Schedule)	66.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**46.2**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 200 miles.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

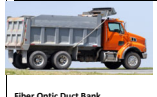
Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (16' W x 19' D) (includes paving debris)	304.0
Volume of Excavate (CY) per Ft of Trench (16' W x 19' D) (includes paving debris)	11.26
Volume Excavate (CY) per FT Including Swell of 15%	12.95
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.29
Estimated Length of Trench per Day Per Crew (ft)	30.0
Number of Haul Trucks per Crew per Daily Production	38.8
Total One-Way Haul Trips from Site to Staging/Storage and return	**77.7**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline (4.75' H x 16' W minus (0.5*3.14*7.25^2)/4)	55.37
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.05
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.36
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.24
Estimated Length of Trench per Day Per Crew (ft)	30
Number of Pipe Bedding Import Trucks per Day	7.1
Total One-Way Haul Trips of Pipe Bedding Import to Site	**14.1**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**14.1**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**52.9**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**22.3**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**2.5**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**1.5**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**1.5**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**1.1**
(Assumes 3" thick above 20' wide at trench plus 40' full overlay for half the full road wide)	
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**187.8**
Daily One-Way Haul Trips During the Pipeline Construction (Two Crews)	**375.6**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**311.9**

10 Wheel Dump Trucks for Soils Transport:



18 Wheel Flatbed Trucks for Hauling Pipe

Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	200
One-Way Spoils Haul Trips from Site to Storage Site and return	**8.89**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**16.0**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**1.8**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.5**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.5**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	800
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	22.0
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**5.5**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.4**
(Assumes 3" thick above 2' wide at trench)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**36.1**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**9.0**

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	106
Excavation Diameter (ft)	9
Tunnel Volume (in-situ) (cu-yds)*	287
Shaft Volume (cu-yds)*	914
Total Volume of Shafts and Tunnel (cu-yds)*	1,201
Total Number of Truck Trips for Soil Removal	120
Total Number of Truck Trips for Piping and Casing	8
Total Number of Truck Trips for Shaft Construction	720
Disturbed Pavement (sq-ft)	705
Paving Replacement Import (18" thick) (cu-ft)	1,058
Paving Replacement Import (18" thick) (cu-yds)	39
Total Number of Truck Trips for Replacing Paving	4
Total Truck Trips During Construction	**853**
Number of Truck Trip per day on Average	1.31

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	6,237
Excavation Diameter (ft)	9
Tunnel Volume (in-situ) (cu-yds)*	16,899
Shaft Volume (cu-yds)*	11,882
Total Volume of Shafts and Tunnel (cu-yds)*	28,781
Total Number of Truck Trips for Soil Removal	2,878
Total Number of Truck Trips for Piping and Casing	499
Total Number of Truck Trips for Shaft Construction	4,680
Disturbed Pavement (sq-ft)	9,165
Paving Replacement Import (18" thick) (cu-ft)	13,748
Paving Replacement Import (18" thick) (cu-yds)	509
Total Number of Truck Trips for Replacing Paving	51
Total Truck Trips During Construction	**8,108**
Number of Truck Trip per day on Average	12.47

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

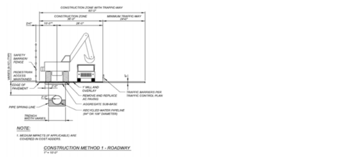
Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils,Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)	Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils,Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)	Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils,Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)
Pipeline Construction **Volume of Excavate per Day Exported from the Site to Storage per day (CY) 776.9** **Volume of Excavate per Day Returned to the Site from Storage per day (CY) 529.1** **Volume of Spoils from Storage to Landfill (non-hazardous) (CY) 223.0** **Volume of Spoils from Storage to Landfill (Hazardous) (CY) 24.8** **Volume of Imported Pipe Bedding to Storage from Supplier per day (CY) 141.5** **Volume of Imported Pipe Bedding from Storage to the Site per day (CY) 141.5** **Volume of Pipe Hauled to Storage by the Supplier per day (CY) 91.7** **Volume of Pipe Hauled to the Site from Storage per day (CY) 91.7** **Volume of Paving Material Imported to the Site per day (CY) 19.1** **Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.** **Fiber Optic Duct Bank** **Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell) 51.1** **Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY) 0.0** **Volume of Spoils from Storage to Landfill (non-hazardous) (CY) 46.0** **Volume of Spoils from Storage to Landfill (Hazardous) (CY) 5.1** **Volume of Imported Soil to Storage from Supplier per day (CY) 7.4** **Volume of Imported Soil from Storage to the Site per day (CY) 7.4** **Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY) 800** **Length of 6" Conduit Hauled to the Site from Storage per day (CY) 800** **Volume of Concrete Hauled to the Site from Supplier per day (CY) 22.0** **Volume of Paving Material Imported to the Site per day (CY) 3.7** Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.	Total Volume of Shafts and Tunnel (cu-yds) 1,201 Paving Replacement Import (18" thick) (cu-yds) 39 Total Exported Material (cu-yds) 1,240 1,201	Total Volume of Shafts and Tunnel (cu-yds) 28,781 Paving Replacement Import (18" thick) (cu-yds) 509 Total Exported Material (cu-yds) 29,290 28,781
Special Access Routes in the Riverbed or for Oversized Materials or Equipment This does not apply to this construction method.	**Special Access Routes in the Riverbed or for Oversized Materials or Equipment** Not applicable.	**Special Access Routes in the Riverbed or for Oversized Materials or Equipment** Not applicable.
Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.	**Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater** Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.	**Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater** Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.
Temporary Lighting There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.	**Temporary Lighting** Temporary lighting requirements: One 0.1 KW light inside tunnel per 25 feet. Two 10 KW post lights per shaft site.	**Temporary Lighting** Temporary lighting requirements: One 0.1 KW light inside tunnel per 25 feet. Two 10 KW post lights per shaft site.
Water Supply (Hydrants? Water Trucks?) Water for construction will likely to obtained from local hydrants per an agreement with the local authority.	**Water Supply (Hydrants? Water Trucks?)** Water for construction will likely to obtained from local hydrants per an agreement with the local authority.	**Water Supply (Hydrants? Water Trucks?)** Water for construction will likely to obtained from local hydrants per an agreement with the local authority.
Temporary or Permanent Right-of-Way/Easements It appears the pipeline is within the MWD service area for this construction method does not deviate into private property where a permanent easement would be required. It is not anticipated that temporary construction easements will be needed.	**Temporary or Permanent Right-of-Way/Easements** For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.	**Temporary or Permanent Right-of-Way/Easements** For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.
Demolition? Paving will be demolished to a width of 16 feet along the pipeline and will extend 2 ft to either side of the 12' wide trench. In some locations additioanl hardscape, curbs, gutters, sidewalks and concrete medians will need to be demolished during the construction. All demolished items will be replaced to existing conditions.	**Demolition?** There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.	**Demolition?** There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.
Access Pits/Locations and Spacing The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.	**Access Pits/Locations and Spacing** Shafts will be located at each end of each crossing.	**Access Pits/Locations and Spacing** Shafts will be located at each end of each crossing.
Traffic Control Requirements Traffic control will be required throughout virtually all pipeline reaches for this construction method CM-1. A Construction Zone with traffic way will be used by taking out of service one side of the street as a will be used by taking out of service one side of the street as a Construction Zone and maintaining a Traffic Way on the other side of the street.	**Traffic Control Requirements** There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.	**Traffic Control Requirements** There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.
Generator Requirements Large Generator Set 45kw for Night Lighting Standby Large Generator Set 45kw for Night Lighting Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	**Generator Requirements** Included in equipment list - see tab "Equipment - CM-4A through CM-4F"	**Generator Requirements** Included in equipment list - see tab "Equipment - CM-4A through CM-4F"
Ventilation Requirements Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	**Ventilation Requirements** 100 HP Ventilation fan for each tunnel 40 HP Ventilation fan per shaft Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day	**Ventilation Requirements** 100 HP Ventilation fan for each tunnel 40 HP Ventilation fan per shaft Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day
Equipment Usage See attached worksheet "Equipment - CM-1, CM-2, CM-3A"	**Equipment Usage** See attached worksheet "Equipment - CM-4A through CM-4F"	**Equipment Usage** See attached worksheet "Equipment - CM-4A through CM-4F"
CM-1 Roadways (Cut & Cover) - Excavation/Trenching		
Pipeline Construction Typical Trench dimensions are: 16 ft wide X 19 ft deep Total Length (ft) 32,390 Total Excavation (cu-ft) 9,846,616 **Total Excavation (cu-yds) 364,689** **(This does not include swelling of the soil once removed.)**		
Fiber Optic Ductbank Trench Width Pavement (sq-ft) 64,780 (2 feet wide through length of pipeline) Trench Width Pavement (sq-yds) 7,198		
CM-1 Roadways - Pavement/Concrete Replacement or Rehabilitation		
Pipeline Construction Trench Width Pavement (sq-ft) 647,804 (20 feet wide through length of pipeline) Trench Width Pavement (sq-yds) 71,978 Finished Coat on half of Roadways (sq-yds) 1,295,607 (40 feet wide through length of pipeline - covering half of full roadway) **Fiber Optic Ductbank** Trench Width Pavement (sq-ft) 64,780 (2 feet wide through length of pipeline) Trench Width Pavement (sq-yds) 7,198		
CM-1 Roadways (Cut & Cover) - Temporary Median Removal		
Median Locations: None this Contract		

Reach 3, Preferred Alignment (CEQA Responses, MWD RRWP 7 foot Diameter Pipeline)

CM-1 Roadways



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
18	52	2,590
	Total	2,590

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	415
Daily Crew Production (FT per day)	30
Estimated Number of Pipeline Crews Per Day	0.21
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	7
Shoring Crews	0.2
Workers per Crew	3
Saw Cut Crew	0.05
Workers per crew	3
Demolition Crew	0.05
Workers per crew	3
Paving Crew	0.2
Workers per crew	5
Utility Relocation Crew	0.1
Workers per crew	6
Traffic Control	0.15
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.10**
Total Workers per Day (Average Throughout Construction Schedule)	**2.10**

Fiber Optic Duct Bank	
Construction Schedule (working days)	415
Daily Crew Production (FT per day)	200
Estimated Number of Combined Fiber Optic Crews Per Day	0.03
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0.1
Workers per crew	5
Total Workers per Day (Average Throughout Fiber Optic Construction)	**8.30**
Total Workers per Day (Average Throughout Construction Schedule)	**0.26**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	2.10
One-Way Trips per Day (50 miles)	4.20
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**6.2**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	

Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule	0.26
One-Way Trips per Day (50 miles)	0.52
Shuttle to Move Workers from Park to Site (One way - 5 miles)	0
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**0.5**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	

Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule	26.00
One-Way Trips per Day (50 miles)	52.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	4
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**56.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	17.00
One-Way Trips per Day (50 miles)	34.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**36.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	2.10
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**1.5**
Total Workers per Day (Maximum During Construction Schedule)	26.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**18.2**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.26
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.2**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 200 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (16' W x 19' D) (includes paving debris)	304.0
Volume of Excavate (CY) per Ft of Trench (16' W x 19' D) (includes paving debris)	11.26
Volume Excavate (CY) per FT Including Swell of 15%	12.95
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.29
Estimated Length of Trench per Day Per Crew (ft)	30.0
Number of Haul Trucks per Crew per Daily Production	38.8
Total One-Way Haul Trips from Site to Staging/Storage and return	**77.7**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline	
(4.75' H x 16' W minus (0.5*3.14*7.25^2)/4)	55.37
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.05
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.36
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.24
Estimated Length of Trench per Day Per Crew (ft)	30
Number of Pipe Bedding Import Trucks per Day	7.1
Total One-Way Haul Trips of Pipe Bedding Import to Site	**14.1**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**14.1**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**52.9**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**22.3**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**2.5**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**1.5**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**1.5**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**1.1**
(Assumes 3" thick above 20' wide at trench plus 40' full overlay for half the full road wide)	
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**187.8**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**39.1**

10 Wheel Dump Trucks for Soils Transport:

18 Wheel Flatbed Trucks for Hauling Pipe

Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	200
One-Way Spoils Haul Trips from Site to Storage Site and return	**8.89**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**16.0**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**1.8**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.5**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.5**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	800
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	22.0
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**5.5**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.4**
(Assumes 3" thick above 2' wide at trench)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**36.1**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**1.1**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**388.4**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**264.5**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**111.5**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**12.4**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**70.7**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**70.7**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**45.8**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**45.8**
Volume of Paving Material Imported to the Site per day (CY)	**9.6**

Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.

Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**51.1**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**46.0**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.1**
Volume of Imported Soil to Storage from Supplier per day (CY)	**7.4**
Volume of Imported Soil from Storage to the Site per day (CY)	**7.4**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**800**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**800**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**22.0**
Volume of Paving Material Imported to the Site per day (CY)	**3.7**

Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

This does not apply to this construction method.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

It appears the pipeline is within the MWD service area for this construction method does not deviate into private property where a permanent easement would be required. It is not anticipated that temporary construction easements will be needed.

Demolition?

Paving will be demolished to a width of 16 feet along the pipeline and will extend 2 ft to either side of the 12' wide trench. In some locations additioanl hardscape, curbs, gutters, sidewalks and concrete medians will need to be demolished during the construction. All demolished items will be replaced to existing conditions.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

Traffic control will be required throughout virtually all pipeline reaches for this construction method CM-1. A Construction Zone with traffic way will be used by taking out of service one side of the street as a will be used by taking out of service one side of the street as a Construction Zone and maintaining a Traffic Way on the other side of the street.

Generator Requirements

Large Generator Set 45kw for Night Lighting
Standby Large Generator Set 45kw for Night Lighting
Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Ventilation Requirements

Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Equipment Usage

See attached worksheet "Equipment - CM-1, CM-2, CM-3A"

CM-1 Roadways (Cut & Cover) - Excavation/Trenching

Pipeline Construction	
Typical Trench dimensions are: 16 ft wide X 19 ft deep	
Total Length (ft)	2,590
Total Excavation (cu-ft)	787,360
Total Excavation (cu-yds)	**29,161**
(This does not include swelling of the soil once removed.)	
Fiber Optic Duct Bank	
Typical Trench dimensions are: 2 ft wide X 5 ft deep	
Total Length (ft)	2,590
Total Excavation (cu-ft)	25,900
Total Excavation (cu-yds)	**959**
(This does not include swelling of the soil once removed.)	

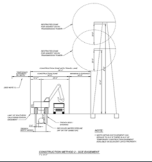
CM-1 Roadways - Pavement/Concrete Replacement or Rehabilitation

Pipeline Construction	
Trench Width Pavement (sq-ft)	51,800
(20 feet wide through length of pipeline)	
Trench Width Pavement (sq-yds)	5,756
Finished Coat on half of Roadways (sq-yds)	103,600
(40 feet wide through length of pipeline - covering half of full roadway)	
Fiber Optic Ductbank	
Trench Width Pavement (sq-ft)	5,180
(2 feet wide through length of pipeline)	
Trench Width Pavement (sq-yds)	576

CM-1 Roadways (Cut & Cover) - Temporary Median Removal

Median Locations: None this Contract

CM-2 SCE Easement



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
20, 21	56	4,980
21, 22	58	2,759
	Total	7,739

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	415
Feet of Pipeline Construction per day needed	100
Estimated Number of Pipeline Crews Per Day	0.19
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	9
Shoring Crews	0.2
Workers per Crew	3
Utility Relocation Crew	0.05
Workers per crew	6
Water Truck Crew	0.15
Workers per Crew	1
Site Restoration Crew	0.15
Workers per crew	3
Temporary Gravel Roadway Crew	0.1
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.9**
Total Workers per Day (Average Throughout Construction Schedule)	**2.03**

Fiber Optic Duct Bank	
Construction Schedule (working days)	415
Daily Crew Production (FT per day)	220
Estimated Number of Combined Fiber Optic Crews Per Day	0.03
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0
Workers per crew	0
Total Workers per Day (Average Throughout Fiber Optic Construction)	**7.80**
Total Workers per Day (Average Throughout Construction Schedule)	**0.24**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	2.03
One-Way Trips per Day (50 miles)	4.07
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**6.1**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	

Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule	0.24
One-Way Trips per Day (50 miles)	0.47
Shuttle to Move Workers from Park to Site (One way - 5 miles)	0
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**0.5**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	

Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule	18.00
One-Way Trips per Day (50 miles)	36.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**38.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	12.00
One-Way Trips per Day (50 miles)	24.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**26.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	2.03
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**1.4**
Total Workers per Day (Maximum During Construction Schedule)	18.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**12.6**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.24
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.2**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 150 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (16' W x 19' D) (includes paving debris)	304.0
Volume of Excavate (CY) per Ft of Trench (16' W x 19' D) (includes paving debris)	11.26
Volume Excavate (CY) per FT Including Swell of 15%	12.95
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.29
Estimated Length of Trench per Day Per Crew (ft)	100.0
Number of Haul Trucks per Crew per Daily Production	129.5
Total One-Way Haul Trips from Site to Staging/Storage and return	**259.0**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline	
(4.75' H x 16' W minus (0.5*3.14*7.25^2)/4)	55.37
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.05
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.36
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.24
Estimated Length of Trench per Day Per Crew (ft)	100
Number of Pipe Bedding Import Trucks per Day	23.6
Total One-Way Haul Trips of Pipe Bedding Import to Site	**47.2**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**47.2**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**176.4**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**74.3**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**8.3**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**5.0**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**5.0**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**0.0**
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**622.3**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**116.0**

Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	220
One-Way Spoils Haul Trips from Site to Storage Site and return	**9.78**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**17.6**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**2.0**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.6**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.6**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	880
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	24.2
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**6.0**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.0**
(Not Applicable)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**39.3**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**1.2**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**1294.8**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**881.8**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**371.7**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**41.3**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**235.8**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**235.8**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**152.8**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**152.8**
Volume of Paving Material Imported to the Site per day (CY)	**31.9**

Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.

Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**56.2**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**50.6**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.6**
Volume of Imported Soil to Storage from Supplier per day (CY)	**8.1**
Volume of Imported Soil from Storage to the Site per day (CY)	**8.1**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**880**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**880**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**24.2**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**

Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

This does not apply to this construction method.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from water trucks due to the lack of available hydrants in these areas.

Temporary or Permanent Right-of-Way/Easements

The pipeline within the SCE easement will require obtaining a permanent easement. Contractors will also need temporary construction easements along the piping route since their construction activities will extend beyond the limits of the permanent easement.

Demolition?

Surface features will be demolished during construction and will be replaced back to existing conditions including grassland, gravel, concrete paving, etc.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

The majority of the CM-2 method construction will take place cross country away from existing streets. Minimal traffic control may be required in some locations to ensure safety.

Generator Requirements

Large Generator Set 45kw for Night Lighting
Standby Large Generator Set 45kw for Night Lighting
Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Ventilation Requirements

Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

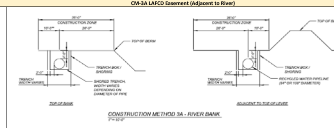
Equipment Usage

See attached worksheet "Equipment - CM-1, CM-2, CM-3A"

CM-2 SCE Easement (Cut & Cover) - Excavation/Trenching

Pipeline Construction	
Typical Trench dimensions are: 16 ft wide X 19 ft deep	
Total Length (ft)	7,739
Total Excavation (cu-ft)	2,352,623
Total Excavation (cu-yds)	**87,134**
(This does not include swelling of the soil once removed.)	
Fiber Optic Duct Bank	
Typical Trench dimensions are: 2 ft wide X 5 ft deep	
Total Length (ft)	7,739
Total Excavation (cu-ft)	77,389
Total Excavation (cu-yds)	**2,866**
(This does not include swelling of the soil once removed.)	

CM-3A LAFCD Easement (Adjacent to River)



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
19, 20	54	3,120
	Total	3,120

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	415
Feet of Pipeline Construction per day needed	100
Estimated Number of Pipeline Crews Per Day	0.08
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	9
Shoring Crews	0.2
Workers per Crew	3
Utility Relocation Crew	0.05
Workers per crew	6
Water Truck Crew	0.15
Workers per Crew	1
Site Restoration Crew	0.15
Workers per crew	3
Temporary Gravel Roadway Crew	0.1
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.9**
Total Workers per Day (Average Throughout Construction Schedule)	**0.82**

Fiber Optic Duct Bank	
Construction Schedule (working days)	415
Daily Crew Production (FT per day)	220
Estimated Number of Combined Fiber Optic Crews Per Day	0.03
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0
Workers per crew	0
Total Workers per Day (Average Throughout Fiber Optic Construction)	**7.80**
Total Workers per Day (Average Throughout Construction Schedule)	**0.27**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	0.82
One-Way Trips per Day (50 miles)	1.64
Shuttle to Move Workers from Park to Site (One way - 5 miles)	0
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**1.6**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	

Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule	0.27
One-Way Trips per Day (50 miles)	0.53
Shuttle to Move Workers from Park to Site (One way - 5 miles)	0
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**0.5**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	

Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule	12.00
One-Way Trips per Day (50 miles)	24.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**26.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	12.00
One-Way Trips per Day (50 miles)	24.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**26.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	0.82
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.6**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.27
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.2**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 150 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (16' W x 19' D) (includes paving debris)	304.0
Volume of Excavate (CY) per Ft of Trench (16' W x 19' D) (includes paving debris)	11.26
Volume Excavate (CY) per FT Including Swell of 15%	12.95
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.29
Estimated Length of Trench per Day Per Crew (ft)	100.0
Number of Haul Trucks per Crew per Daily Production	129.5
Total One-Way Haul Trips from Site to Staging/Storage and return	**259.0**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline	
(4.75' H x 16' W minus (0.5*3.14*7.25^2)/4)	55.37
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.05
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.36
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.24
Estimated Length of Trench per Day Per Crew (ft)	100
Number of Pipe Bedding Import Trucks per Day	23.6
Total One-Way Haul Trips of Pipe Bedding Import to Site	**47.2**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**47.2**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**176.4**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**74.3**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**8.3**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**5.0**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**5.0**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**0.0**
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**622.3**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**46.8**

Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	220
One-Way Spoils Haul Trips from Site to Storage Site and return	**9.78**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**17.6**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**2.0**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.6**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.6**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	880
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	24.2
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**6.0**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.0**
(Not Applicable)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**39.3**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**1.3**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**1294.8**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**881.8**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**371.7**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**41.3**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**235.8**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**235.8**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**152.8**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**152.8**
Volume of Paving Material Imported to the Site per day (CY)	**31.9**

Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.

Note: Values are per day of Pipeline Construction and are not averaged over the Construction Schedule for the Reach.

Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**56.2**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**50.6**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.6**
Volume of Imported Soil to Storage from Supplier per day (CY)	**8.1**
Volume of Imported Soil from Storage to the Site per day (CY)	**8.1**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**880**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**880**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**24.2**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**

Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Temporary roadway surface will be needed to allow heavy vehicle access particularly during wet weather.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

The pipeline within the LAFCD easement will require obtaining a permanent easement. Contractors will also need temporary construction easements along the piping route since their construction activities will extend beyond the limits of the permanent easement.

Demolition?

Surface features will be demolished during construction and will be replaced back to existing conditions including grassland, gravel, concrete paving, etc.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

The majority of the CM-3A method construction will take place cross country away from existing streets. Minimal traffic control may be required in some locations to ensure safety.

Generator Requirements

Large Generator Set 45kw for Night Lighting
Standby Large Generator Set 45kw for Night Lighting
Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Ventilation Requirements

Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

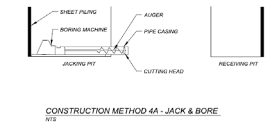
Equipment Usage

See attached worksheet "Equipment - CM-1, CM-2, CM-3A"

CM-3A LAFCD Easement (Cut & Cover) - Excavation/Trenching

Pipeline Construction	
Typical Trench dimensions are: 16 ft wide X 19 ft deep	
Total Length (ft)	3,120
Total Excavation (cu-ft)	948,489
Total Excavation (cu-yds)	**35,129**
(This does not include swelling of the soil once removed.)	
Fiber Optic Duct Bank	
Typical Trench dimensions are: 2 ft wide X 5 ft deep	
Total Length (ft)	3,120
Total Excavation (cu-ft)	31,200
Total Excavation (cu-yds)	**1,156**
(This does not include swelling of the soil once removed.)	

CM-4A Pipe Jacking



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
20	55	393
21	57	233
	Total	626

4 shafts

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	415
Feet of Tunnel Construction needed per day	1.51
Estimated Number of Tunnel Crews Per Day	0.15
(based on 10 feet per day per crew)	
Estimated Number of Pipeline Crews Per Day	0.04
(based on 40 feet per day per crew)	
Estimated Number of Shaft Crews Per Day	0.87
(based on 90 days per shaft)	
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	7
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**8.90**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	8.90
One-Way Trips per Day (50 miles)	17.80
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**19.8**
* Assumes maximum of 15 workers per shuttle	
Total Workers per Day (Maximum During Construction Schedule	16.00
One-Way Trips per Day (50 miles)	32.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**34.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	8.90
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**6.2**
Total Workers per Day (Maximum During Construction Schedule)	16.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.2**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	626
Excavation Diameter (ft)	9
Tunnel Volume (in-situ) (cu-yds)*	1,697
Shaft Volume (cu-yds)*	1,828
Total Volume of Shafts and Tunnel (cu-yds)*	3,525
Total Number of Truck Trips for Soil Removal	353
Total Number of Truck Trips for Piping and Casing	50
Total Number of Truck Trips for Shaft Construction	1,440
Disturbed Pavement (sq-ft)	1,410
Paving Replacement Import (18" thick) (cu-ft)	2,115
Paving Replacement Import (18" thick) (cu-yds)	78
Total Number of Truck Trips for Replacing Paving	8
Total Truck Trips During Construction	**1,850**
Number of Truck Trip per day on Average	4.46

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	3,525
Paving Replacement Import (18" thick) (cu-yds)	78
Total Exported Material (cu-yds)	3,603
	3,525

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

Generator Requirements

Included in equipment list - see tab "Equipment - CM-4A through CM-4F"

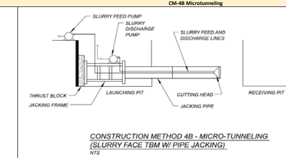
Ventilation Requirements

100 HP Ventilation fan for each tunnel
40 HP Ventilation fan per shaft
Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day.

Equipment Usage

See attached worksheet "Equipment - CM-4A through CM-4F"

CM-4B Microtunneling



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
18, 19	53	2,220
	Total	2,220

2 shafts

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	415
Feet of Tunnel Construction needed per day	5.35
Estimated Number of Tunnel Crews Per Day	0.27
(based on 20 feet per day per crew)	
Estimated Number of Pipeline Crews Per Day	0.13
(based on 40 feet per day per crew)	
Estimated Number of Shaft Crews Per Day	0.43
(based on 90 days per shaft)	
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	15
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**9.92**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	9.92
One-Way Trips per Day (50 miles)	19.84
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	4
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**23.8**
* Assumes maximum of 15 workers per shuttle	
Total Workers per Day (Maximum Throughout Construction Schedule	16.00
One-Way Trips per Day (50 miles)	32.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	6
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**38.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	9.92
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**6.9**
Total Workers per Day (Maximum During Construction Schedule)	16.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.2**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	2,220
Excavation Diameter (ft)	9
Tunnel Volume (in-situ) (cu-yds)*	6,016
Shaft Volume (cu-yds)*	914
Total Volume of Shafts and Tunnel (cu-yds)*	6,930
Total Number of Truck Trips for Soil Removal	693
Total Number of Truck Trips for Piping and Casing	178
Total Number of Truck Trips for Shaft Construction	720
Disturbed Pavement (sq-ft)	705
Paving Replacement Import (18" thick) (cu-ft)	1,058
Paving Replacement Import (18" thick) (cu-yds)	39
Total Number of Truck Trips for Replacing Paving	4
Total Truck Trips During Construction	**1,595**
Number of Truck Trip per day on Average	3.84

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	6,930
Paving Replacement Import (18" thick) (cu-yds)	39
Total Exported Material (cu-yds)	6,969
	6,930

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

Generator Requirements

Included in equipment list - see tab "Equipment - CM-4A through CM-4F"

Ventilation Requirements

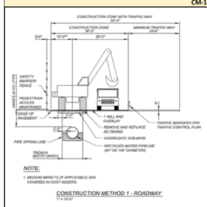
100 HP Ventilation fan for each tunnel
40 HP Ventilation fan per shaft
Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day.

Equipment Usage

See attached worksheet "Equipment - CM-4A through CM-4F"

Reach 4, Preferred Alignment CEQA Responses, MWD RRWP (7 feet Diameter Pipeline)

CM-1 Roadways



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
24, 25, 26, 27	62	12,783
	Total	12,783

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	1280
Daily Crew Production (FT per day)	30
Estimated Number of Pipeline Crews Per Day	0.33
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	7
Shoring Crews	0.2
Workers per Crew	3
Saw Cut Crew	0.05
Workers per crew	3
Demolition Crew	0.05
Workers per crew	3
Paving Crew	0.2
Workers per crew	5
Utility Relocation Crew	0.1
Workers per crew	6
Traffic Control	0.15
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.10**
Total Workers per Day (Average Throughout Construction Schedule)	**3.36**

Fiber Optic Duct Bank	
Construction Schedule (working days)	1280
Daily Crew Production (FT per day)	200
Estimated Number of Combined Fiber Optic Crews Per Day	0.05
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0.1
Workers per crew	5
Total Workers per Day (Average Throughout Fiber Optic Construction)	**8.30**
Total Workers per Day (Average Throughout Construction Schedule)	**0.41**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	3.36
One-Way Trips per Day (50 miles)	6.72
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**8.7**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle

Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule)	0.41
One-Way Trips per Day (50 miles)	0.83
Shuttle to Move Workers from Park to Site (One way - 5 miles)	0
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**0.8**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle

Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	26.00
One-Way Trips per Day (50 miles)	52.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	4
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**56.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle
Note: Hauling Vehicles included in Items below.

Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	17.00
One-Way Trips per Day (50 miles)	34.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**36.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle
Note: Hauling Vehicles included in Items below.

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	3.36
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**2.4**
Total Workers per Day (Maximum During Construction Schedule)	26.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**18.2**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.41
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.3**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

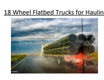
Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 200 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (16' W x 19' D) (includes paving debris)	304.0
Volume of Excavate (CY) per Ft of Trench (16' W x 19' D) (includes paving debris)	11.26
Volume Excavate (CY) per FT Including Swell of 15%	12.95
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.29
Estimated Length of Trench per Day Per Crew (ft)	30.0
Number of Haul Trucks per Crew per Daily Production	38.8
Total One-Way Haul Trips from Site to Staging/Storage and return	**77.7**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline (4.75' H x 16' W minus (0.5*3.14*7.25^2)/4)	55.37
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.05
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.36
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.24
Estimated Length of Trench per Day Per Crew (ft)	30
Number of Pipe Bedding Import Trucks per Day	7.1
Total One-Way Haul Trips of Pipe Bedding Import to Site	**14.1**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**14.1**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return) (68.1% of Excavate Trips from Site to Storage)	**52.9**
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back (31.9%*90% of Excavate Trips from Site to Storage)	**22.3**
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back (31.9%*10% of Excavate Trips from Site to Storage)	**2.5**
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way) (Assumes 20 ft of 7' DIA pipe per trip)	**1.5**
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way) (Assumes 20 ft of 7' DIA pipe per trip)	**1.5**
No. of One way Trips to Site Importing Paving Materials (50 miles ea way) (Assumes 3" thick above 20' wide at trench plus 40' full overlay for half the full road wide)	**1.1**
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**187.8**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**62.5**

10 Wheel Dump Trucks for Soils Transport:

18 Wheel Flatbed Trucks for Hauling Pipe



Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	200
One-Way Spoils Haul Trips from Site to Storage Site and return	**8.89**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**16.0**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**1.8**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.5**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.5**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	800
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	22.0
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**5.5**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return (Assumes 3" thick above 2' wide at trench)	**0.4**
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**36.1**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**1.8**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**388.4**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**264.5**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**111.5**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**12.4**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**70.7**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**70.7**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**45.8**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**45.8**
Volume of Paving Material Imported to the Site per day (CY)	**9.6**

Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.

Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**51.1**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**46.0**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.1**
Volume of Imported Soil to Storage from Supplier per day (CY)	**7.4**
Volume of Imported Soil from Storage to the Site per day (CY)	**7.4**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**800**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**800**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**22.0**
Volume of Paving Material Imported to the Site per day (CY)	**3.7**

Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

This does not apply to this construction method.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

It appears the pipeline is within the MWD service area for this construction method does not deviate into private property where a permanent easement would be required. It is not anticipated that temporary construction easements will be needed.

Demolition?

Paving will be demolished to a width of 16 feet along the pipeline and will extend 2 ft to either side of the 12' wide trench. In some locations additioanl hardscape, curbs, gutters, sidewalks and concrete medians will need to be demolished during the construction. All demolished items will be replaced to existing conditions.

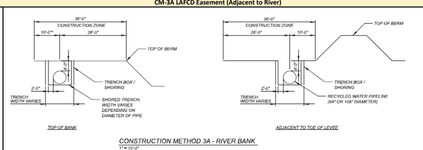
Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

Traffic control will be required throughout virtually all pipeline reaches for this construction method CM-1. A Construction Zone with traffic way will be used by taking out of service one side of the street as a will be used by taking out of service one side of the street as a

CM-3A LAFCD Easement (Adjacent to River)



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
22	59	1,216
	Total	1,216

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	1280
Feet of Pipeline Construction per day needed	100
Estimated Number of Pipeline Crews Per Day	0.01
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	9
Shoring Crews	0.2
Workers per Crew	3
Utility Relocation Crew	0.05
Workers per crew	6
Water Truck Crew	0.15
Workers per Crew	1
Site Restoration Crew	0.15
Workers per crew	3
Temporary Gravel Roadway Crew	0.1
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.9**
Total Workers per Day (Average Throughout Construction Schedule)	**0.10**

Fiber Optic Duct Bank	
Construction Schedule (working days)	1280
Daily Crew Production (FT per day)	220
Estimated Number of Combined Fiber Optic Crews Per Day	0.004
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0
Workers per crew	0
Total Workers per Day (Average Throughout Fiber Optic Construction)	**7.80**
Total Workers per Day (Average Throughout Construction Schedule)	**0.03**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	0.10
One-Way Trips per Day (50 miles)	0.21
Shuttle to Move Workers from Park to Site (One way - 5 miles)	0
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**0.2**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle

Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule)	0.03
One-Way Trips per Day (50 miles)	0.07
Shuttle to Move Workers from Park to Site (One way - 5 miles)	0
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**0.1**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle

Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	12.00
One-Way Trips per Day (50 miles)	24.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**26.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle
Note: Hauling Vehicles included in Items below.

Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	12.00
One-Way Trips per Day (50 miles)	24.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**26.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle
Note: Hauling Vehicles included in Items below.

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	0.10
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.1**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.03
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.0**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 150 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (16' W x 19' D) (includes paving debris)	304.0
Volume of Excavate (CY) per Ft of Trench (16' W x 19' D) (includes paving debris)	11.26
Volume Excavate (CY) per FT Including Swell of 15%	12.95
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.29
Estimated Length of Trench per Day Per Crew (ft)	100.0
Number of Haul Trucks per Crew per Daily Production	129.5
Total One-Way Haul Trips from Site to Staging/Storage and return	**259.0**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline (4.75' H x 16' W minus (0.5*3.14*7.25^2)/4)	55.37
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.05
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.36
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.24
Estimated Length of Trench per Day Per Crew (ft)	100
Number of Pipe Bedding Import Trucks per Day	23.6
Total One-Way Haul Trips of Pipe Bedding Import to Site	**47.2**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**47.2**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return) (68.1% of Excavate Trips from Site to Storage)	**176.4**
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back (31.9%*90% of Excavate Trips from Site to Storage)	**74.3**
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back (31.9%*10% of Excavate Trips from Site to Storage)	**8.3**
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way) (Assumes 20 ft of 7' DIA pipe per trip)	**5.0**
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way) (Assumes 20 ft of 7' DIA pipe per trip)	**5.0**
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**0.0**
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**622.3**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**5.9**

Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	220
One-Way Spoils Haul Trips from Site to Storage Site and return	**9.78**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**17.6**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**2.0**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.6**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.6**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	880
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	24.2
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**6.0**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return (Not Applicable)	**0.0**
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**39.3**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**0.2**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**1294.8**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**881.8**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**371.7**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**41.3**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**235.8**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**235.8**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**152.8**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**152.8**
Volume of Paving Material Imported to the Site per day (CY)	**31.9**

Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.

Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**56.2**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**50.6**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.6**
Volume of Imported Soil to Storage from Supplier per day (CY)	**8.1**
Volume of Imported Soil from Storage to the Site per day (CY)	**8.1**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**880**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**880**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**24.2**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**

Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Temporary roadway surface will be needed to allow heavy vehicle access particularly during wet weather.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

The pipeline within the LAFCD easement will require obtaining a permanent easement. Contractors will also need temporary construction easements along the piping route since their construction activities will extend beyond the limits of the permanent easement.

Demolition?

Surface features will be demolished during construction and will be replaced back to existing conditions including grassland, gravel, concrete paving, etc.

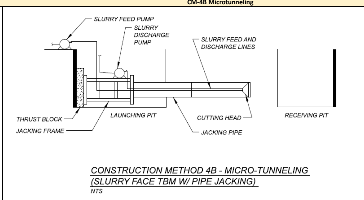
Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

The majority of the CM-3A method construction will take place cross country away from existing streets. Minimal traffic control may be required in some locations to ensure safety.

CM-4B Microtunneling



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
24	61	425
	Total	425

2 shafts

Estimated Number of Construction Workers Per Day

Construction Schedule (working days) (-120 days proc. mobil.; -60 test, comm., demob)	1280
Feet of Tunnel Construction needed per day	0.33
Estimated Number of Tunnel Crews Per Day (based on 20 feet per day per crew)	0.02
Estimated Number of Pipeline Crews Per Day (based on 40 feet per day per crew)	0.01
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	0.14
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	15
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**1.81**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	1.81
One-Way Trips per Day (50 miles)	3.61
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	4
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**7.6**

* Assumes maximum of 15 workers per shuttle.

Total Workers per Day (Maximum Throughout Construction Schedule)	16.00
One-Way Trips per Day (50 miles)	32.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	6
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**38.0**

* Assumes maximum of 15 workers per shuttle.
Note: Hauling Vehicles included in Items below.

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	1.81
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**1.3**
Total Workers per Day (Maximum During Construction Schedule)	16.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.2**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	425
Excavation Diameter (ft)	9
Tunnel Volume (in-situ) (cu-yds)*	1,152
Shaft Volume (cu-yds)*	914
Total Volume of Shafts and Tunnel (cu-yds)*	2,066
Total Number of Truck Trips for Soil Removal	207
Total Number of Truck Trips for Piping and Casing	34
Total Number of Truck Trips for Shaft Construction	720
Disturbed Pavement (sq-ft)	705
Paving Replacement Import (18" thick) (cu-ft)	1,058
Paving Replacement Import (18" thick) (cu-yds)	39
Total Number of Truck Trips for Replacing Paving	4
Total Truck Trips During Construction	**964**
Number of Truck Trip per day on Average	0.75

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	2,066
Paving Replacement Import (18" thick) (cu-yds)	39
Total Exported Material (cu-yds)	2,105
	2,066

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

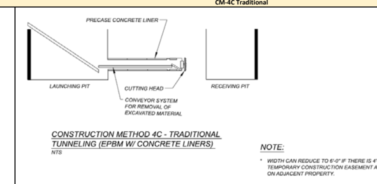
Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing. One intermediate shaft will be required for Segment 56.

Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

CM-4C Traditional



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
22, 23	60	5,666
27	63	2,397
	Total	8,063

4 shafts

Estimated Number of Construction Workers Per Day

Construction Schedule (working days) (-120 days proc. mobil.; -60 test, comm., demob)	1280
Feet of Tunnel Construction needed per day	6.30
Estimated Number of Tunnel Crews Per Day (based on 30 feet per day per crew)	0.21
Estimated Number of Pipeline Crews Per Day (based on 40 feet per day per crew)	0.16
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	0.28
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	15
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**8.22**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	8.22
One-Way Trips per Day (50 miles)	16.44
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**18.4**

* Assumes maximum of 15 workers per shuttle.

Total Workers per Day (Maximum Throughout Construction Schedule)	16.00
One-Way Trips per Day (50 miles)	32.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**34.0**

* Assumes maximum of 15 workers per shuttle.
Note: Hauling Vehicles included in Items below.

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	8.22
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**5.8**
Total Workers per Day (Maximum During Construction Schedule)	16.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.2**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Tunneling will likely require near 24/7 work. Tunnel launch shaft sites will need to assume 24/7 work and provide for light and noise mitigation as needed. Assume a variance for 24/7 work at launch sites.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 22,680 sq-ft and the receiving staging 11,670 sq-ft

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal. Spoils from night shift work will be temporarily stockpiled at the launch shaft site if nightime hauling is restricted.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	8,063
Excavation Diameter (ft)	11
Tunnel Volume (in-situ) (cu-yds)*	32,638
Shaft Volume (cu-yds)*	1,866
Total Volume of Shafts and Tunnel (cu-yds)*	34,504
Total Number of Truck Trips for Soil Removal	3,450
Total Number of Truck Trips for Piping and Casing	645
Total Number of Truck Trips for Shaft Construction	1,440
Disturbed Pavement (sq-ft)	1,440
Paving Replacement Import (18" thick) (cu-ft)	2,160
Paving Replacement Import (18" thick) (cu-yds)	80
Total Number of Truck Trips for Replacing Paving	8
Total Truck Trips During Construction	**5,543**
Number of Truck Trip per day on Average	4.33

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	34,504
Paving Replacement Import (18" thick) (cu-yds)	80
Total Exported Material (cu-yds)	34,584
	34,504

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

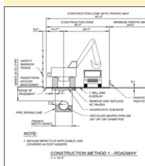
Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

Construction Zone and maintaining a Traffic Way on the other side of the street.			
Generator Requirements	**Generator Requirements**	**Generator Requirements**	**Generator Requirements**
Large Generator Set 45kw for Night Lighting Standby Large Generator Set 45kw for Night Lighting Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	Large Generator Set 45kw for Night Lighting Standby Large Generator Set 45kw for Night Lighting Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	Included in equipment list - see tab "Equipment - CM-4A through CM-4F"	Included in equipment list - see tab "Equipment - CM-4A through CM-4F"
Ventilation Requirements	**Ventilation Requirements**	**Ventilation Requirements**	**Ventilation Requirements**
Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	100 HP Ventilation fan for each tunnel 40 HP Ventilation fan per shaft Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day	100 HP Ventilation fan for each tunnel 40 HP Ventilation fan per shaft Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day
Equipment Usage	**Equipment Usage**	**Equipment Usage**	**Equipment Usage**
See attached worksheet "Equipment - CM-1, CM-2, CM-3A"	See attached worksheet "Equipment - CM-1, CM-2, CM-3A"	See attached worksheet "Equipment - CM-4A through CM-4F"	See attached worksheet "Equipment - CM-4A through CM-4F"
CM-1 Roadways (Cut & Cover) - Excavation/Trenching	**CM-3A LAFCD Easement (Cut & Cover) - Excavation/Trenching**		
Pipeline Construction Typical Trench dimensions are: 16 ft wide X 19 ft deep Total Length (ft) 12,783 Total Excavation (cu-ft) 3,886,123 **Total Excavation (cu-yds) 143,930** **(This does not include swelling of the soil once removed.)** **Fiber Optic Duct Bank** Typical Trench dimensions are: 2 ft wide X 5 ft deep Total Length (ft) 12,783 Total Excavation (cu-ft) 127,833 **Total Excavation (cu-yds) 4,735** **(This does not include swelling of the soil once removed.)**	**Pipeline Construction** Typical Trench dimensions are: 16 ft wide X 19 ft deep Total Length (ft) 1,216 Total Excavation (cu-ft) 369,664 **Total Excavation (cu-yds) 13,691** **(This does not include swelling of the soil once removed.)** **Fiber Optic Duct Bank** Typical Trench dimensions are: 2 ft wide X 5 ft deep Total Length (ft) 1,216 Total Excavation (cu-ft) 12,160 **Total Excavation (cu-yds) 450** **(This does not include swelling of the soil once removed.)**		
CM-1 Roadways - Pavement/Concrete Replacement or Rehabilitation			
Pipeline Construction Trench Width Pavement (sq-ft) 255,666 (20 feet wide through length of pipeline) Trench Width Pavement (sq-yds) 28,407 Finished Coat on half of Roadways (sq-yds) 511,332 (40 feet wide through length of pipeline - covering half of full roadway) **Fiber Optic Ductbank** Trench Width Pavement (sq-ft) 25,567 (2 feet wide through length of pipeline) Trench Width Pavement (sq-yds) 2,841			
CM-1 Roadways (Cut & Cover) - Temporary Median Removal			
Median Locations: None this Contract			

Reach 5, Preferred Alignment CEQA Responses, MWD RRWP (7 feet Diameter Pipeline)

CM-1 Roadways



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
27, 28	64	3,184
28	66	1,751
29, 30, 31, 32, 33	68	15,229
35	73	1,227
35	75	1,340
	Total	22,731
	Miles	4.31

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	455
Daily Crew Production (FT per day)	30
Estimated Number of Pipeline Crews Per Day	1.67
Number of Pipeline Crews	2
Pipeline Construction Crews	1
Workers per crew	7
Shoring Crews	0.2
Workers per Crew	3
Saw Cut Crew	0.05
Workers per crew	3
Demolition Crew	0.05
Workers per crew	3
Paving Crew	0.2
Workers per crew	5
Utility Relocation Crew	0.1
Workers per crew	6
Traffic Control	0.15
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**20.20**
Total Workers per Day (Average Throughout Construction Schedule)	**16.82**

Fiber Optic Duct Bank	
Construction Schedule (working days)	705
Daily Crew Production (FT per day)	200
Estimated Number of Combined Fiber Optic Crews Per Day	0.16
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0.1
Workers per crew	5
Total Workers per Day (Average Throughout Fiber Optic Construction)	**8.30**
Total Workers per Day (Average Throughout Construction Schedule)	**1.34**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	16.82
One-Way Trips per Day (50 miles)	33.64
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**35.6**
* Assumes maximum of 15 workers per shuttle	

Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule	1.34
One-Way Trips per Day (50 miles)	2.68
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**4.7**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	

Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule	52.00
One-Way Trips per Day (50 miles)	104.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	6
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**110.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	17.00
One-Way Trips per Day (50 miles)	34.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**36.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	16.82
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.8**
Total Workers per Day (Maximum During Construction Schedule)	52.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**36.4**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	1.34
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.9**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

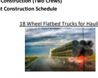
Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 200 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (16' W x 19' D) (includes paving debris)	304.0
Volume of Excavate (CY) per Ft of Trench (16' W x 19' D) (includes paving debris)	11.26
Volume Excavate (CY) per FT Including Swell of 15%	12.95
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.29
Estimated Length of Trench per Day Per Crew (ft)	30.0
Number of Haul Trucks per Crew per Daily Production	38.8
Total One-Way Haul Trips from Site to Staging/Storage and return	**77.7**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline	
(4.75' H x 16' W minus (0.5*3.14*7.25^2)/4)	55.37
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.05
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.36
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.24
Estimated Length of Trench per Day Per Crew (ft)	30
Number of Pipe Bedding Import Trucks per Day	7.1
Total One-Way Haul Trips of Pipe Bedding Import to Site	**14.1**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**14.1**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**52.9**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**22.3**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**2.5**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**1.5**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**1.5**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**1.1**
(Assumes 3" thick above 20' wide at trench plus 40' full overlay for half the full road wide)	
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**187.8**
Daily One-Way Haul Trips During the Pipeline Construction (Two Crews)	**375.6**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**312.7**

10 Wheel Dump Trucks for Soils Transport:

18 Wheel Flatbed Trucks for Hauling Pipe



Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	200
One-Way Spoils Haul Trips from Site to Storage Site and return	**8.89**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**16.0**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**1.8**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.5**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.5**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	800
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	22.0
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**5.5**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.4**
(Assumes 3" thick above 2' wide at trench)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**36.1**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**5.8**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**776.9**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**529.1**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**223.0**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**24.8**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**141.5**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**141.5**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**91.7**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**91.7**
Volume of Paving Material Imported to the Site per day (CY)	**19.1**
Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.	

Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**51.1**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**46.0**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.1**
Volume of Imported Soil to Storage from Supplier per day (CY)	**7.4**
Volume of Imported Soil from Storage to the Site per day (CY)	**7.4**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**800**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**800**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**22.0**
Volume of Paving Material Imported to the Site per day (CY)	**3.7**
Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.	

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

This does not apply to this construction method.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

It appears the pipeline is within the MWD service area for this construction method does not deviate into private property where a permanent easement would be required. It is not anticipated that temporary construction easements will be needed.

Demolition?

Paving will be demolished to a width of 16 feet along the pipeline and will extend 2 ft to either side of the 12' wide trench. In some locations additioanl hardscape, curbs, gutters, sidewalks and concrete medians will need to be demolished during the construction. All demolished items will be replaced to existing conditions.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

Traffic control will be required throughout virtually all pipeline reaches for this construction method CM-1. A Construction Zone with traffic way will be used by taking out of service one side of the street as a will be used by taking out of service one side of the street as a Construction Zone and maintaining a Traffic Way on the otherside of the street.

Generator Requirements

Large Generator Set 45kw for Night Lighting
Standby Large Generator Set 45kw for Night Lighting
Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Ventilation Requirements

Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Equipment Usage

See attached worksheet "Equipment - CM-1, CM-2, CM-3A"

CM-1 Roadways (Cut & Cover) - Excavation/Trenching

Pipeline Construction	
Typical Trench dimensions are: 16 ft wide X 19 ft deep	
Total Length (ft)	22,731
Total Excavation (cu-ft)	6,910,297
Total Excavation (cu-yds)	**255,937**
(This does not include swelling of the soil once removed.)	
Fiber Optic Duct Bank	
Typical Trench dimensions are: 2 ft wide X 5 ft deep	
Total Length (ft)	22,731
Total Excavation (cu-ft)	227,312
Total Excavation (cu-yds)	**8,419**
(This does not include swelling of the soil once removed.)	

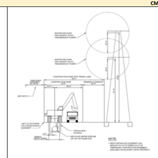
CM-1 Roadways - Pavement/Concrete Replacement or Rehabilitation

Pipeline Construction	
Trench Width Pavement (sq-ft)	454,625
(20 feet wide through length of pipeline)	
Trench Width Pavement (sq-yds)	50,514
Finished Coat on half of Roadways (sq-yds)	909,250
(40 feet wide through length of pipeline - covering half of full roadway)	
Fiber Optic Ductbank	
Trench Width Pavement (sq-ft)	45,462
(2 feet wide through length of pipeline)	
Trench Width Pavement (sq-yds)	5,051

CM-1 Roadways (Cut & Cover) - Temporary Median Removal

Median Locations: None this Contract

CM-2 SCE Easement



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
34	70	572
34, 35	72	3,257
	Total	3,829

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	455
Feet of Pipeline Construction per day needed	100
Estimated Number of Pipeline Crews Per Day	0.08
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	9
Shoring Crews	0.2
Workers per Crew	3
Utility Relocation Crew	0.05
Workers per crew	6
Water Truck Crew	0.15
Workers per Crew	1
Site Restoration Crew	0.15
Workers per crew	3
Temporary Gravel Roadway Crew	0.1
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.9**
Total Workers per Day (Average Throughout Construction Schedule)	**0.92**

Fiber Optic Duct Bank	
Construction Schedule (working days)	705
Daily Crew Production (FT per day)	220
Estimated Number of Combined Fiber Optic Crews Per Day	0.02
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0
Workers per crew	0
Total Workers per Day (Average Throughout Fiber Optic Construction)	**7.80**
Total Workers per Day (Average Throughout Construction Schedule)	**0.19**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	0.92
One-Way Trips per Day (50 miles)	1.83
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**3.8**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule	0.19
One-Way Trips per Day (50 miles)	0.39
Shuttle to Move Workers from Park to Site (One way - 5 miles)	0
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**0.4**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Total Workers per Day (Maximum During Construction Schedule	18.00
One-Way Trips per Day (50 miles)	36.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**38.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	12.00
One-Way Trips per Day (50 miles)	24.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**26.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	0.92
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.6**
Total Workers per Day (Maximum During Construction Schedule)	18.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**12.6**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.19
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.1**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 150 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (16' W x 19' D) (includes paving debris)	304.0
Volume of Excavate (CY) per Ft of Trench (16' W x 19' D) (includes paving debris)	11.26
Volume Excavate (CY) per FT Including Swell of 15%	12.95
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.29
Estimated Length of Trench per Day Per Crew (ft)	100.0
Number of Haul Trucks per Crew per Daily Production	129.5
Total One-Way Haul Trips from Site to Staging/Storage and return	**259.0**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline	
(4.75' H x 16' W minus (0.5*3.14*7.25^2)/4)	55.37
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.05
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.36
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.24
Estimated Length of Trench per Day Per Crew (ft)	100
Number of Pipe Bedding Import Trucks per Day	23.6
Total One-Way Haul Trips of Pipe Bedding Import to Site	**47.2**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**47.2**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**176.4**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**74.3**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**8.3**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**5.0**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**5.0**
(Assumes 20 ft of 7' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**0.0**
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**622.3**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**52.4**

Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	220
One-Way Spoils Haul Trips from Site to Storage Site and return	**9.78**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**17.6**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**2.0**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.6**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.6**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	880
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	24.2
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**6.0**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.0**
(Not Applicable)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**39.3**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**1.0**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**1294.8**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**881.8**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**371.7**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**41.3**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**235.8**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**235.8**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**152.8**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**152.8**
Volume of Paving Material Imported to the Site per day (CY)	**31.9**
Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.	

Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**56.2**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**50.6**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.6**
Volume of Imported Soil to Storage from Supplier per day (CY)	**8.1**
Volume of Imported Soil from Storage to the Site per day (CY)	**8.1**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**880**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**880**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**24.2**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**
Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.	

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

This does not apply to this construction method.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from water trucks due to the lack of available hydrants in these areas.

Temporary or Permanent Right-of-Way/Easements

The pipeline within the SCE easement will require obtaining a permanent easement. Contractors will also need temporary construction easements along the piping route since their construction activities will extend beyond the limits of the permanent easement.

Demolition?

Surface features will be demolished during construction and will be replaced back to existing conditions including grassland, gravel, concrete paving, etc.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

The majority of the CM-2 method construction will take place cross country away from existing streets. Minimal traffic control may be required in some locations to ensure safety.

Generator Requirements

Large Generator Set 45kw for Night Lighting
Standby Large Generator Set 45kw for Night Lighting
Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Ventilation Requirements

Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

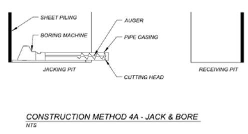
Equipment Usage

See attached worksheet "Equipment - CM-1, CM-2, CM-3A"

CM-2 SCE Easement (Cut & Cover) - Excavation/Trenching

Pipeline Construction	
Typical Trench dimensions are: 16 ft wide X 19 ft deep	
Total Length (ft)	3,829
Total Excavation (cu-ft)	1,164,080
Total Excavation (cu-yds)	**43,114**
(This does not include swelling of the soil once removed.)	
Fiber Optic Duct Bank	
Typical Trench dimensions are: 2 ft wide X 5 ft deep	
Total Length (ft)	3,829
Total Excavation (cu-ft)	38,292
Total Excavation (cu-yds)	**1,418**
(This does not include swelling of the soil once removed.)	

CM-4A Pipe Jacking



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
28	65	252
29	67	328
	Total	580

Number of Shafts : 4

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	455
Feet of Tunnel Construction needed per day	1.27
Estimated Number of Tunnel Crews Per Day (based on 10 feet per day per crew)	0.13
Estimated Number of Pipeline Crews Per Day (based on 40 feet per day per crew)	0.03
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	0.79
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	7
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**8.03**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	8.03
One-Way Trips per Day (50 miles)	16.06
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**18.1**
* Assumes maximum of 15 workers per shuttle	
Total Workers per Day (Maximum During Construction Schedule	16.00
One-Way Trips per Day (50 miles)	32.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**34.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	8.03
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**5.6**
Total Workers per Day (Maximum During Construction Schedule)	16.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.2**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	580
Excavation Diameter (ft)	9
Tunnel Volume (in-situ) (cu-yds)*	1,572
Shaft Volume (cu-yds)*	1,828
Total Volume of Shafts and Tunnel (cu-yds)*	3,400
Total Number of Truck Trips for Soil Removal	340
Total Number of Truck Trips for Piping and Casing	46
Total Number of Truck Trips for Shaft Construction	1,440
Disturbed Pavement (sq-ft)	1,410
Paving Replacement Import (18" thick) (cu-ft)	2,115
Paving Replacement Import (18" thick) (cu-yds)	78
Total Number of Truck Trips for Replacing Paving	8
Total Truck Trips During Construction	**1,834**
Number of Truck Trip per day on Average	4.03

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	3,400
Paving Replacement Import (18" thick) (cu-yds)	78
Total Exported Material (cu-yds)	3,478
	3,400

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

Generator Requirements

Included in equipment list - see tab "Equipment - CM-4A through CM-4F"

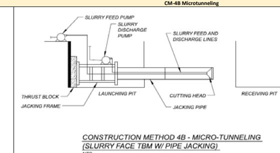
Ventilation Requirements

100 HP Ventilation fan for each tunnel
40 HP Ventilation fan per shaft
Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day

Equipment Usage

See attached worksheet "Equipment - CM-4A through CM-4F"

CM-4B Microtunneling



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
34	71	211
35	74	233
35	76	334
	Total	778

Number of Shafts : 6

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	455
Feet of Tunnel Construction needed per day	1.71
Estimated Number of Tunnel Crews Per Day (based on 10 feet per day per crew)	0.17
Estimated Number of Pipeline Crews Per Day (based on 40 feet per day per crew)	0.04
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	1.19
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	15
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**13.04**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	13.04
One-Way Trips per Day (50 miles)	26.09
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	4
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**30.1**
* Assumes maximum of 15 workers per shuttle	
Total Workers per Day (Maximum Throughout Construction Schedule	24.00
One-Way Trips per Day (50 miles)	48.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	6
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**54.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	13.04
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**9.1**
Total Workers per Day (Maximum During Construction Schedule)	24.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**16.8**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	778
Excavation Diameter (ft)	9
Tunnel Volume (in-situ) (cu-yds)*	2,108
Shaft Volume (cu-yds)*	2,742
Total Volume of Shafts and Tunnel (cu-yds)*	4,850
Total Number of Truck Trips for Soil Removal	485
Total Number of Truck Trips for Piping and Casing	62
Total Number of Truck Trips for Shaft Construction	2,160
Disturbed Pavement (sq-ft)	2,115
Paving Replacement Import (18" thick) (cu-ft)	3,173
Paving Replacement Import (18" thick) (cu-yds)	118
Total Number of Truck Trips for Replacing Paving	12
Total Truck Trips During Construction	**2,719**
Number of Truck Trip per day on Average	5.98

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	4,850
Paving Replacement Import (18" thick) (cu-yds)	118
Total Exported Material (cu-yds)	4,968
	4,850

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

Generator Requirements

Included in equipment list - see tab "Equipment - CM-4A through CM-4F"

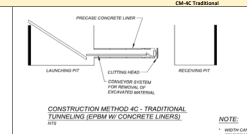
Ventilation Requirements

100 HP Ventilation fan for each tunnel
40 HP Ventilation fan per shaft
Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day

Equipment Usage

See attached worksheet "Equipment - CM-4A through CM-4F"

CM-4C Traditional



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
33, 34	69	3,390
	Total	3,390

Number of Shafts : 2

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	455
Feet of Tunnel Construction needed per day	7.45
Estimated Number of Tunnel Crews Per Day (based on 30 feet per day per crew)	0.25
Estimated Number of Pipeline Crews Per Day (based on 40 feet per day per crew)	0.19
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	0.40
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	15
Workers per Pipeline Crew	16
Workers per Shaft Crew	8
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**10.17**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	10.17
One-Way Trips per Day (50 miles)	20.34
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**22.3**
* Assumes maximum of 15 workers per shuttle	
Total Workers per Day (Maximum Throughout Construction Schedule	16.00
One-Way Trips per Day (50 miles)	32.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**34.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	10.17
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**7.1**
Total Workers per Day (Maximum During Construction Schedule)	16.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.2**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Tunneling will likely require near 24/7 work. Tunnel launch shaft sites will need to assume 24/7 work and provide for light and noise mitigation as needed. Assume a variance for 24/7 work at launch sites.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 22,680 sq-ft and the receiving staging 11,670 sq-ft

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal. Spoils from night shift work will be temporarily stockpiled at the launch shaft site if nighttime hauling is restricted.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	3,390
Excavation Diameter (ft)	11
Tunnel Volume (loose) (cu-yds)*	13,722
Shaft Volume (cu-yds)*	933
Total Volume of Shafts and Tunnel (cu-yds)*	14,655
Total Number of Truck Trips for Soil Removal	1,465
Total Number of Truck Trips for Piping and Casing	136
Total Number of Truck Trips for Shaft Construction	720
Disturbed Pavement (sq-ft)	720
Paving Replacement Import (18" thick) (cu-ft)	1,080
Paving Replacement Import (18" thick) (cu-yds)	40
Total Number of Truck Trips for Replacing Paving	4
Total Truck Trips During Construction	**2,325**
Number of Truck Trip per day on Average	5.11

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	14,655
Paving Replacement Import (18" thick) (cu-yds)	40
Total Exported Material (cu-yds)	14,695
	14,655

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

Generator Requirements

Included in equipment list - see tab "Equipment - CM-4A through CM-4F"

Ventilation Requirements

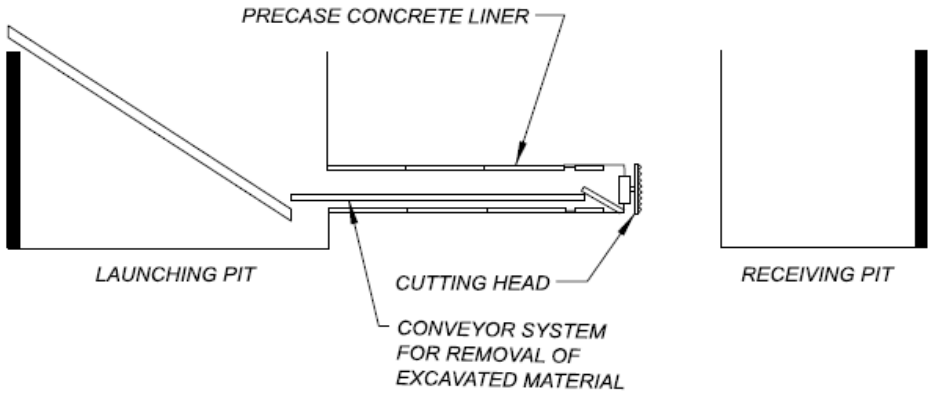
100 HP Ventilation fan for each tunnel
40 HP Ventilation fan per shaft
Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day

Equipment Usage

See attached worksheet "Equipment - CM-4A through CM-4F"

Reach 6, Preferred Alignment CEQA Responses, MWD RRWP (9 feet Diameter Pipeline)

CM-4F Traditional



CONSTRUCTION METHOD 4C - TRADITIONAL
TUNNELING (EPBM W/ CONCRETE LINERS)
NTS

NOTE:

* WIDTH CAN REDUCE TO 6'-0" IF THERE IS 4'-0" OF TEMPORARY CONSTRUCTION EASEMENT AVAILABLE ON ADJACENT PROPERTY.

Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
35	77	6,226
37, 38	78	6,878
	Total	**13,104**

Number of Shafts : 4

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	769
Feet of Tunnel Construction needed per day	17.04
Estimated Number of Tunnel Crews Per Day (based on 30 feet per day per crew)	0.57
Estimated Number of Pipeline Crews Per Day (based on 30 feet per day per crew)	0.57
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	0.47
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	20
Workers per Pipeline Crew	17
Workers per Shaft Crew	10
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**26.00**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	26.00
One-Way Trips per Day (50 miles)	52.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**54.0**

* Assumes maximum of 15 workers per shuttle.

Total Workers per Day (Maximum Throughout Construction Schedule)	20
One-Way Trips per Day (50 miles)	40
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**42.0**

* Assumes maximum of 15 workers per shuttle.

Note: Hauling Vehicles included in Items below.

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	26.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**18.2**
Total Workers per Day (Maximum During Construction Schedule)	20.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**14.0**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Tunneling will likely require near 24/7 work. Tunnel launch shaft sites will need to assume 24/7 work and provide for light and noise mitigation as needed.
Assume a variance for 24/7 work at launch sites.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 22,680 sq-ft and the receiving staging 11,670 sq-ft

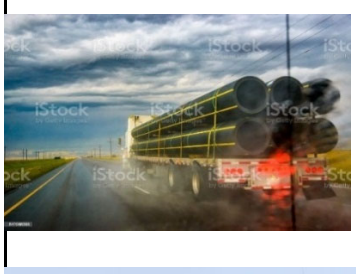
Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal. Spoils from night shift work will be temporarily stockpiled at the launch shaft site if nightime hauling is restricted.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	13,104
Excavation Diameter (ft)	15
Tunnel Volume (loose) (cu-yds)*	98,630
Shaft Volume (cu-yds)*	5,444
Total Volume of Shafts and Tunnel (cu-yds)*	104,074
Total Number of Truck Trips for Soil Removal	10,407
Total Number of Truck Trips for Piping and Casing	524
Total Number of Truck Trips for Shaft Construction	1,440
Disturbed Pavement (sq-ft)	1,440
Paving Replacement Import (18" thick) (cu-ft)	2,160
Paving Replacement Import (18" thick) (cu-yds)	80
Total Number of Truck Trips for Replacing Paving	8
Total Truck Trips During Construction	**12,380**
Number of Truck Trip per day on Average	16.10

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks



Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	104,074
Paving Replacement Import (18" thick) (cu-yds)	80
Total Exported Material (cu-yds)	104,154
	104,074

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

Generator Requirements

Included in equipment list - see tab "Equipment - CM-4A through CM-4F""

Ventilation Requirements

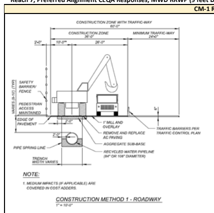
100 HP Ventilation fan for each tunnel
40 HP Ventilation fan per shaft
Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day

Equipment Usage

See attached worksheet "Equipment - CM-4A through CM-4F"

Reach 7, Preferred Alignment CEQA Responses, MWD RRWP (9 feet Diameter Pipeline)

CM-1 Roadways



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
45	94	1,084
45, 46	96	3,600
	Total	**4,684**

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	535
Daily Crew Production (FT per day)	25
Estimated Number of Pipeline Crews Per Day	0.35
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	7
Shoring Crews	0.2
Workers per Crew	3
Saw Cut Crew	0.05
Workers per crew	3
Demolition Crew	0.05
Workers per crew	3
Paving Crew	0.2
Workers per crew	5
Utility Relocation Crew	0.1
Workers per crew	6
Traffic Control	0.15
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.10**
Total Workers per Day (Average Throughout Construction Schedule)	**3.54**

Fiber Optic Duct Bank	
Construction Schedule (working days)	515
Daily Crew Production (FT per day)	200
Estimated Number of Combined Fiber Optic Crews Per Day	0.05
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0.1
Workers per crew	5
Total Workers per Day (Average Throughout Fiber Optic Construction)	**8.30**
Total Workers per Day (Average Throughout Construction Schedule)	**0.38**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	3.54
One-Way Trips per Day (50 miles)	7.07
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**9.1**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle

Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule)	0.38
One-Way Trips per Day (50 miles)	0.75
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**2.8**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle

Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	26.00
One-Way Trips per Day (50 miles)	52.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	4
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**56.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle
Note: Hauling Vehicles included in Items below.

Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	17.00
One-Way Trips per Day (50 miles)	34.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**36.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle
Note: Hauling Vehicles included in Items below.

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	3.54
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**2.5**
Total Workers per Day (Maximum During Construction Schedule)	26.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**18.2**

Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.38
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.3**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 200 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (18' W x 21' D) (includes paving debris)	378.0
Volume of Excavate (CY) per Ft of Trench (18' W x 21' D) (includes paving debris)	14.00
Volume Excavate (CY) per FT Including Swell of 15%	16.10
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.61
Estimated Length of Trench per Day Per Crew (ft)	25.0
Number of Haul Trucks per Crew per Daily Production	40.3
Total One-Way Haul Trips from Site to Staging/Storage and return	**80.5**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline (5.25' H x 18' W minus (0.5*3.14*9.25^2)/4)	60.92
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.26
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.59
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.26
Estimated Length of Trench per Day Per Crew (ft)	25
Number of Pipe Bedding Import Trucks per Day	6.5
Total One-Way Haul Trips of Pipe Bedding Import to Site	**13.0**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**13.0**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return) (68.1% of Excavate Trips from Site to Storage)	**54.8**
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back (31.9%*90% of Excavate Trips from Site to Storage)	**23.1**
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back (31.9%*10% of Excavate Trips from Site to Storage)	**2.6**
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way) (Assumes 20 ft of 9' DIA pipe per trip)	**1.3**
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way) (Assumes 20 ft of 9' DIA pipe per trip)	**1.3**
No. of One way Trips to Site Importing Paving Materials (50 miles ea way) (Assumes 3" thick above 22' wide at trench plus 40' full overlay for half the full road wide)	**1.0**
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**190.4**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**66.7**

10 Wheel Dump Trucks for Soils Transport: 18 Wheel Flatbed Trucks for Hauling Pipe

Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	200
One-Way Spoils Haul Trips from Site to Storage Site and return	**8.89**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**16.0**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**1.8**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.5**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.5**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	800
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	22.0
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**5.5**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return (Assumes 3" thick above 2' wide at trench)	**0.4**
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**36.1**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**1.6**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**402.5**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**274.1**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**115.6**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**12.8**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**64.9**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**64.9**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**38.2**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**38.2**
Volume of Paving Material Imported to the Site per day (CY)	**8.4**

Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.

Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**51.1**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**46.0**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.1**
Volume of Imported Soil to Storage from Supplier per day (CY)	**7.4**
Volume of Imported Soil from Storage to the Site per day (CY)	**7.4**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**800**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**800**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**22.0**
Volume of Paving Material Imported to the Site per day (CY)	**3.7**

Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

This does not apply to this construction method.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

It appears the pipeline is within the MWD service area for this construction method does not deviate into private property where a permanent easement would be required. It is not anticipated that temporary construction easements will be needed.

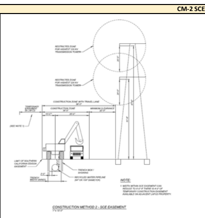
Demolition?

Paving will be demolished to a width of 16 feet along the pipeline and will extend 2 ft to either side of the 12' wide trench. In some locations additioanl hardscape, curbs, gutters, sidewalks and concrete medians will need to be demolished during the construction. All demolished items will be replaced to existing conditions.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

CM-2 SCE Easement



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
38, 39	79	4,692
39, 40	81	3,512
41	83	620
41, 42	85	1,686
42	87	1,833
42, 43	89	986
43, 44	91	4,342
	Total	**17,671**

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	535
Feet of Pipeline Construction per day needed	80
Estimated Number of Pipeline Crews Per Day	0.41
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	9
Shoring Crews	0.2
Workers per Crew	3
Utility Relocation Crew	0.05
Workers per crew	6
Water Truck Crew	0.15
Workers per Crew	1
Site Restoration Crew	0.15
Workers per crew	3
Temporary Gravel Roadway Crew	0.1
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.9**
Total Workers per Day (Average Throughout Construction Schedule)	**4.50**

Fiber Optic Duct Bank	
Construction Schedule (working days)	615
Daily Crew Production (FT per day)	220
Estimated Number of Combined Fiber Optic Crews Per Day	0.13
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0
Workers per crew	0
Total Workers per Day (Average Throughout Fiber Optic Construction)	**7.80**
Total Workers per Day (Average Throughout Construction Schedule)	**1.02**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	4.50
One-Way Trips per Day (50 miles)	9.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**11.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle

Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule)	1.02
One-Way Trips per Day (50 miles)	2.04
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**4.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle

Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	18.00
One-Way Trips per Day (50 miles)	36.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**38.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle

Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	12.00
One-Way Trips per Day (50 miles)	24.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**26.0**

* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle
Note: Hauling Vehicles included in Items below.

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	4.50
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**3.2**
Total Workers per Day (Maximum During Construction Schedule)	18.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**12.6**

Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	1.02
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.7**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 150 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (18' W x 21' D) (includes paving debris)	378.0
Volume of Excavate (CY) per Ft of Trench (18' W x 21' D) (includes paving debris)	14.00
Volume Excavate (CY) per FT Including Swell of 15%	16.10
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.61
Estimated Length of Trench per Day Per Crew (ft)	80.0
Number of Haul Trucks per Crew per Daily Production	128.8
Total One-Way Haul Trips from Site to Staging/Storage and return	**257.6**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline (5.25' H x 18' W minus (0.5*3.14*9.25^2)/4)	60.92
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.26
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.59
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.26
Estimated Length of Trench per Day Per Crew (ft)	80
Number of Pipe Bedding Import Trucks per Day	20.8
Total One-Way Haul Trips of Pipe Bedding Import to Site	**41.5**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**41.5**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return) (68.1% of Excavate Trips from Site to Storage)	**175.4**
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back (31.9%*90% of Excavate Trips from Site to Storage)	**74.0**
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back (31.9%*10% of Excavate Trips from Site to Storage)	**8.2**
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way) (Assumes 20 ft of 9' DIA pipe per trip)	**4.0**
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way) (Assumes 20 ft of 9' DIA pipe per trip)	**4.0**
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**0.0**
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**606.2**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**250.3**

10 Wheel Dump Trucks for Soils Transport: 18 Wheel Flatbed Trucks for Hauling Pipe

Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	220
One-Way Spoils Haul Trips from Site to Storage Site and return	**9.78**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**17.6**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**2.0**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.6**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.6**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	880
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	24.2
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**6.0**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return (Not Applicable)	**0.0**
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**39.3**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**5.1**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**1288.0**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**877.1**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**369.8**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**41.1**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**207.6**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**207.6**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**199.0**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**199.0**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**

Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.

Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**56.2**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**50.6**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.6**
Volume of Imported Soil to Storage from Supplier per day (CY)	**8.1**
Volume of Imported Soil from Storage to the Site per day (CY)	**8.1**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**880**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**880**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**24.2**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**

Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

This does not apply to this construction method.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from water trucks due to the lack of available hydrants in these areas.

Temporary or Permanent Right-of-Way/Easements

The pipeline within the SCE easement will require obtaining a permanent easement. Contractors will also need temporary construction easements along the piping route since their construction activities will extend beyond the limits of the permanent easement.

Demolition?

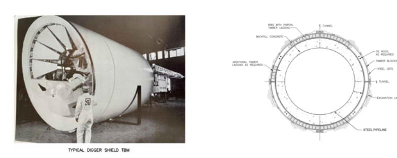
Surface features will be demolished during construction and will be replaced back to existing conditions including grassland, gravel, concrete paving, etc.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

CM-4E Shield Tunneling with Ribs and Lagging

Description: Shield tunneling uses a shield with a digger arm or road header excavating at the face. Hydraulic jacks at the rear of the shield push off the previously installed support elements to propel the shield forward. Steel ribs and timber lagging are used as ground support for the excavation prior to installation of the steel carrier pipe and backfilling of the annual space.



TYPICAL DIGGER SHIELD TBM

Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
39	80	194
41	84	86
42	86	112
42	88	457
43	90	118
45	93	353
45	95	87
	Total	**1,407**

Number of Shafts : 10

Estimated Number of Construction Workers Per Day

Construction Schedule (working days) (-120 days proc. mobil.; -60 test, comm., demob)	535
Feet of Tunnel Construction needed per day	2.63
Estimated Number of Tunnel Crews Per Day (based on 20 feet per day per crew)	0.13
Estimated Number of Pipeline Crews Per Day (based on 30 feet per day per crew)	0.09
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	1.68
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	14
Workers per Pipeline Crew	17
Workers per Shaft Crew	10
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**20.45**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	20.45
One-Way Trips per Day (50 miles)	40.91
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**42.9**

* Assumes maximum of 15 workers per shuttle.

Total Workers per Day (Maximum During Construction Schedule)	17
One-Way Trips per Day (50 miles)	34
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**36.0**

* Assumes maximum of 15 workers per shuttle.
Note: Hauling Vehicles included in Items below.

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	20.45
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**14.3**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	1,407
Excavation Diameter (ft)	11
Tunnel Volume (loose) (cu-yds)*	5,695
Shaft Volume (cu-yds)*	4,570
Total Volume of Shafts and Tunnel (cu-yds)*	10,265
Total Number of Truck Trips for Soil Removal	1,027
Total Number of Truck Trips for Piping and Casing	56
Total Number of Truck Trips for Shaft Construction	3,600
Disturbed Pavement (sq-ft)	3,525
Paving Replacement Import (18" thick) (cu-ft)	5,288
Paving Replacement Import (18" thick) (cu-yds)	196
Total Number of Truck Trips for Replacing Paving	20
Total Truck Trips During Construction	**4,702**
Number of Truck Trip per day on Average	8.79

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	10,265
Paving Replacement Import (18" thick) (cu-yds)	196
Total Exported Material (cu-yds)	10,461
	10,265

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

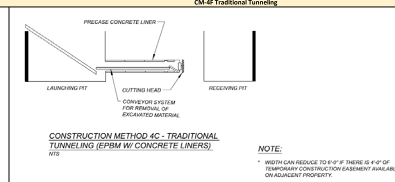
Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

CM-4F Traditional Tunneling



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
40,41	82	3,687
44, 45	92	2,925
	Total	**6,612**

Number of Shafts : 4

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	535
Feet of Tunnel Construction needed per day	12.36
Estimated Number of Tunnel Crews Per Day (based on 30 feet per day per crew)	0.41
Estimated Number of Pipeline Crews Per Day (based on 30 feet per day per crew)	0.41
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	1.69
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	20
Workers per Pipeline Crew	17
Workers per Shaft Crew	10
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**32.40**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	32.40
One-Way Trips per Day (50 miles)	64.80
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**66.8**

* Assumes maximum of 15 workers per shuttle.

Total Workers per Day (Maximum Throughout Construction Schedule)	17.00
One-Way Trips per Day (50 miles)	34.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**36.0**

* Assumes maximum of 15 workers per shuttle.
Note: Hauling Vehicles included in Items below.

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	32.40
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**22.7**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Tunneling will likely require near 24/7 work. Tunnel launch shaft sites will need to assume 24/7 work and provide for light and noise mitigation as needed. Assume a variance for 24/7 work at launch sites.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 22,680 sq-ft and the receiving staging 11,670 sq-ft

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal. Spoils from night shift work will be temporarily stockpiled at the launch shaft site if nighttime hauling is restricted.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	6,612
Excavation Diameter (ft)	15
Tunnel Volume (loose) (cu-yds)*	49,767
Shaft Volume (cu-yds)*	5,444
Total Volume of Shafts and Tunnel (cu-yds)*	55,211
Total Number of Truck Trips for Soil Removal	5,521
Total Number of Truck Trips for Piping and Casing	264
Total Number of Truck Trips for Shaft Construction	1,440
Disturbed Pavement (sq-ft)	720
Paving Replacement Import (18" thick) (cu-ft)	1,080
Paving Replacement Import (18" thick) (cu-yds)	40
Total Number of Truck Trips for Replacing Paving	4
Total Truck Trips During Construction	**7,230**
Number of Truck Trip per day on Average	13.51

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	55,211
Paving Replacement Import (18" thick) (cu-yds)	40
Total Exported Material (cu-yds)	55,251
	55,211

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

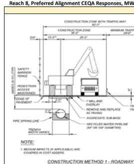
Shafts will be located at each end of each crossing.

Traffic Control Requirements	**Traffic Control Requirements**	**Traffic Control Requirements**	**Traffic Control Requirements**
Traffic control will be required throughout virtually all pipeline reaches for this construction method CM-1. A Construction Zone with traffic way will be used by taking out of service one side of the street as a will be used by taking out of service one side of the street as a Construction Zone and maintaining a Traffic Way on the other side of the street.	The majority of the CM-2 method construction will take place cross country away from existing streets. Minimal traffic control may be required in some locations to ensure safety.	There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.	There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.
Generator Requirements	**Generator Requirements**	**Generator Requirements**	**Generator Requirements**
Large Generator Set 45kw for Night Lighting Standby Large Generator Set 45kw for Night Lighting Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	Large Generator Set 45kw for Night Lighting Standby Large Generator Set 45kw for Night Lighting Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	Included in equipment list - see tab "Equipment - CM-4A through CM-4F"	Included in equipment list - see tab "Equipment - CM-4A through CM-4F"
Ventilation Requirements	**Ventilation Requirements**	**Ventilation Requirements**	**Ventilation Requirements**
Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose (All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)	100 HP Ventilation fan for each tunnel 40 HP Ventilation fan per shaft Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day	100 HP Ventilation fan for each tunnel 40 HP Ventilation fan per shaft Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day
Equipment Usage	**Equipment Usage**	**Equipment Usage**	**Equipment Usage**
See attached worksheet "Equipment - CM-1, CM-2, CM-3A"	See attached worksheet "Equipment - CM-1, CM-2, CM-3A"	See attached worksheet "Equipment - CM-4A through CM-4F"	See attached worksheet "Equipment - CM-4A through CM-4F"
CM-1 Roadways (Cut & Cover) - Excavation/Trenching	**CM-2 SCE Easement (Cut & Cover) - Excavation/Trenching**		
Pipeline Construction Typical Trench dimensions are: 18 ft wide X 21 ft deep Total Length (ft) 4,684 Total Excavation (cu-ft) 1,770,552 **Total Excavation (cu-yds) 65,576** **(This does not include swelling of the soil once removed.)** **Fiber Optic Duct Bank** Typical Trench dimensions are: 2 ft wide X 5 ft deep Total Length (ft) 4,684 Total Excavation (cu-ft) 46,840 **Total Excavation (cu-yds) 1,735** **(This does not include swelling of the soil once removed.)**	**Pipeline Construction** Typical Trench dimensions are: 18 ft wide X 21 ft deep Total Length (ft) 17,671 Total Excavation (cu-ft) 6,679,638 **Total Excavation (cu-yds) 247,394** **(This does not include swelling of the soil once removed.)** **Fiber Optic Duct Bank** Typical Trench dimensions are: 2 ft wide X 5 ft deep Total Length (ft) 17,671 Total Excavation (cu-ft) 176,710 **Total Excavation (cu-yds) 6,545** **(This does not include swelling of the soil once removed.)**		
CM-1 Roadways - Pavement/Concrete Replacement or Rehabilitation			
Pipeline Construction Trench Width Pavement (sq-ft) 103,048 (22 feet wide through length of pipeline) Trench Width Pavement (sq-yds) 11,450 Finished Coat on half of Roadways (sq-yds) 187,360 (40 feet wide through length of pipeline - covering half of full roadway) **Fiber Optic Ductbank** Trench Width Pavement (sq-ft) 9,368 (2 feet wide through length of pipeline) Trench Width Pavement (sq-yds) 1,041			
CM-1 Roadways (Cut & Cover) - Temporary Median Removal			
Median Locations: None this Contract			

Reach 8, Preferred Alignment CEQA Responses, MWD RRWP (9 feet Diameter Pipeline)

Also see file: CEQA Information, Pump Stations, Backbone Alignment 20231005.xlsx

CM-1 Roadways



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
46	97	1,094
47	98	2,025
49	104	1,320
	Total	4,439

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	300
Daily Crew Production (FT per day)	25
Estimated Number of Pipeline Crews Per Day	0.59
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	7
Shoring Crews	0.2
Workers per Crew	3
Saw Cut Crew	0.05
Workers per crew	3
Demolition Crew	0.05
Workers per crew	3
Paving Crew	0.2
Workers per crew	5
Utility Relocation Crew	0.1
Workers per crew	6
Traffic Control	0.15
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.10**
Total Workers per Day (Average Throughout Construction Schedule)	**5.98**
Fiber Optic Duct Bank	
Construction Schedule (working days)	515
Daily Crew Production (FT per day)	200
Estimated Number of Combined Fiber Optic Crews Per Day	0.04
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0.1
Workers per crew	5
Total Workers per Day (Average Throughout Fiber Optic Construction)	**8.30**
Total Workers per Day (Average Throughout Construction Schedule)	**0.36**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	5.98
One-Way Trips per Day (50 miles)	11.96
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**14.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule)	0.36
One-Way Trips per Day (50 miles)	0.72
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**2.7**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	26.00
One-Way Trips per Day (50 miles)	52.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	4
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**56.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	
Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	17.00
One-Way Trips per Day (50 miles)	34.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**36.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	5.98
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**4.2**
Total Workers per Day (Maximum During Construction Schedule)	26.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**18.2**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.36
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.3**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

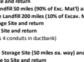
Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 200 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (18' W x 21' D) (includes paving debris)	378.0
Volume of Excavate (CY) per Ft of Trench (18' W x 21' D) (includes paving debris)	14.00
Volume Excavate (CY) per FT Including Swell of 15%	16.10
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.61
Estimated Length of Trench per Day Per Crew (ft)	25.0
Number of Haul Trucks per Crew per Daily Production	40.3
Total One-Way Haul Trips from Site to Staging/Storage and return	**80.5**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline	
(5.25' H x 18' W minus (0.5*3.14*9.25^2)/4)	60.92
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.26
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.59
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.26
Estimated Length of Trench per Day Per Crew (ft)	25
Number of Pipe Bedding Import Trucks per Day	6.5
Total One-Way Haul Trips of Pipe Bedding Import to Site	**13.0**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**13.0**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**54.8**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**23.1**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**2.6**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**1.3**
(Assumes 20 ft of 9' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**1.3**
(Assumes 20 ft of 9' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**1.0**
(Assumes 3" thick above 22' wide at trench plus 40' full overlay for half the full road wide)	
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**190.4**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**112.7**

10 Wheel Dump Trucks for Soils Transport:

18 Wheel Flatbed Trucks for Hauling Pipe



Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	200
One-Way Spoils Haul Trips from Site to Storage Site and return	**8.89**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**16.0**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**1.8**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.5**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.5**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	800
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	22.0
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**5.5**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.4**
(Assumes 3" thick above 2' wide at trench)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**36.1**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**1.6**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**402.5**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**274.1**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**115.6**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**12.8**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**64.9**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**64.9**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**38.2**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**38.2**
Volume of Paving Material Imported to the Site per day (CY)	**8.4**
Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.	
Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**51.1**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**46.0**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.1**
Volume of Imported Soil to Storage from Supplier per day (CY)	**7.4**
Volume of Imported Soil from Storage to the Site per day (CY)	**7.4**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**800**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**800**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**22.0**
Volume of Paving Material Imported to the Site per day (CY)	**3.7**
Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.	

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

This does not apply to this construction method.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

It appears the pipeline is within the MWD service area for this construction method does not deviate into private property where a permanent easement would be required. It is not anticipated that temporary construction easements will be needed.

Demolition?

Paving will be demolished to a width of 16 feet along the pipeline and will extend 2 ft to either side of the 12' wide trench. In some locations additioanl hardscape, curbs, gutters, sidewalks and concrete medians will need to be demolished during the construction. All demolished items will be replaced to existing conditions.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

Traffic control will be required throughout virtually all pipeline reaches for this construction method CM-1. A Construction Zone with traffic way will be used by taking out of service one side of the street as a will be used by taking out of service one side of the street as a Construction Zone and maintaining a Traffic Way on the other side of the street.

Generator Requirements

Large Generator Set 45kw for Night Lighting
Standby Large Generator Set 45kw for Night Lighting
Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Ventilation Requirements

Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Equipment Usage

See attached worksheet "Equipment - CM-1, CM-2, CM-3A"

CM-1 Roadways (Cut & Cover) - Excavation/Trenching

Pipeline Construction	
Typical Trench dimensions are: 18 ft wide X 21 ft deep	
Total Length (ft)	4,439
Total Excavation (cu-ft)	1,677,942
Total Excavation (cu-yds)	**62,146**
(This does not include swelling of the soil once removed.)	
Fiber Optic Duct Bank	
Typical Trench dimensions are: 2 ft wide X 5 ft deep	
Total Length (ft)	4,439
Total Excavation (cu-ft)	44,390
Total Excavation (cu-yds)	**1,644**
(This does not include swelling of the soil once removed.)	

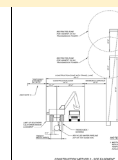
CM-1 Roadways - Pavement/Concrete Replacement or Rehabilitation

Pipeline Construction	
Trench Width Pavement (sq-ft)	97,658
(22 feet wide through length of pipeline)	
Trench Width Pavement (sq-yds)	10,851
Finished Coat on half of Roadways (sq-yds)	177,560
(40 feet wide through length of pipeline - covering half of full roadway)	
Fiber Optic Ductbank	
Trench Width Pavement (sq-ft)	8,878
(2 feet wide through length of pipeline)	
Trench Width Pavement (sq-yds)	986

CM-1 Roadways (Cut & Cover) - Temporary Median Removal

Median Locations: None this Contract

CM-2 SCE Easement



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
51	110	2,626
52	112	893
53, 54, 55	116	3,718
	Total	7,237

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	300
Feet of Pipeline Construction per day needed	80
Estimated Number of Pipeline Crews Per Day	0.30
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	9
Shoring Crews	0.2
Workers per Crew	3
Utility Relocation Crew	0.05
Workers per crew	6
Water Truck Crew	0.15
Workers per Crew	1
Site Restoration Crew	0.15
Workers per crew	3
Temporary Gravel Roadway Crew	0.1
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.9**
Total Workers per Day (Average Throughout Construction Schedule)	**3.29**
Fiber Optic Duct Bank	
Construction Schedule (working days)	515
Daily Crew Production (FT per day)	220
Estimated Number of Combined Fiber Optic Crews Per Day	0.06
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0
Workers per crew	0
Total Workers per Day (Average Throughout Fiber Optic Construction)	**7.80**
Total Workers per Day (Average Throughout Construction Schedule)	**0.50**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	3.29
One-Way Trips per Day (50 miles)	6.57
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**8.6**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule)	0.50
One-Way Trips per Day (50 miles)	1.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)	0
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**1.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	18.0
One-Way Trips per Day (50 miles)	36.0
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**38.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	
Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	12.00
One-Way Trips per Day (50 miles)	24.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**26.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	3.29
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**2.3**
Total Workers per Day (Maximum During Construction Schedule)	18.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**12.6**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.50
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.3**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 150 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (18' W x 21' D) (includes paving debris)	378.0
Volume of Excavate (CY) per Ft of Trench (18' W x 21' D) (includes paving debris)	14.00
Volume Excavate (CY) per FT Including Swell of 15%	16.10
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.61
Estimated Length of Trench per Day Per Crew (ft)	80.0
Number of Haul Trucks per Crew per Daily Production	128.8
Total One-Way Haul Trips from Site to Staging/Storage and return	**257.6**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline	
(5.25' H x 18' W minus (0.5*3.14*9.25^2)/4)	60.92
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.26
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.59
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.26
Estimated Length of Trench per Day Per Crew (ft)	80
Number of Pipe Bedding Import Trucks per Day	20.8
Total One-Way Haul Trips of Pipe Bedding Import to Site	**41.5**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**41.5**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**175.4**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**74.0**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**8.2**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**4.0**
(Assumes 20 ft of 9' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**4.0**
(Assumes 20 ft of 9' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**0.0**
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**606.2**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**182.8**
Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	220
One-Way Spoils Haul Trips from Site to Storage Site and return	**9.78**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**17.6**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**2.0**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.6**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.6**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	880
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	24.2
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**6.0**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.0**
(Not Applicable)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**39.3**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**2.5**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**1288.0**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**877.1**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**369.8**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**41.1**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**207.6**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**207.6**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**122.3**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**122.3**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**
Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.	
Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**56.2**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**50.6**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.6**
Volume of Imported Soil to Storage from Supplier per day (CY)	**8.1**
Volume of Imported Soil from Storage to the Site per day (CY)	**8.1**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**880**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**880**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**24.2**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**
Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.	

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

This does not apply to this construction method.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from water trucks due to the lack of available hydrants in these areas.

Temporary or Permanent Right-of-Way/Easements

The pipeline within the SCE easement will require obtaining a permanent easement. Contractors will also need temporary construction easements along the piping route since their construction activities will extend beyond the limits of the permanent easement.

Demolition?

Surface features will be demolished during construction and will be replaced back to existing conditions including grassland, gravel, concrete paving, etc.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

The majority of the CM-2 method construction will take place cross country away from existing streets. Minimal traffic control may be required in some locations to ensure safety.

Generator Requirements

Large Generator Set 45kw for Night Lighting
Standby Large Generator Set 45kw for Night Lighting
Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Ventilation Requirements

Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

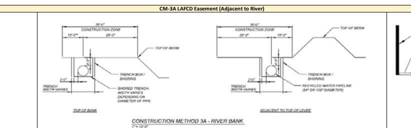
Equipment Usage

See attached worksheet "Equipment - CM-1, CM-2, CM-3A"

CM-2 SCE Easement (Cut & Cover) - Excavation/Trenching

Pipeline Construction	
Typical Trench dimensions are: 18 ft wide X 21 ft deep	
Total Length (ft)	7,237
Total Excavation (cu-ft)	2,735,586
Total Excavation (cu-yds)	**101,318**
(This does not include swelling of the soil once removed.)	
Fiber Optic Duct Bank	
Typical Trench dimensions are: 2 ft wide X 5 ft deep	
Total Length (ft)	7,237
Total Excavation (cu-ft)	72,370
Total Excavation (cu-yds)	**2,680**
(This does not include swelling of the soil once removed.)	

CM-3A LAFCD Easement (Adjacent to River)



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
47, 48, 49	102	5,914
49, 50	107	1,313
50, 51	109	1,152
52, 53	114	4,158
	Total	12,537

Estimated Number of Construction Workers Per Day

Pipeline Construction	
Construction Schedule (working days)	300
Feet of Pipeline Construction per day needed	80
Estimated Number of Pipeline Crews Per Day	0.52
Number of Pipeline Crews	1
Pipeline Construction Crews	1
Workers per crew	9
Shoring Crews	0.2
Workers per Crew	3
Utility Relocation Crew	0.05
Workers per crew	6
Water Truck Crew	0.15
Workers per Crew	1
Site Restoration Crew	0.15
Workers per crew	3
Temporary Gravel Roadway Crew	0.1
Crew Size	4
Total Workers per Day (Average Throughout Pipeline Construction)	**10.9**
Total Workers per Day (Average Throughout Construction Schedule)	**5.69**
Fiber Optic Duct Bank	
Construction Schedule (working days)	515
Daily Crew Production (FT per day)	220
Estimated Number of Combined Fiber Optic Crews Per Day	0.11
Number of Combined Fiber Optic Crews	1
Trenching, Backfill, Conduit, Formwork Crew	1
Workers per crew	4
Concrete Crew	0.75
Workers per Crew	4
Electrician Crew	0.2
Workers per crew	4
Paving Crew	0
Workers per crew	0
Total Workers per Day (Average Throughout Fiber Optic Construction)	**7.80**
Total Workers per Day (Average Throughout Construction Schedule)	**0.86**

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	5.69
One-Way Trips per Day (50 miles)	11.39
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**13.4**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Fiber Optic Ductbank	
Total Workers per Day (Average Throughout Construction Schedule)	0.86
One-Way Trips per Day (50 miles)	1.73
Shuttle to Move Workers from Park to Site (One way - 5 miles)	2
Total One Way Trips per Day of Worker Vehicles (Average Throughout Construction Schedule)	**3.7**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Pipeline Construction	
Total Workers per Day (Maximum During Construction Schedule)	12.0
One-Way Trips per Day (50 miles)	24.0
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum Throughout Construction Schedule)	**26.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	
Fiber Optic Duct Bank	
Total Workers per Day (Maximum During Construction Schedule)	12.00
One-Way Trips per Day (50 miles)	24.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**26.0**
* Assumes maximum of 15 workers per shuttle and 70% of workers need shuttle	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Pipeline Construction	
Total Workers per Day (Average Throughout Construction Schedule)	5.69
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**4.0**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**
Fiber Optic Duct Bank	
Total Workers per Day (Average Throughout Construction Schedule)	0.86
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**0.6**
Total Workers per Day (Maximum During Construction Schedule)	12.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**8.4**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

No construction work is planned for weekends. There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. For example in some locations nighttime work would have less impact to businesses. We expect Contractors will periodically request variances to extend work beyond normal noise ordinance hours.

Construction Staging Area and Storage Location(s)

We currently anticipate two staging/storage locations per contract package. We currently anticipate 8 contract packages for the pipeline so there will be a total of 16 staging and storage areas. Typically a staging/storage area will be on average 4 acres and is assumed to be within 5 miles from the site.

Locations/Procedures for Storing/Transporting Spoils

Due to the limited work area at each construction site we anticipate that stockpiling of soils at the site will not be possible. All excavated soil will likely be hauled offsite to a stockpile at the staging/storage area. The spoil portion of the excavate will be separated and hauled to disposal site(s) and the remaining soil will be hauled back to the construction site to be used to refill the pipe trench. We estimate that 40% of the total excavated material will be spoils or deemed unusable that will need to be hauled and disposed of at landfills at an average one way distance of 50 miles. It is also estimated that 10% of the total spoils (10% of the 40%) will be deemed hazardous and require hauling and disposal at a hazardous waste landfill at an estimate one way distance of 150 miles.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Pipeline Construction	
Volume of Excavate (CF) per Ft of Trench (18' W x 21' D) (includes paving debris)	378.0
Volume of Excavate (CY) per Ft of Trench (18' W x 21' D) (includes paving debris)	14.00
Volume Excavate (CY) per FT Including Swell of 15%	16.10
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	1.61
Estimated Length of Trench per Day Per Crew (ft)	80.0
Number of Haul Trucks per Crew per Daily Production	128.8
Total One-Way Haul Trips from Site to Staging/Storage and return	**257.6**
Estimated Pipe Bedding Soil Import to Site (CF) from Storage Per Foot of Pipeline	
(5.25' H x 18' W minus (0.5*3.14*9.25^2)/4)	54.42
Est. Pipe Bedding Soil Import to Site (CY) Per Ft of Pipeline	2.02
Pipe Bedding Soil Import (CY) per FT Including Swell of 15%	2.32
Capacity per Dump Truck (CY)	10.0
Number of Haul Trucks per FT of Trench	0.23
Estimated Length of Trench per Day Per Crew (ft)	80
Number of Pipe Bedding Import Trucks per Day	18.5
Total One-Way Haul Trips of Pipe Bedding Import to Site	**37.1**
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	**37.1**
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	**175.4**
(68.1% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	**74.0**
(31.9%*90% of Excavate Trips from Site to Storage)	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	**8.2**
(31.9%*10% of Excavate Trips from Site to Storage)	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	**4.0**
(Assumes 20 ft of 9' DIA pipe per trip)	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	**4.0**
(Assumes 20 ft of 9' DIA pipe per trip)	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	**0.0**
Daily One-Way Haul Trips per Crew During the Pipeline Construction	**597.4**
Daily Average One-Way Haul Trips Throughout Construction Schedule	**312.1**
Fiber Optic Duct Bank	
Volume of Excavate (CF) per Ft of Trench (2' W x 5' D) to be Excavated (incl. paving debris)	10.0
Volume of Excavate (CF) per Ft of Trench to be Stockpiled and Reused in the Trench	4.0
Volume of Excavate (CF) per Ft of Trench (2' W x 3' D) to be Removed (incl. paving debris)	6.0
Volume of Excavate (CF) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	6.9
Volume of Excavate (CY) per Ft of Trench to be Removed incl. 15% Swell (incl. paving debris)	0.26
Volume of Imported Soil (CF) per FT of Trench (2' W x 0.5')	1.00
Volume of Imported Soil (CY) per FT of Trench (2' W x 0.5')	0.04
Capacity per Dump Truck (CY)	10.0
Trench Length per Day (FT)	220
One-Way Spoils Haul Trips from Site to Storage Site and return	**9.78**
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	**17.6**
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	**2.0**
One-Way Imported Soil Trips from Offsite to Storage Site and return	**1.6**
One-Way Imported Soil Trips from Storage Site to Site and return	**1.6**
Length of 6" Conduit Installed per Day (LF) (assumes 4 conduits in ductbank)	880
Length of 6" Conduit per Conduit Haul Truck	5,600
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	**0.3**
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	**0.3**
Volume of Concrete (CF) per FT of Duct Bank	3.0
Volume of Concrete (CY) per Day of Duct Bank Installation	24.2
Concrete Truck Capacity (CY)	8.0
One-Way Concrete Truck Trips per Day and return	**6.0**
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	**0.0**
(Not Applicable)	
Total Average Daily One-Way Truck Trips During the Fiber Optic Duct Bank Construction	**39.3**
Total Average Daily One-Way Truck Trips Throughout Construction Schedule	**4.3**

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Pipeline Construction	
Volume of Excavate per Day Exported from the Site to Storage per day (CY)	**1288.0**
Volume of Excavate per Day Returned to the Site from Storage per day (CY)	**877.1**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**369.8**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**41.1**
Volume of Imported Pipe Bedding to Storage from Supplier per day (CY)	**185.4**
Volume of Imported Pipe Bedding from Storage to the Site per day (CY)	**185.4**
Volume of Pipe Hauled to Storage by the Supplier per day (CY)	**122.3**
Volume of Pipe Hauled to the Site from Storage per day (CY)	**122.3**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**
Note: Values are per day during Pipeline Construction and do not represent an average over the construction schedule.	
Fiber Optic Duct Bank	
Volume of Excavate/Spoils per Day Exported from the Site to Storage per day (CY) (incl. 15% swell)	**56.2**
Volume of Excavate/Spoils per Day Returned to the Site from Storage per day (CY)	**0.0**
Volume of Spoils from Storage to Landfill (non-hazardous) (CY)	**50.6**
Volume of Spoils from Storage to Landfill (Hazardous) (CY)	**5.6**
Volume of Imported Soil to Storage from Supplier per day (CY)	**8.1**
Volume of Imported Soil from Storage to the Site per day (CY)	**8.1**
Length of 6" Conduit Hauled to the Storage by the Supplier per day (CY)	**880**
Length of 6" Conduit Hauled to the Site from Storage per day (CY)	**880**
Volume of Concrete Hauled to the Site from Supplier per day (CY)	**24.2**
Volume of Paving Material Imported to the Site per day (CY)	**0.0**
Note: Values occur during the construction of the fiber optic ductbank that is a portion of the overall Construction Schedule for the Reach.	

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Temporary roadway surface will be needed to allow heavy vehicle access particularly during wet weather.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

There may be nighttime work dictated by particular needs along the alignment to address community and business impacts. In these cases temporary lighting will be provided by the Contractor.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

The pipeline within the LAFCD easement will require obtaining a permanent easement. Contractors will also need temporary construction easements along the piping route since their construction activities will extend beyond the limits of the permanent easement.

Demolition?

Surface features will be demolished during construction and will be replaced back to existing conditions including grassland, gravel, concrete paving, etc.

Access Pits/Locations and Spacing

The pipeline construction for this type CM-1 will be a continual excavation of a trench that provides access along the full pipeline route. Specific access pits are not needed for this type of construction.

Traffic Control Requirements

The majority of the CM-3A method construction will take place cross country away from existing streets. Minimal traffic control may be required in some locations to ensure safety.

Generator Requirements

Large Generator Set 45kw for Night Lighting
Standby Large Generator Set 45kw for Night Lighting
Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
Standby Large Generator Set 75kw for Dewatering Pumps and Ventilation Fans
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

Ventilation Requirements

Pipe welding will require ventilation - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
Shoring installation (sheeting) as needed will require ventilation during welding - Utility Blower Fan 520W 2,295 CFM High Velocity Ventilator with Duct Hose
(All included in equipment list - see tab "Equipment - CM-1, CM-2, CM-3A)

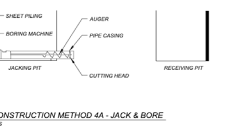
Equipment Usage

See attached worksheet "Equipment - CM-1, CM-2, CM-3A"

CM-3A LAFCD Easement (Cut & Cover) - Excavation/Trenching

Pipeline Construction	
Typical Trench dimensions are: 18 ft wide X 21 ft deep	
Total Length (ft)	12,537
Total Excavation (cu-ft)	4,738,986
Total Excavation (cu-yds)	**175,518**
(This does not include swelling of the soil once removed.)	
Fiber Optic Duct Bank	
Typical Trench dimensions are: 2 ft wide X 5 ft deep	
Total Length (ft)	12,537
Total Excavation (cu-ft)	125,370
Total Excavation (cu-yds)	**4,643**
(This does not include swelling of the soil once removed.)	

CM-4D Pipe Jacking



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
46, 47	98	647
47	100	518
47	101	481
49	103	1,216
49	104	375
50	108	1,310
51	110	484
51, 52	112	944
	Total	5,975

Number of Shafts : 14

Estimated Number of Construction Workers Per Day

Construction Schedule (working days)	300
Feet of Tunnel Construction needed per day	19.92
Estimated Number of Tunnel Crews Per Day (based on 10 feet per day per crew)	1.99
Estimated Number of Pipeline Crews Per Day (based on 30 feet per day per crew)	0.66
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	4.20
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	10
Workers per Pipeline Crew	14
Workers per Shaft Crew	10
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**71.51**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	71.51
One-Way Trips per Day (50 miles)	143.02
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**145.0**
* Assumes maximum of 15 workers per shuttle.	
Total Workers per Day (Maximum During Construction Schedule)	57.00
One-Way Trips per Day (50 miles)	114.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**116.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	71.51
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**50.1**
Total Workers per Day (Maximum During Construction Schedule)	57.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**39.9**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	5,975
Excavation Diameter (ft)	11
Tunnel Volume (loose) (cu-yds)*	24,185
Shaft Volume (cu-yds)*	6,398
Total Volume of Shafts and Tunnel (cu-yds)*	30,583
Total Number of Truck Trips for Soil Removal	3,058
Total Number of Truck Trips for Piping and Casing	478
Total Number of Truck Trips for Shaft Construction	5,040
Disturbed Pavement (sq-ft)	4,935
Paving Replacement Import (18" thick) (cu-ft)	7,403
Paving Replacement Import (18" thick) (cu-yds)	274
Total Number of Truck Trips for Replacing Paving	27
Total Truck Trips During Construction	**8,604**
Number of Truck Trip per day on Average	28.68

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	30,583
Paving Replacement Import (18" thick) (cu-yds)	274
Total Exported Material (cu-yds)	30,857
	30,583

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

Generator Requirements

Included in equipment list - see tab "Equipment - CM-4A through CM-4F"

Ventilation Requirements

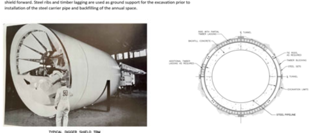
100 HP Ventilation fan for each tunnel
40 HP Ventilation fan per shaft
Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day

Equipment Usage

See attached worksheet "Equipment - CM-4A through CM-4F"

CM-4E Shield Tunneling with Ribs and Lagging

Description: Shield tunneling uses a shield with a digger arm or road header excavating at the face. Hydraulic jacks at the rear of the shield push off the previously installed support elements to propel the shield forward. Steel ribs and timber lagging are used as ground support for the excavation prior to installation of the steel carrier pipe and backfilling of the annual space.



Pipe Segments of This Construction Type

Plan Nos. (pdf)	Segment No.	Length (ft)
49	106	176
53	115	57
	Total	233

Number of Shafts : 4

Estimated Number of Construction Workers Per Day

Construction Schedule (working days) (~120 days proc. mobil.; ~60 test, comm., demob)	300
Feet of Tunnel Construction needed per day	0.78
Estimated Number of Tunnel Excavation Crews Per Day (based on 20 feet per day per crew)	0.04
Estimated Number of Pipeline Crews Per Day (based on 30 feet per day per crew)	0.03
Estimated Number of Shaft Crews Per Day (based on 90 days per shaft)	2.40
Estimated Number of Paving Crews Per Day	0.10
Workers per Tunnel Crew	14
Workers per Pipeline Crew	17
Workers per Shaft Crew	10
Workers per Paving crew	3
Total Workers per Day (Average Throughout Construction Schedule)	**25.28**

Note: The installation of Fiber Optic cabling is estimated to be within these provided production rates.

Estimated Number of One-Way Construction Worker Vehicle Trips Per Day

Total Workers per Day (Average Throughout Construction Schedule)	25.28
One-Way Trips per Day (50 miles)	50.57
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Average Throughout Construction Schedule)	**52.6**
* Assumes maximum of 15 workers per shuttle.	
Total Workers per Day (Maximum During Construction Schedule)	17.00
One-Way Trips per Day (50 miles)	34.00
Shuttle to Move Workers from Park to Site (One way - 5 miles)*	2
Total One Way Trips per Day of Worker Cars (Maximum During Construction Schedule)	**36.0**
* Assumes maximum of 15 workers per shuttle.	
Note: Hauling Vehicles included in Items below.	

Construction Worker Vehicle Parking Location(s)

Total Workers per Day (Average Throughout Construction Schedule)	25.28
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**17.7**
Total Workers per Day (Maximum During Construction Schedule)	17.00
Assume 30% of Staff can park Nearby the Construction Location	
Remaining 70% Need an Establ. Parking Loc'ns	**11.9**

Will There be Weekend or Nighttime Construction? Will we Likely Comply with Noise Ordinance or Will We Request Variance?

Some critical crossings may require weekend or nighttime work by permit. Where waivers are feasible, Saturday day work may be needed.

Construction Staging Area and Storage Location(s)

Construction staging located at each shaft site (each end of crossing).
Launching staging area will be 6,300 sq-ft and the receiving staging 3,800 sq-ft
Additional material and equipment storage available at 4 acre pipeline staging area.

Locations/Procedures for Storing/Transporting Spoils

Excavated spoils will be temporarily stockpiled at the launch shaft sites or loaded directly into dump trucks and hauled offsite daily for disposal.

Number of Daily One-Way Haul Truck Trips Due to Material Transportation (e.g. off-haul/disposal, material); Type of Trucks

Length (ft)	233
Excavation Diameter (ft)	11
Tunnel Volume (loose) (cu-yds)*	943
Shaft Volume (cu-yds)*	1,828
Total Volume of Shafts and Tunnel (cu-yds)*	2,771
Total Number of Truck Trips for Soil Removal	277
Total Number of Truck Trips for Piping and Casing	9
Total Number of Truck Trips for Shaft Construction	1,440
Disturbed Pavement (sq-ft)	1,410
Paving Replacement Import (18" thick) (cu-ft)	2,115
Paving Replacement Import (18" thick) (cu-yds)	78
Total Number of Truck Trips for Replacing Paving	8
Total Truck Trips During Construction	**1,734**
Number of Truck Trip per day on Average	5.78

*Assumes a 1.15 bulking factor
10 CY loads in 12 CY dump trucks

Disposal Location for Construction Debris

It is estimated that construction debris will be hauled and disposed of in a landfill with a one way trip of 50 miles.

Volume of any Material Imported/Exported, Including Demolition Waste (Asphalt/Concrete, Soils, Hazardous Soils, Slurry, Steel/Metals) and Clean Construction Materials (Concrete, Pipeline Segments, Rebar, Base Material/Sand/Gravel, etc)

Total Volume of Shafts and Tunnel (cu-yds)	2,771
Paving Replacement Import (18" thick) (cu-yds)	78
Total Exported Material (cu-yds)	2,849
	2,771

Special Access Routes in the Riverbed or for Oversized Materials or Equipment

Not applicable.

Measures to Address Dewatering/Treatment/Proper Disposal of Groundwater

Geotechnical and hydrogeologic investigations will be performed during detailed design to determine groundwater depth, construction dewatering requirements, and groundwater quality along the pipeline route. The contractor will likely provide local treatment and discharge to a local sewer system per an agreement established with the local authority. Dewatering and treatment requirements will be determined including discharge locations for treated dewatering flow. It is anticipated that dewatering will be accomplished mainly through dewatering pumps located in the pipe trench during construction and in some cases may require wellpoint dewatering methods. Permitting will be obtained for all dewatered discharge locations.

Temporary Lighting

Temporary lighting requirements:
One 0.1 KW light inside tunnel per 25 feet.
Two 10 KW post lights per shaft site.

Water Supply (Hydrants? Water Trucks?)

Water for construction will likely to obtained from local hydrants per an agreement with the local authority.

Temporary or Permanent Right-of-Way/Easements

For pipelines located in city streets no additional right of way needs are anticipated. For pipelines located within rivers or within SCE or private property subsurface easements will be required.

Demolition?

There may be some limited demolition needed in some locations where shafts are constructed including trees, concrete walkways, etc. All demolition will be reconstructed/replaced in kind.

Access Pits/Locations and Spacing

Shafts will be located at each end of each crossing.

Traffic Control Requirements

There will be traffic control needed for the construction of many of the access pits on either side of the tunnel.

Generator Requirements

Included in equipment list - see tab "Equipment - CM-4A through CM-4F"

Ventilation Requirements

100 HP Ventilation fan for each tunnel
40 HP Ventilation fan per shaft
Assume 24-hr day, 90% usage of the ventilation fan during 24-hr day

Equipment Usage

See attached worksheet "Equipment - CM-4A through CM-4F"

APPENDIX C – PIPELINE CONSTRUCTION VMT FOR NOISE CALCULATION

ADTs for Noise Analysis on Backbone Conveyance System Construction

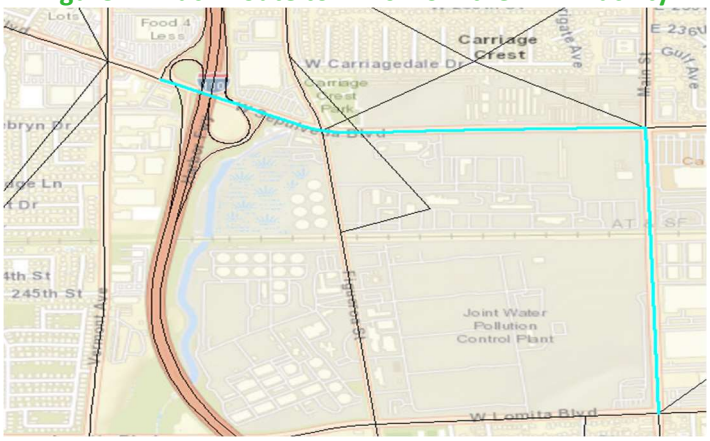
A calculation of Average Daily Traffic (ADT) was performed to generate input for noise calculations. This calculates the ADT adjacent to the pipeline and its associated construction traffic and the land uses that might be affected by noise due to the backbone conveyance system construction.

Assumptions on adjacent land uses were based on a review of aerial imagery. There is a separate "freeway" land use category for long haul trips once they are assumed to have reached the freeway and no longer travel on local streets and become immaterial to the noise calculations. The calculations are provided in this Appendix.

ADTs for Noise Analysis on AWP Facility Construction

Similar to pipeline construction, a separate calculation was performed to generate an estimate of ADT on streets used by construction traffic for input to the noise analysis. For noise analysis purposes, the assumed path from the AWP Facility to the I-110 freeway for the truck trips heading to and from the landfill is shown in Figure 1.

Figure 1: Truck Route to I-110 from the AWP Facility



The construction ADT by roadway classification for the AWP Facility is shown in **Table 1**. This is used as an input to the noise analysis. Based on **Table 1**, there would be a 4 percent increase in truck traffic on arterials within a 5-mile buffer of the AWP Facility and the same level of truck traffic on local and collector streets. There would be a 3 percent increase in total ADT on arterials and around 1 percent increase in total ADT on local and collector streets.

Table 1: AWP Facility ADT by Roadway Classification

Daily ADT per Link by Roadway Classification Within 5 miles buffer of AWP Facility					
Scenario	Vehicle Type	Roadway Class	Phase 1	Phase 2	Total
No Project (NP)	Truck ADT	Arterial	1,329	1,329	2,658
		Collector	424	424	849
		Local	177	177	354
	All ADT	Arterial	19,877	19,877	39,754
		Collector	1,741	1,741	3,481
		Local	2,279	2,279	4,557
Project Trips	Truck ADT	Arterial	78	33	111
		Collector	2	0	2
		Local	1	0	1

	All ADT	Arterial	681	370	1,051
		Collector	14	7	21
		Local	20	11	31
NP + Project Trips	TruckADT	Arterial	1,407	1,362	2,769
		Collector	426	425	851
		Local	178	177	355
	All ADT	Arterial	20,558	20,247	40,805
		Collector	1,755	1,748	3,503
		Local	2,299	2,290	4,589
% Change (NP + Project Trips)/ (NP)	TruckADT	Arterial	6%	2%	4%
		Collector	0%	0%	0%
		Local	0%	0%	0%
	All ADT	Arterial	3%	2%	3%
		Collector	1%	0%	1%
		Local	1%	0%	1%

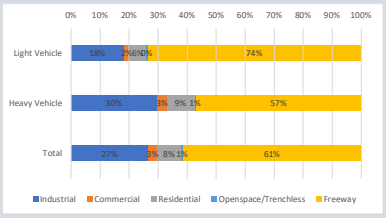
Reach 1

Daily VMT by Land Use

	Within 5 miles of site	Outside 5 miles of site	Total
Light Vehicle	717	1998	**2714**
Heavy Vehicle	3181	4178	**7359**
Total	**3898**	**6176**	**10073**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	495	53	157	12	1998	**2714**
Heavy Vehicle	2197	236	696	53	4178	**7359**
Total	**2692**	**289**	**853**	**64**	**6176**	**10073**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	18%	2%	6%	0%	74%	**100%**
Heavy Vehicle	30%	3%	9%	1%	57%	**100%**
Total	**27%**	**3%**	**8%**	**1%**	**61%**	**100%**



Within 5 miles of site include everything for the first 5 miles
Outside 5 miles of site only include everything beyond the first 5 miles

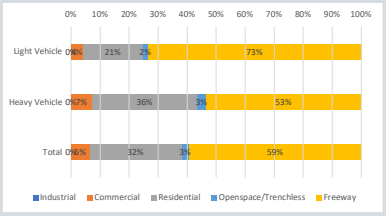
Reach 2

Daily VMT by Land Use

	Within 5 miles of site	Outside 5 miles of site	Total
Light Vehicle	655	1808	**2463**
Heavy Vehicle	2805	3202	**6008**
Total	**3460**	**5011**	**8471**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	0	103	507	45	1808	**2463**
Heavy Vehicle	0	441	2173	191	3202	**6008**
Total	**0**	**545**	**2680**	**236**	**5011**	**8471**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	0%	4%	21%	2%	73%	**100%**
Heavy Vehicle	0%	7%	36%	3%	53%	**100%**
Total	**0%**	**6%**	**32%**	**3%**	**59%**	**100%**



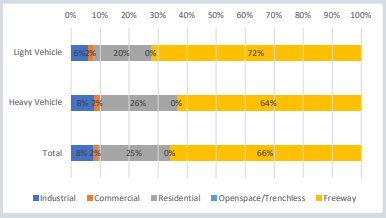
Reach 3

Daily VMT by Land Use

	Within 5 miles of site	Outside 5 miles of site	Total
Light Vehicle	273	719	**992**
Heavy Vehicle	1064	1859	**2923**
Total	**1337**	**2578**	**3916**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	60	15	198	0	719	**992**
Heavy Vehicle	235	58	771	0	1859	**2923**
Total	**295**	**73**	**968**	**0**	**2578**	**3916**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	6%	2%	20%	0%	72%	**100%**
Heavy Vehicle	8%	2%	26%	0%	64%	**100%**
Total	**8%**	**2%**	**25%**	**0%**	**66%**	**100%**



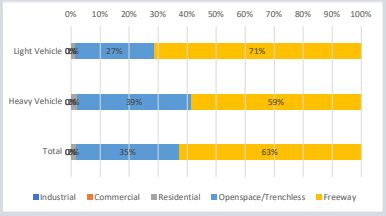
Reach 4

Daily VMT by Land Use

	Within 5 miles of site	Outside 5 miles of site	Total
Light Vehicle	164	409	**573**
Heavy Vehicle	467	658	**1125**
Total	**631**	**1067**	**1698**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	0	0	8	156	409	**573**
Heavy Vehicle	0	0	23	443	658	**1125**
Total	**0**	**0**	**32**	**599**	**1067**	**1698**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	0%	0%	1%	27%	71%	**100%**
Heavy Vehicle	0%	0%	2%	39%	59%	**100%**
Total	**0%**	**0%**	**2%**	**35%**	**63%**	**100%**



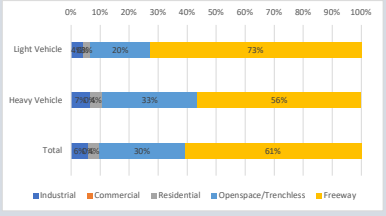
Reach 5

Daily VMT by Land Use

	Within 5 miles of site	Outside 5 miles of site	Total
Light Vehicle	554	1481	**2035**
Heavy Vehicle	2504	3238	**5742**
Total	**3057**	**4719**	**7777**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	84	0	53	417	1481	**2035**
Heavy Vehicle	379	0	241	1883	3238	**5742**
Total	**463**	**0**	**295**	**2299**	**4719**	**7777**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	4%	0%	3%	20%	73%	**100%**
Heavy Vehicle	7%	0%	4%	33%	56%	**100%**
Total	**6%**	**0%**	**4%**	**30%**	**61%**	**100%**



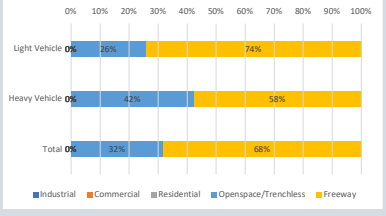
Reach 6

Daily VMT by Land Use [1]

	Within 5 miles of site	Outside 5 miles of site	Total
Light Vehicle	265	762	**1027**
Heavy Vehicle	248	338	**586**
Total	**513**	**1100**	**1613**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	0	0	0	265	762	**1027**
Heavy Vehicle	0	0	0	248	338	**586**
Total	**0**	**0**	**0**	**513**	**1100**	**1613**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	0%	0%	0%	26%	74%	**100%**
Heavy Vehicle	0%	0%	0%	42%	58%	**100%**
Total	**0%**	**0%**	**0%**	**32%**	**68%**	**100%**



[1] Alignment is all in trenchless

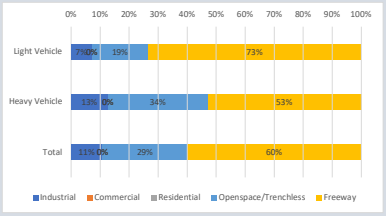
Reach 7

Daily VMT by Land Use

	Within 5 miles of site	Outside 5 miles of site	Total
Light Vehicle	664	1826	**2490**
Heavy Vehicle	2277	2550	**4827**
Total	**2941**	**4376**	**7317**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	179	0	0	485	1826	**2490**
Heavy Vehicle	614	0	0	1663	2550	**4827**
Total	**794**	**0**	**0**	**2148**	**4376**	**7317**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	7%	0%	0%	19%	73%	**100%**
Heavy Vehicle	13%	0%	0%	34%	53%	**100%**
Total	**11%**	**0%**	**0%**	**29%**	**60%**	**100%**



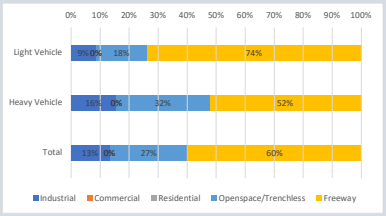
Reach 8

Daily VMT by Land Use

	Within 5 miles of site	Outside 5 miles of site	Total
Light Vehicle	1183	3327	**4510**
Heavy Vehicle	4227	4632	**8859**
Total	**5410**	**7959**	**13368**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	389	0	0	794	3327	**4510**
Heavy Vehicle	1389	0	0	2838	4632	**8859**
Total	**1778**	**0**	**0**	**3632**	**7959**	**13368**

	Industrial	Commercial	Residential	Openspace/Trenchless	Freeway	Total
Light Vehicle	9%	0%	0%	18%	74%	**100%**
Heavy Vehicle	16%	0%	0%	32%	52%	**100%**
Total	**13%**	**0%**	**0%**	**27%**	**60%**	**100%**



Daily Project Trips ADT by Roadway Classification

Vehicle Type		Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8
Light Vehicle		146	133	59	36	115	54	137	241
Heavy Vehicle		854	704	339	138	674	80	619	1151
Total		**1001**	**837**	**398**	**174**	**789**	**134**	**755**	**1392**

Distribution of Daily Project Trips ADT by Roadway Classification

Vehicle Type	Roadway Class	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8
Light Vehicle	Arterial	124	115	51	31	98	45	113	199
	Collector	7	6	3	3	9	5	11	17
	Local	15	12	5	3	9	4	13	26
Heavy Vehicle	Arterial	618	602	291	118	576	66	506	958
	Collector	152	35	19	8	41	7	46	68
	Local	84	67	28	12	57	7	66	125
Total	Arterial	742	717	342	149	674	111	619	1156
	Collector	159	41	22	11	50	11	57	85
	Local	99	79	33	14	65	12	79	151

Daily ADT per Link by Roadway Classification - Within 5 mile buffer of Reach

Scenario	Vehicle Type	Roadway Class	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Sum
NP	TruckADT	Arterial	971	762	744	853	925	715	543	433	5,945
		Collector	239	44	49	60	66	73	50	31	612
		Local	132	85	73	83	91	79	71	57	671
	All ADT	Arterial	18,346	20,623	24,764	25,540	26,401	23,286	20,246	17,783	176,988
		Collector	1,254	1,067	1,569	2,117	2,328	2,335	1,901	1,482	14,052
		Local	2,200	2,189	2,245	2,334	2,351	2,183	2,313	2,287	18,101
WP Reassignment Only	TruckADT	Arterial	970	761	745	851	921	720	543	435	5,947
		Collector	241	46	49	60	66	73	50	32	618
		Local	132	85	73	83	91	79	71	57	672
	All ADT	Arterial	18,468	20,737	24,916	25,628	26,481	23,378	20,246	17,785	177,638
		Collector	1,342	1,148	1,615	2,165	2,395	2,381	1,946	1,544	14,537
		Local	2,200	2,193	2,249	2,340	2,351	2,183	2,313	2,287	18,117
Project Trips	TruckADT	Arterial	618	602	291	118	576	66	506	958	3,735
		Collector	152	35	19	8	41	7	46	68	377
		Local	84	67	28	12	57	7	66	125	447
	All ADT	Arterial	742	717	342	149	674	111	619	1156	4,511
		Collector	159	41	22	11	50	11	57	85	436
		Local	99	79	33	14	65	12	79	151	533
WP Reassignment + Project Trips	TruckADT	Arterial	1,588	1,363	1,036	970	1,497	786	1,049	1,393	9,682
		Collector	393	81	68	68	108	80	97	100	995
		Local	217	153	101	95	148	87	137	182	1,119
	All ADT	Arterial	19,211	21,454	25,258	25,777	27,154	23,489	20,865	18,941	182,149
		Collector	1,502	1,189	1,638	2,176	2,445	2,393	2,003	1,628	14,973
		Local	2,299	2,273	2,282	2,355	2,416	2,195	2,392	2,437	18,649
(WP Reassignment + Project Trips) (NP)	TruckADT	Arterial	617	601	292	117	573	72	506	960	3,737
		Collector	154	37	19	8	41	7	47	69	383
		Local	84	67	29	12	57	7	66	125	447
	All ADT	Arterial	864	831	495	237	754	204	619	1,158	5,161
		Collector	247	123	69	59	117	58	102	146	921
		Local	99	84	37	21	66	12	79	151	548
% Change (WP Reassignment + Project Trips) (NP)	TruckADT	Arterial	64%	79%	39%	14%	62%	10%	93%	222%	
		Collector	65%	83%	40%	14%	62%	9%	94%	224%	
		Local	64%	79%	39%	14%	62%	9%	93%	221%	
	All ADT	Arterial	5%	4%	2%	1%	3%	1%	3%	7%	
		Collector	20%	11%	4%	3%	5%	2%	5%	10%	
		Local	4%	4%	2%	1%	3%	1%	3%	7%	

APPENDIX D – PIPELINE CONSTRUCTION VMT CALCULATION

CM-1 (Pipeline) for Reach 1,2,3,4,5,7,8	# of crews	workers per crew	total workers	equipment per crew	total equipment
Pipeline Construction Crews	1	7	**7**	31	**31**
Shoring Crews	0.2	3	**0.6**	6	**1.2**
Saw Cut Crew	0.05	3	**0.15**	2	**0.1**
Demolition Crew	0.05	3	**0.15**	4	**0.2**
Paving Crew	0.2	5	**1**	6	**1.2**
Utility Relocation Crew	0.1	6	**0.6**	6	**0.6**
Traffic Control	0.15	4	**0.6**	4	**0.6**
Trenching, Backfill, Conduit, Formwork Crew	1	4	**4**	7	**7**
Concrete Crew	0.75	4	**3**	1	**0.75**
Electrician Crew	0.2	4	**0.8**	4	**0.8**
Paving Crew	0.1	5	**0.5**	6	**0.6**

34.9 Pipeline Equipment Only (on average throughout pipeline construction)

9.15 Fiber Optic Duct Bank Equipment Only (on average throughout fiber optic construction)

CM-2, CM-3A for Reach 3,4,5,7,8	# of crews	workers per crew	total workers	equipment per crew	total equipment
Pipeline Construction Crews	1	9	**9**	31	**31**
Shoring Crews	0.2	3	**0.6**	6	**1.2**
Utility Relocation Crew	0.05	6	**0.3**	6	**0.3**
Water Truck Crew	0.15	1	**0.15**	1	**0.15**
Site Restoration Crew	0.15	3	**0.45**	5	**0.75**
Temporary Gravel Roadway Crew	0.1	4	**0.4**	3	**0.3**
Trenching, Backfill, Conduit, Formwork Crew	1	4	**4**	7	**7**
Concrete Crew	0.75	4	**3**	1	**0.75**
Electrician Crew	0.2	4	**0.8**	4	**0.8**
Paving Crew	0	0	**0**	6	**0**

33.7 Pipeline Equipment Only (on average throughout pipeline construction)

8.55 Fiber Optic Duct Bank Equipment Only (on average throughout fiber optic construction)

CM-4 seris workers per crew for Reach 1,2,3,4,5,6,7,8	CM-4A	CM-4B	CM-4C	CM-4D	CM-4E	CM-4F
Tunnel Crew	7	15	15	10	14	20
Pipeline Crew	16	16	16	14	17	17
Shaft Crew	8	8	8	10	10	10
Paving Crew	3	3	3	3	3	3

	CM-4A					CM-4B				
Reach 1	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**
Tunnel Crew	0.45	7	**3.18**		**0**	0.14	15	**2.17**	16	**2.32**
Pipeline Crew	0.11	16	**1.82**	31	**3.52**	0.07	16	**1.16**	17	**1.23**
Shaft Crew	2.8	8	**22.4**	29	**81.20**	2	8	**12.8**	29	**46.4**
Paving Crew	0.10	3	**0.3**		**0**	0.10	3	**0.3**		**0**
			Total Equipment CM-4A		**84.72**			Total Equipment CM-4B		**49.95**

	CM-4A					CM-4B				
Reach 2	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**
Tunnel Crew	0.02	7	**0.11**		**0**	0.48	15	**7.20**	16	**7.68**
Pipeline Crew	0.00	16	**0.07**	31	**0.13**	0.24	16	**3.84**	17	**4.08**
Shaft Crew	0.28	8	**2.22**	29	**8.03**	4	8	**28.8**	29	**104.4**
Paving Crew	0.10	3	**0.3**		**0**	0.10	3	**0.3**		**0**
			Total Equipment CM-4A		**8.16**			Total Equipment CM-4B		**116.15**

	CM-4A					CM-4B				
Reach 3	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**
Tunnel Crew	0.15	7	**1.06**		**0**	0.27	15	**4.01**	16	**4.28**
Pipeline Crew	0.04	16	**0.60**	31	**1.17**	0.13	16	**2.14**	17	**2.27**
Shaft Crew	0.87	8	**6.94**	29	**25.16**	0.43	8	**3.47**	29	**12.58**
Paving Crew	0.10	3	**0.3**		**0**	0.10	3	**0.3**		**0**
			Total Equipment CM-4A		**26.33**			Total Equipment CM-4B		**19.13**

	CM-4B					CM-4C				
Reach 4	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**
Tunnel Crew	0.02	15	**0.25**	16	**0.27**	0.21	15	**3.15**	16	**3.36**
Pipeline Crew	0.01	16	**0.13**	17	**0.14**	0.16	16	**2.52**	19	**2.99**
Shaft Crew	0.14	8	**1.13**	29	**4.08**	0.28	8	**2.25**	29	**8.16**
Paving Crew	0.10	3	**0.3**		**0**	0.10	3	**0.3**		**0**
			Total Equipment CM-4B		**4.48**			Total Equipment CM-4C		**14.51**

	CM-4A					CM-4B					CM-4C				
Reach 5	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**
Tunnel Crew	0.13	7	**0.89**		**0**	0.17	15	**2.56**	16	**2.74**	0.25	15	**3.73**	16	**3.97**
Pipeline Crew	0.03	16	**0.51**	31	**0.99**	0.04	16	**0.68**	17	**0.73**	0.19	16	**2.98**	19	**3.54**
Shaft Crew	0.79	8	**6.33**	29	**22.95**	1.19	8	**9.49**	29	**34.42**	0.40	8	**3.16**	29	**11.47**
Paving Crew	0.10	3	**0.3**		**0**	0.10	3	**0.3**		**0**	0.10	3	**0.3**		**0**
			Total Equipment CM-4A		**23.93**			Total Equipment CM-4B		**37.88**			Total Equipment CM-4C		**18.99**

	CM-4F				
Reach 6	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**
Tunnel Crew	0.57	20	**11.36**	16	**9.09**
Pipeline Crew	0.57	17	**9.66**	18	**10.22**
Shaft Crew	0.47	10	**4.68**	27	**12.64**
Paving Crew	0.10	3	**0.3**		**0**
			Total Equipment CM-4F		**31.95**

	CM-4E					CM-4F				
Reach 7	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**
Tunnel Crew	0.13	14	**1.84**	16	**2.10**	0.41	20	**8.24**	16	**6.59**
Pipeline Crew	0.09	17	**1.49**	18	**1.58**	0.41	17	**7.00**	18	**7.42**
Shaft Crew	1.68	10	**16.82**	27	**45.42**	1.69	10	**16.86**	27	**45.52**
Paving Crew	0.10	3	**0.3**		**0**	0.10	3	**0.3**		**0**
			Total Equipment CM-4E		**49.10**			Total Equipment CM-4F		**59.53**

	CM-4D					CM-4E				
Reach 8	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**	**# of crews**	**workers per crew**	**total workers**	**equipment per crew**	**total equipment**
Tunnel Crew	1.99	10	**19.92**		**0**	0.04	14	**0.54**	16	**0.62**
Pipeline Crew	0.66	14	**9.29**	31	**20.58**	0.03	17	**0.44**	18	**0.47**
Shaft Crew	4.20	10	**42**	27	**113.4**	2.40	10	**24**	27	**64.8**
Paving Crew	0.10	3	**0.3**		**0**	0.10	3	**0.3**		**0**
			Total Equipment CM-4D		**133.98**			Total Equipment CM-4E		**65.89**

	CM-1						CM-2						CM-3A						CM-4A			
Reach #	**Estimated Number of Pipeline Crews Per Day**	**Total Equipment per Day (on average throughout pipeline construction)**	**Estimated Number of Combined Fiber Optic Crews Per Day**	**Total Equipment per Day (on average throughout fiber optic construction)**	**Total Equipment per Day (on average throughout construction schedule)**	**Daily Construction Vehicle (HV) Trips (on average throughout construction schedule)**	**Estimated Number of Pipeline Crews Per Day**	**Total Equipment per Day (on average throughout pipeline construction)**	**Estimated Number of Combined Fiber Optic Crews Per Day**	**Total Equipment per Day (on average throughout fiber optic construction)**	**Total Equipment per Day (on average throughout construction schedule)**	**Daily Construction Vehicle (HV) Trips (on average throughout construction schedule)**	**Estimated Number of Pipeline Crews Per Day**	**Total Equipment per Day (on average throughout pipeline construction)**	**Estimated Number of Combined Fiber Optic Crews Per Day**	**Total Equipment per Day (on average throughout fiber optic construction)**	**Total Equipment per Day (on average throughout construction schedule)**	**Daily Construction Vehicle (HV) Trips (on average throughout construction schedule)**	**Estimated Number of Crews Per Day**	**Total Equipment per Day (on average throughout construction)**	**Total Equipment per Day (on average throughout construction schedule)**	**Daily Construction Vehicle (HV) Trips (on average throughout construction schedule)**
1	2.12	34.90	0.32	9.15	76.77	**153.55**													1	84.72	84.72	**169.44**
2	1.66	34.90	0.25	9.15	60.25	**120.50**													1	8.16	8.16	**16.31**
3	0.21	34.90	0.03	9.15	7.55	**15.09**	0.19	33.70	0.03	8.55	6.54	**13.09**	0.08	33.70	0.03	8.55	2.83	**5.65**	1	26.33	26.33	**52.65**
4	0.33	34.90	0.05	9.15	12.08	**24.15**							0.01	33.70	0.00	8.55	0.36	**0.71**				
5	1.67	34.90	0.16	9.15	59.59	**119.19**	0.08	33.70	0.02	8.55	3.05	**6.09**							1	23.93	23.93	**47.87**
6																						
7	0.35	34.90	0.05	9.15	12.64	**25.28**	0.41	33.70	0.13	8.55	15.03	**30.06**										
8	0.59	34.90	0.04	9.15	21.05	**42.10**	0.30	33.70	0.06	8.55	10.71	**21.42**	0.52	33.70	0.11	8.55	18.55	**37.10**				

	CM-4B				CM-4C				CM-4D				CM-4E				CM-4F			
Reach #	**Estimated Number of Crews Per Day**	**Total Equipment per Day (on average throughout construction)**	**Total Equipment per Day (on average throughout construction schedule)**	**Daily Construction Vehicle (HV) Trips (on average throughout construction schedule)**	**Estimated Number of Crews Per Day**	**Total Equipment per Day (on average throughout construction)**	**Total Equipment per Day (on average throughout construction schedule)**	**Daily Construction Vehicle (HV) Trips (on average throughout construction schedule)**	**Estimated Number of Crews Per Day**	**Total Equipment per Day (on average throughout construction)**	**Total Equipment per Day (on average throughout construction schedule)**	**Daily Construction Vehicle (HV) Trips (on average throughout construction schedule)**	**Estimated Number of Crews Per Day**	**Total Equipment per Day (on average throughout construction)**	**Total Equipment per Day (on average throughout construction schedule)**	**Daily Construction Vehicle (HV) Trips (on average throughout construction schedule)**	**Estimated Number of Crews Per Day**	**Total Equipment per Day (on average throughout construction)**	**Total Equipment per Day (on average throughout construction schedule)**	**Daily Construction Vehicle (HV) Trips (on average throughout construction schedule)**
1	1	49.95	49.95	**99.89**																
2	1	116.15	116.15	**232.31**																
3	1	19.13	19.13	**38.26**																
4	1	4.48	4.48	**8.97**	1	14.51	14.51	**29.02**												
5	1	37.88	37.88	**75.76**	1	18.99	18.99	**37.97**												
6																	1	31.95	31.95	**63.90**
7													1	49.10	49.10	**98.20**	1	59.53	59.53	**119.06**
8									1	133.98	133.98	**267.96**	1	65.89	65.89	**131.77**				

Distance per Trip for "Total One-Way Haul Trips from Site to Staging/Storage and return"	3.51
Distance per Trip for "Total One-Way Haul Trips of Pipe Bedding Import to Site"	
Distance per Trip for "Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier"	30
Distance per Trip for "Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)"	
Distance per Trip for "No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back"	32
Distance per Trip for "No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles)	200
Distance per Trip for "No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)"	50
Distance per Trip for "No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)"	5
Distance per Trip for "No. of One way Trips to Site Importing Paving Materials (50 miles ea way)"	50

Pipeline Construction

Distance per Trip for "One-Way Spoils Haul Trips from Site to Storage Site and return"	
Distance per Trip for "One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return"	
Distance per Trip for "One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excavv. Mat'l) & retu	
Distance per Trip for "One-Way Imported Soil Trips from Offsite to Storage Site and return"	
Distance per Trip for "One-Way Imported Soil Trips from Storage Site to Site and return"	
Distance per Trip for "One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return"	
Distance per Trip for "One-Way Daily Haul Trips of Pipe from Storage Site to Site and return"	
Distance per Trip for "One-Way Concrete Truck Trips per Day and return"	
Distance per Trip for "One way Trips to Site Importing Paving Materials (50 miles ea way) and return"	

Fiber Optic Duct Bank

Reach 1, CM-1

Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	77.69	3.51	272.80	272.80	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	14.15	3.51	49.69	49.69	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	14.15	30.00	424.50	70.75	353.75	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	52.91	3.51	185.78	185.78	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	22.30	31.50	702.59	111.52	591.07	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	2.48	200.00	495.66	12.39	483.26	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	1.50	50.00	75.00	7.50	67.50	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	1.50	5.00	7.50	7.50	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	1.10	50.00	54.94	5.49	49.45	
Sum			2268.46	723.43	1545.03	
Estimated Number of Pipeline Crews Per Day			2.12	2.12	2.12	
Haul Truck VMT for Pipeline Construction			4801.41	1531.20	3270.21	
Fiber Optic Duct Bank	**Trips**	**Trip Distance**	**VMT**	**VMT first 5 miles**	**VMT beyond first 5 miles**	
One-Way Spoils Haul Trips from Site to Storage Site and return	8.89	3.51	31.21	31.21	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	16.00	31.50	504.00	80.00	424.00	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.78	200.00	355.56	8.89	346.67	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.48	30.00	44.44	7.41	37.04	
One-Way Imported Soil Trips from Storage Site to Site and return	1.48	3.51	5.20	5.20	0.00	
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.29	50.00	14.29	1.43	12.86	
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.29	5.00	1.43	1.43	0.00	
One-Way Concrete Truck Trips per Day and return	5.49	30.00	164.72	27.45	137.27	
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.43	50.00	21.30	2.13	19.17	
Sum			1142.15	165.15	977.00	
Estimated Number of Combined Fiber Optic Crews Per Day			0.32	0.32	0.32	
Haul Truck VMT for Fiber Optic Duct Bank			362.62	52.43	310.19	
		Total VMT	5164.03	1583.63	3580.39	Total VMT

Reach 2, CM-1

Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	77.69	3.83	297.85	297.85	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	14.15	3.83	54.25	54.25	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	14.15	30.00	424.50	70.75	353.75	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	52.91	3.83	202.84	202.84	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	22.30	32.00	713.74	111.52	602.22	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	2.48	200.00	495.66	12.39	483.26	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	1.50	50.00	75.00	7.50	67.50	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	1.50	5.00	7.50	7.50	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	1.10	50.00	54.94	5.49	49.45	
Sum			2326.28	770.10	1556.18	
Estimated Number of Pipeline Crews Per Day			1.66	1.66	1.66	
Haul Truck VMT for Pipeline Construction			3864.04	1279.17	2584.87	
Fiber Optic Duct Bank	**Trips**	**Trip Distance**	**VMT**	**VMT first 5 miles**	**VMT beyond first 5 miles**	
One-Way Spoils Haul Trips from Site to Storage Site and return	8.89	3.83	34.08	34.08	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	16.00	32.00	512.00	80.00	432.00	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.78	200.00	355.56	8.89	346.67	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.48	30.00	44.44	7.41	37.04	
One-Way Imported Soil Trips from Storage Site to Site and return	1.48	3.83	5.68	5.68	0.00	
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.29	50.00	14.29	1.43	12.86	
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.29	5.00	1.43	1.43	0.00	
One-Way Concrete Truck Trips per Day and return	5.49	30.00	164.72	27.45	137.27	
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.43	50.00	21.30	2.13	19.17	
Sum			1153.49	168.50	985.00	
Estimated Number of Combined Fiber Optic Crews Per Day			0.25	0.25	0.25	
Haul Truck VMT for Fiber Optic Duct Bank			287.40	41.98	245.42	
		Total VMT	4151.44	1321.15	2830.29	Total VMT

Reach 3, CM-1

Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	77.69	2.77	215.32	215.32	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	14.15	2.77	39.22	39.22	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	14.15	30.00	424.50	70.75	353.75	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	52.91	2.77	146.63	146.63	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	22.30	29.00	646.83	111.52	535.31	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	2.48	200.00	495.66	12.39	483.26	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	1.50	50.00	75.00	7.50	67.50	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	1.50	5.00	7.50	7.50	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	1.10	50.00	54.94	5.49	49.45	
Sum			2105.60	616.33	1489.27	
Estimated Number of Pipeline Crews Per Day			0.21	0.21	0.21	
Haul Truck VMT for Pipeline Construction			438.03	128.22	309.82	
Fiber Optic Duct Bank	**Trips**	**Trip Distance**	**VMT**	**VMT first 5 miles**	**VMT beyond first 5 miles**	
One-Way Spoils Haul Trips from Site to Storage Site and return	8.89	2.77	24.64	24.64	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	16.00	29.00	464.00	80.00	384.00	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.78	200.00	355.56	8.89	346.67	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.48	30.00	44.44	7.41	37.04	
One-Way Imported Soil Trips from Storage Site to Site and return	1.48	2.77	4.11	4.11	0.00	
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.29	50.00	14.29	1.43	12.86	
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.29	5.00	1.43	1.43	0.00	
One-Way Concrete Truck Trips per Day and return	5.49	30.00	164.72	27.45	137.27	
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.43	50.00	21.30	2.13	19.17	
Sum			1094.47	157.48	937.00	
Estimated Number of Combined Fiber Optic Crews Per Day			0.03	0.03	0.03	
Haul Truck VMT for Fiber Optic Duct Bank			34.15	4.91	29.24	
		Total VMT	472.18	133.13	339.05	Total VMT

Reach 3, CM-2

Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	258.96	2.77	717.73	717.73	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	47.17	2.77	130.72	130.72	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	47.17	30.00	1414.99	235.83	1179.16	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	176.35	2.77	488.78	488.78	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	74.35	29.00	2156.10	371.74	1784.36	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	8.26	200.00	1652.18	41.30	1610.88	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	5.00	50.00	250.00	25.00	225.00	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	5.00	5.00	25.00	25.00	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	0.00	50.00	0.00	0.00	0.00	
Sum			6835.51	2036.11	4799.40	
Estimated Number of Pipeline Crews Per Day			0.19	0.19	0.19	
Haul Truck VMT for Pipeline Construction			1274.68	379.69	894.99	
Fiber Optic Duct Bank	**Trips**	**Trip Distance**	**VMT**	**VMT first 5 miles**	**VMT beyond first 5 miles**	
One-Way Spoils Haul Trips from Site to Storage Site and return	9.78	2.77	27.10	27.10	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	17.60	29.00	510.40	88.00	422.40	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.96	200.00	391.11	9.78	381.33	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.63	30.00	48.89	8.15	40.74	

One-Way Imported Soil Trips from Storage Site to Site and return	1.63	2.77	4.52	4.52	0.00
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.31	50.00	15.71	1.57	14.14
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.31	5.00	1.57	1.57	0.00
One-Way Concrete Truck Trips per Day and return	6.04	30.00	181.19	30.20	151.00
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.00	50.00	0.00	0.00	0.00
Sum			1180.50	170.88	1009.61
Estimated Number of Combined Fiber Optic Crews Per Day			0.03	0.03	0.03
Haul Truck VMT for Fiber Optic Duct Bank			35.67	5.16	30.51
		Total VMT	1310.35	384.86	925.50 Total VMT

Reach 3, CM-3A					
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles
Total One-Way Haul Trips from Site to Staging/Storage and return	258.96	2.77	717.73	717.73	0.00
Total One-Way Haul Trips of Pipe Bedding Import to Site	47.17	2.77	130.72	130.72	0.00
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	47.17	30.00	1414.99	235.83	1179.16
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	176.35	2.77	488.78	488.78	0.00
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	74.35	29.00	2156.10	371.74	1784.36
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	8.26	200.00	1652.18	41.30	1610.88
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	5.00	50.00	250.00	25.00	225.00
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	5.00	5.00	25.00	25.00	0.00
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	0.00	50.00	0.00	0.00	0.00
Sum			6835.51	2036.11	4799.40
Estimated Number of Pipeline Crews Per Day			0.08	0.08	0.08
Haul Truck VMT for Pipeline Construction			513.90	153.08	360.83
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles
One-Way Spoils Haul Trips from Site to Storage Site and return	9.78	2.77	27.10	27.10	0.00
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	17.60	29.00	510.40	88.00	422.40
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.96	200.00	391.11	9.78	381.33
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.63	30.00	48.89	8.15	40.74
One-Way Imported Soil Trips from Storage Site to Site and return	1.63	2.77	4.52	4.52	0.00
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.31	50.00	15.71	1.57	14.14
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.31	5.00	1.57	1.57	0.00
One-Way Concrete Truck Trips per Day and return	6.04	30.00	181.19	30.20	151.00
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.00	50.00	0.00	0.00	0.00
Sum			1180.50	170.88	1009.61
Estimated Number of Combined Fiber Optic Crews Per Day			0.03	0.03	0.03
Haul Truck VMT for Fiber Optic Duct Bank			40.34	5.84	34.50
		Total VMT	554.25	158.92	395.33 Total VMT

Reach 4, CM-1					
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles
Total One-Way Haul Trips from Site to Staging/Storage and return	77.69	3.06	238.10	238.10	0.00
Total One-Way Haul Trips of Pipe Bedding Import to Site	14.15	3.06	43.37	43.37	0.00
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	14.15	30.00	424.50	70.75	353.75
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	52.91	3.06	162.14	162.14	0.00
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	22.30	25.00	557.61	111.52	446.09
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	2.48	200.00	495.66	12.39	483.26
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	1.50	50.00	75.00	7.50	67.50
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	1.50	5.00	7.50	7.50	0.00
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	1.10	50.00	54.94	5.49	49.45
Sum			2058.82	658.77	1400.05
Estimated Number of Pipeline Crews Per Day			0.33	0.33	0.33
Haul Truck VMT for Pipeline Construction			685.38	219.30	466.07
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles
One-Way Spoils Haul Trips from Site to Storage Site and return	8.89	3.06	27.24	27.24	0.00
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	16.00	25.00	400.00	80.00	320.00
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.78	200.00	355.56	8.89	346.67
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.48	30.00	44.44	7.41	37.04
One-Way Imported Soil Trips from Storage Site to Site and return	1.48	3.06	4.54	4.54	0.00
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.29	50.00	14.29	1.43	12.86
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.29	5.00	1.43	1.43	0.00
One-Way Concrete Truck Trips per Day and return	5.49	30.00	164.72	27.45	137.27
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.43	50.00	21.30	2.13	19.17
Sum			1033.52	160.52	873.00
Estimated Number of Combined Fiber Optic Crews Per Day			0.05	0.05	0.05
Haul Truck VMT for Fiber Optic Duct Bank			51.61	8.02	43.59
		Total VMT	736.99	227.32	509.67 Total VMT

Reach 4, CM-3A					
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles
Total One-Way Haul Trips from Site to Staging/Storage and return	258.96	3.06	793.66	793.66	0.00
Total One-Way Haul Trips of Pipe Bedding Import to Site	47.17	3.06	144.55	144.55	0.00
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	47.17	30.00	1414.99	235.83	1179.16
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	176.35	3.06	540.48	540.48	0.00
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	74.35	25.00	1858.71	371.74	1486.97
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	8.26	200.00	1652.18	41.30	1610.88
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	5.00	50.00	250.00	25.00	225.00
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	5.00	5.00	25.00	25.00	0.00
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	0.00	50.00	0.00	0.00	0.00
Sum			6679.57	2177.57	4502.00
Estimated Number of Pipeline Crews Per Day			0.01	0.01	0.01
Haul Truck VMT for Pipeline Construction			63.46	20.69	42.77
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles
One-Way Spoils Haul Trips from Site to Storage Site and return	9.78	3.06	29.97	29.97	0.00
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	17.60	25.00	440.00	88.00	352.00
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.96	200.00	391.11	9.78	381.33
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.63	30.00	48.89	8.15	40.74
One-Way Imported Soil Trips from Storage Site to Site and return	1.63	3.06	4.99	4.99	0.00
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.31	50.00	15.71	1.57	14.14
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.31	5.00	1.57	1.57	0.00
One-Way Concrete Truck Trips per Day and return	6.04	30.00	181.19	30.20	151.00
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.00	50.00	0.00	0.00	0.00
Sum			1113.44	174.23	939.21
Estimated Number of Combined Fiber Optic Crews Per Day			0.004	0.00	0.00
Haul Truck VMT for Fiber Optic Duct Bank			4.81	0.75	4.06
		Total VMT	68.26	21.44	46.82 Total VMT

Reach 5, CM-1					
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles
Total One-Way Haul Trips from Site to Staging/Storage and return	77.69	3.48	270.54	270.54	0.00
Total One-Way Haul Trips of Pipe Bedding Import to Site	14.15	3.48	49.28	49.28	0.00
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	14.15	30.00	424.50	70.75	353.75
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	52.91	3.48	184.24	184.24	0.00
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	22.30	26.00	579.92	111.52	468.39
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	2.48	200.00	495.66	12.39	483.26
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	1.50	50.00	75.00	7.50	67.50
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	1.50	5.00	7.50	7.50	0.00
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	1.10	50.00	54.94	5.49	49.45
Sum			2141.57	719.22	1422.36
Estimated Number of Pipeline Crews Per Day			1.67	1.67	1.67
Haul Truck VMT for Pipeline Construction			3566.35	1197.71	2368.64
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles
One-Way Spoils Haul Trips from Site to Storage Site and return	8.89	3.48	30.95	30.95	0.00
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	16.00	26.00	416.00	80.00	336.00
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.78	200.00	355.56	8.89	346.67
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.48	30.00	44.44	7.41	37.04
One-Way Imported Soil Trips from Storage Site to Site and return	1.48	3.48	5.16	5.16	0.00
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.29	50.00	14.29	1.43	12.86

One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.29	5.00	1.43	1.43	0.00	
One-Way Concrete Truck Trips per Day and return	5.49	30.00	164.72	27.45	137.27	
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.43	50.00	21.30	2.13	19.17	
Sum			1053.85	164.85	889.00	
Estimated Number of Combined Fiber Optic Crews Per Day			0.16	0.16	0.16	
Haul Truck VMT for Fiber Optic Duct Bank			169.90	26.58	143.32	
		Total VMT	3736.24	1224.29	2511.96	Total VMT

Reach 5, CM-2						
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	258.96	3.48	901.81	901.81	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	47.17	3.48	164.25	164.25	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	47.17	30.00	1414.99	235.83	1179.16	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	176.35	3.48	614.14	614.14	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	74.35	26.00	1933.05	371.74	1561.31	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	8.26	200.00	1652.18	41.30	1610.88	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	5.00	50.00	250.00	25.00	225.00	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	5.00	5.00	25.00	25.00	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	0.00	50.00	0.00	0.00	0.00	
Sum			6955.43	2379.08	4576.35	
Estimated Number of Pipeline Crews Per Day			0.08	0.08	0.08	
Haul Truck VMT for Pipeline Construction			585.36	200.22	385.14	
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
One-Way Spoils Haul Trips from Site to Storage Site and return	9.78	3.48	34.05	34.05	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	17.60	26.00	457.60	88.00	369.60	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.96	200.00	391.11	9.78	381.33	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.63	30.00	48.89	8.15	40.74	
One-Way Imported Soil Trips from Storage Site to Site and return	1.63	3.48	5.68	5.68	0.00	
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.31	50.00	15.71	1.57	14.14	
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.31	5.00	1.57	1.57	0.00	
One-Way Concrete Truck Trips per Day and return	6.04	30.00	181.19	30.20	151.00	
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.00	50.00	0.00	0.00	0.00	
Sum			1135.81	178.99	956.81	
Estimated Number of Combined Fiber Optic Crews Per Day			0.02	0.02	0.02	
Haul Truck VMT for Fiber Optic Duct Bank			28.04	4.42	23.62	
		Total VMT	613.40	204.64	408.76	Total VMT

Reach 7, CM-1						
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	80.50	3.44	276.77	276.77	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	12.97	3.44	44.60	44.60	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	12.97	30.00	389.19	64.87	324.33	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	54.82	3.44	188.48	188.48	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	23.11	20.00	462.23	115.56	346.67	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	2.57	200.00	513.59	12.84	500.75	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	1.25	50.00	62.50	6.25	56.25	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	1.25	5.00	6.25	6.25	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	0.97	50.00	48.45	4.84	43.60	
Sum			1992.07	720.46	1271.60	
Estimated Number of Pipeline Crews Per Day			0.35	0.35	0.35	
Haul Truck VMT for Pipeline Construction			697.63	252.31	445.32	
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
One-Way Spoils Haul Trips from Site to Storage Site and return	8.89	3.44	30.56	30.56	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	16.00	20.00	320.00	80.00	240.00	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.78	200.00	355.56	8.89	346.67	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.48	30.00	44.44	7.41	37.04	
One-Way Imported Soil Trips from Storage Site to Site and return	1.48	3.44	5.09	5.09	0.00	
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.29	50.00	14.29	1.43	12.86	
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.29	5.00	1.43	1.43	0.00	
One-Way Concrete Truck Trips per Day and return	5.49	30.00	164.72	27.45	137.27	
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.43	50.00	21.30	2.13	19.17	
Sum			957.39	164.39	793.00	
Estimated Number of Combined Fiber Optic Crews Per Day			0.05	0.05	0.05	
Haul Truck VMT for Fiber Optic Duct Bank			43.54	7.48	36.06	
		Total VMT	741.17	259.79	481.38	Total VMT

Reach 7, CM-2						
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	257.60	3.44	885.67	885.67	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	41.51	3.44	142.73	142.73	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	41.51	30.00	1245.41	207.57	1037.84	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	175.43	3.44	603.14	603.14	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	73.96	20.00	1479.14	369.78	1109.35	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	8.22	200.00	1643.49	41.09	1602.40	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	4.00	50.00	200.00	20.00	180.00	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	4.00	5.00	20.00	20.00	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	0.00	50.00	0.00	0.00	0.00	
Sum			6219.58	2289.98	3929.60	
Estimated Number of Pipeline Crews Per Day			0.41	0.41	0.41	
Haul Truck VMT for Pipeline Construction			2567.90	945.47	1622.43	
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
One-Way Spoils Haul Trips from Site to Storage Site and return	9.78	3.44	33.62	33.62	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	17.60	20.00	352.00	88.00	264.00	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.96	200.00	391.11	9.78	381.33	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.63	30.00	48.89	8.15	40.74	
One-Way Imported Soil Trips from Storage Site to Site and return	1.63	3.44	5.60	5.60	0.00	
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.31	50.00	15.71	1.57	14.14	
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.31	5.00	1.57	1.57	0.00	
One-Way Concrete Truck Trips per Day and return	6.04	30.00	181.19	30.20	151.00	
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.00	50.00	0.00	0.00	0.00	
Sum			1029.70	178.49	851.21	
Estimated Number of Combined Fiber Optic Crews Per Day			0.13	0.13	0.13	
Haul Truck VMT for Fiber Optic Duct Bank			134.49	23.31	111.17	
		Total VMT	2702.39	968.79	1733.60	Total VMT

Reach 8, CM-1						
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	80.50	3.44	276.95	276.95	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	12.97	3.44	44.63	44.63	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	12.97	30.00	389.19	64.87	324.33	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	54.82	3.44	188.60	188.60	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	23.11	20.00	462.23	115.56	346.67	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	2.57	200.00	513.59	12.84	500.75	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	1.25	50.00	62.50	6.25	56.25	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	1.25	5.00	6.25	6.25	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	0.97	50.00	48.45	4.84	43.60	
Sum			1992.40	720.79	1271.60	
Estimated Number of Pipeline Crews Per Day			0.59	0.59	0.59	
Haul Truck VMT for Pipeline Construction			1179.23	426.61	752.62	
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
One-Way Spoils Haul Trips from Site to Storage Site and return	8.89	3.44	30.58	30.58	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	16.00	20.00	320.00	80.00	240.00	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.78	200.00	355.56	8.89	346.67	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.48	30.00	44.44	7.41	37.04	
One-Way Imported Soil Trips from Storage Site to Site and return	1.48	3.44	5.10	5.10	0.00	
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.29	50.00	14.29	1.43	12.86	
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.29	5.00	1.43	1.43	0.00	
One-Way Concrete Truck Trips per Day and return	5.49	30.00	164.72	27.45	137.27	

One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.43	50.00	21.30	2.13	19.17	
Sum			957.41	164.41	793.00	
Estimated Number of Combined Fiber Optic Crews Per Day			0.04	0.04	0.04	
Haul Truck VMT for Fiber Optic Duct Bank			41.26	7.09	34.18	
		Total VMT	1220.50	433.70	786.80	Total VMT

Reach 8, CM-2						
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	257.60	3.44	886.24	886.24	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	41.51	3.44	142.82	142.82	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	41.51	30.00	1245.41	207.57	1037.84	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	175.43	3.44	603.53	603.53	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	73.96	20.00	1479.14	369.78	1109.35	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	8.22	200.00	1643.49	41.09	1602.40	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	4.00	50.00	200.00	20.00	180.00	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	4.00	5.00	20.00	20.00	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	0.00	50.00	0.00	0.00	0.00	
Sum			6220.63	2291.04	3929.60	
Estimated Number of Pipeline Crews Per Day			0.30	0.30	0.30	
Haul Truck VMT for Pipeline Construction			1875.78	690.84	1184.94	
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
One-Way Spoils Haul Trips from Site to Storage Site and return	9.78	3.44	33.64	33.64	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	17.60	20.00	352.00	88.00	264.00	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.96	200.00	391.11	9.78	381.33	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.63	30.00	48.89	8.15	40.74	
One-Way Imported Soil Trips from Storage Site to Site and return	1.63	3.44	5.61	5.61	0.00	
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.31	50.00	15.71	1.57	14.14	
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.31	5.00	1.57	1.57	0.00	
One-Way Concrete Truck Trips per Day and return	6.04	30.00	181.19	30.20	151.00	
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.00	50.00	0.00	0.00	0.00	
Sum			1029.73	178.51	851.21	
Estimated Number of Combined Fiber Optic Crews Per Day			0.06	0.06	0.06	
Haul Truck VMT for Fiber Optic Duct Bank			65.77	11.40	54.37	
		Total VMT	1941.55	702.25	1239.31	Total VMT

Reach 8, CM-3A						
Pipeline Construction	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
Total One-Way Haul Trips from Site to Staging/Storage and return	257.60	3.44	886.24	886.24	0.00	
Total One-Way Haul Trips of Pipe Bedding Import to Site	37.08	3.44	127.58	127.58	0.00	
Also Number of Haul Trips of Pipe Bedding to Storage Site from Supplier	37.08	30.00	1112.52	185.42	927.10	
Number of One-Way Daily Trips Hauling Excavated Soil from Storage back to the Site (and return)	175.43	3.44	603.53	603.53	0.00	
No. of One-Way Spoils Daily Trips from Storage Site to Landfill (50 miles) and back	73.96	20.00	1479.14	369.78	1109.35	
No. of One-Way Spoils Daily Trips from Storage Site to Haz. Waste Landfill (200 miles) and back	8.22	200.00	1643.49	41.09	1602.40	
No. of One-Way Daily Haul Trips of Pipe From Supplier to Storage (50 miles ea. way)	4.00	50.00	200.00	20.00	180.00	
No. of One-Way Daily Haul Trips of Pipe From Storage to Site (5 miles ea way)	4.00	5.00	20.00	20.00	0.00	
No. of One way Trips to Site Importing Paving Materials (50 miles ea way)	0.00	50.00	0.00	0.00	0.00	
Sum			6072.51	2253.65	3818.85	
Estimated Number of Pipeline Crews Per Day			0.52	0.52	0.52	
Haul Truck VMT for Pipeline Construction			3172.13	1177.25	1994.87	
Fiber Optic Duct Bank	Trips	Trip Distance	VMT	VMT first 5 miles	VMT beyond first 5 miles	
One-Way Spoils Haul Trips from Site to Storage Site and return	9.78	3.44	33.64	33.64	0.00	
One-Way Spoils Haul Trips from Storage Site to Landfill 50 miles (90% of Exc. Mat'l) and return	17.60	20.00	352.00	88.00	264.00	
One-Way Spoils Haul Trips from Site to Haz. Waste Landfill 200 miles (10% of Excav. Mat'l) & return	1.96	200.00	391.11	9.78	381.33	
One-Way Imported Soil Trips from Offsite to Storage Site and return	1.63	30.00	48.89	8.15	40.74	
One-Way Imported Soil Trips from Storage Site to Site and return	1.63	3.44	5.61	5.61	0.00	
One-Way Daily Haul Trips of Pipe from Supplier to Storage Site (50 miles ea. way) and return	0.31	50.00	15.71	1.57	14.14	
One-Way Daily Haul Trips of Pipe from Storage Site to Site and return	0.31	5.00	1.57	1.57	0.00	
One-Way Concrete Truck Trips per Day and return	6.04	30.00	181.19	30.20	151.00	
One way Trips to Site Importing Paving Materials (50 miles ea way) and return	0.00	50.00	0.00	0.00	0.00	
Sum			1029.73	178.51	851.21	
Estimated Number of Combined Fiber Optic Crews Per Day			0.11	0.11	0.11	
Haul Truck VMT for Fiber Optic Duct Bank			113.94	19.75	94.19	
		Total VMT	3286.07	1197.00	2089.06	Total VMT

Summary - Daily VMT (Average Daily Throughout the Construction Schedule when All Construction Methods Occuring Concurrently)

		Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Total Per Day
Construction Worker and Non-Haul Truck VMT Per Day	Light Vehicle	2,714	2,463	992	573	2,035	1,027	2,490	4,510	**16,805**
	Heavy Vehicle	1,485	1,415	346	193	999	167	937	1,721	**7,264**
	Total	4,199	3,878	1,338	765	3,034	1,195	3,428	6,231	**24,068**
Haul Truck Trips VMT Per Day	Light Vehicle	-	-	-	-	-	-	-	-	**-**
	Heavy Vehicle	5,874	4,593	2,578	932	4,743	419	3,890	7,137	**30,165**
	Total	5,874	4,593	2,578	932	4,743	419	3,890	7,137	**30,165**
Total VMT Per Day	Light Vehicle	2,714	2,463	992	573	2,035	1,027	2,490	4,510	**16,805**
	Heavy Vehicle	7,359	6,008	2,923	1,125	5,742	586	4,827	8,859	**37,428**
	Total	10,073	8,471	3,916	1,698	7,777	1,613	7,317	13,368	**54,233**

Summary - VMT Throughout Reach Duration

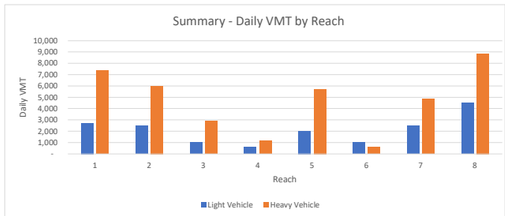
		Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7	Reach 8	Throughout Project
Construction Worker and Non-Haul Truck VMT Throughout Reach Duration	Light Vehicle	1,221,442	1,601,082	411,868	732,956	942,628	790,085	1,335,661	1,370,389	**8,406,110**
	Heavy Vehicle	668,230	919,873	143,482	246,555	457,494	128,775	501,980	519,214	**3,585,604**
	Total	1,889,672	2,520,955	555,350	979,511	1,400,122	918,861	1,837,641	1,889,603	**11,991,714**
Haul Truck Trips VMT Throughout Reach Duration	Light Vehicle	-	-	-	-	-	-	-	-	**-**
	Heavy Vehicle	2,643,334	2,985,169	1,069,670	1,193,417	2,207,406	321,869	2,090,830	2,188,705	**14,700,402**
	Total	2,643,334	2,985,169	1,069,670	1,193,417	2,207,406	321,869	2,090,830	2,188,705	**14,700,402**
Total VMT Throughout Reach Duration	Light Vehicle	1,221,442	1,601,082	411,868	732,956	942,628	790,085	1,335,661	1,370,389	**8,406,110**
	Heavy Vehicle	3,311,564	3,905,043	1,213,153	1,439,972	2,664,900	450,645	2,592,810	2,707,919	**18,286,006**
	Total	4,533,006	5,506,124	1,625,020	2,172,928	3,607,528	1,240,730	3,928,471	4,078,308	**26,692,116**

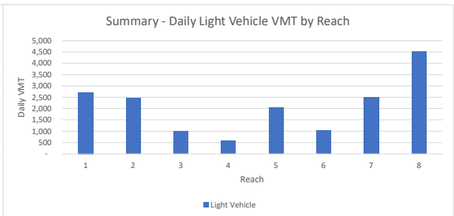
Summary - Lengths (Miles)

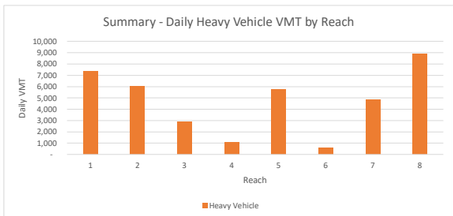
Reach #	Total Estimated Reach Length (from GIS)	Total Estimated Reach Length (from Reach)	CM-1 Roadways	CM-2 SCE Easement	CM-3A LAFCD Easement (Adjacent to River)	CM-4A Pipe Jacking	CM-4B Microtunneling	CM-4C Traditional Tunneling	CM-4D Pipe Jacking	CM-4E Shield Tunneling with Ribs and Lagging	CM-4F Traditional Tunneling
Reach 1	6.16	6.05	5.41	-	-	0.39	0.25	-	-	-	-
Reach 2	7.29	7.34	6.13	-	-	0.02	1.18	-	-	-	-
Reach 3	3.08	3.09	0.49	1.47	0.59	0.12	0.42	-	-	-	-
Reach 4	5.01	4.26	2.42	-	0.23	-	0.08	1.53	-	-	-
Reach 5	3.56	5.93	4.31	0.73	-	0.11	0.15	0.64	-	-	-
Reach 6	2.55	2.48	-	-	-	-	-	-	-	-	2.48
Reach 7	5.99	5.75	0.89	3.35	-	-	-	-	-	0.27	1.25
Reach 8	5.53	5.76	0.84	1.37	2.37	-	-	-	1.13	0.04	-
Total	39.17	40.65	20.49	6.91	3.20	0.64	2.08	2.17	1.13	0.31	3.73

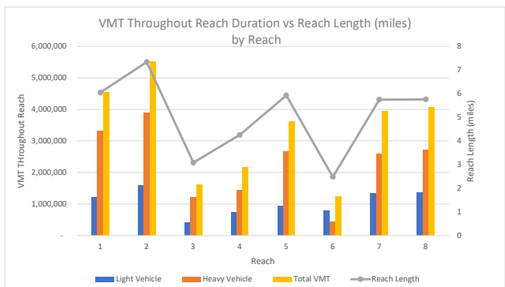
Summary - Haul Truck Daily VMT

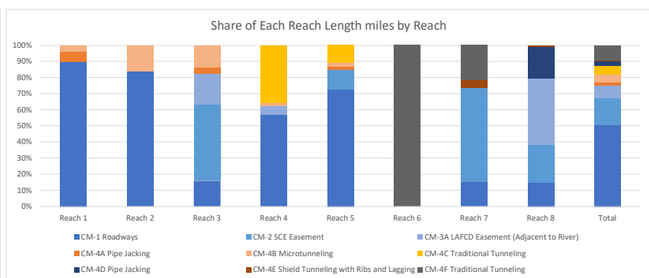
Reach #	*Noise*	Total VMT	CM-1 Roadways	CM-2 SCE Easement	CM-3A LAFCD Easement (Adjacent to River)	CM-4A Pipe Jacking	CM-4B Microtunneling	CM-4C Traditional Tunneling	CM-4D Pipe Jacking	CM-4E Shield Tunneling with Ribs and Lagging	CM-4F Traditional Tunneling
Reach 1	*7,359*	5,874	5,164	-	-	450	260	-	-	-	-
Reach 2	*6,008*	4,593	4,151	-	-	42	399	-	-	-	-
Reach 3	*2,923*	2,578	472	1,310	554	129	111	-	-	-	-
Reach 4	*1,125*	932	737	-	68	-	19	108	-	-	-
Reach 5	*5,742*	4,743	3,736	613	-	105	155	133	-	-	-
Reach 6	*586*	419	-	-	-	-	-	-	-	-	419
Reach 7	*4,827*	3,890	741	2,702	-	-	-	-	-	176	270
Reach 8	*8,859*	7,137	1,220	1,942	3,286	-	-	-	574	116	-
Total		30,165	16,223	6,568	3,909	726	945	241	574	291	689











Reach	Length
1	6.16
2	7.29
3	3.08
4	5.01
5	3.56
6	2.55
7	5.99
8	5.53
	39.16

Summary - # of feet per day assumption (daily crew production) (same across construction method)

	CM-1 Roadways*	CM-2 SCE Easement*	CM-3A LAFCD Easement* (Adjacent to River)	CM-4A Pipe Jacking	CM-4B Microtunneling	CM-4C Traditional Tunneling	CM-4D Pipe Jacking	CM-4E Shield Tunneling with Ribs and Lagging	CM-4F Traditional Tunneling
Reach 1	230.0	-	-	4.5	2.9	-	-	-	-
Reach 2	230.0	-	-	0.2	9.6	-	-	-	-
Reach 3	230.0	320.0	320.0	1.5	5.4	-	-	-	-
Reach 4	230.0	-	320.0	-	0.3	6.3	-	-	-
Reach 5	230.0	320.0	-	1.3	1.7	7.5	-	-	-
Reach 6	-	-	-	-	-	-	-	-	17.0
Reach 7	225.0	300.0	-	-	-	-	-	2.6	12.4
Reach 8	225.0	300.0	300.0	-	-	-	19.9	0.8	-

* Pipeline Construction and Fiber Optic Duct Bank Combined

Summary - Construction Schedule # of Days (same across reach)

	CM-1 Roadways	CM-2 SCE Easement	CM-3A LAFCD Easement (Adjacent to River)	CM-4A Pipe Jacking	CM-4B Microtunneling	CM-4C Traditional Tunneling	CM-4D Pipe Jacking	CM-4E Shield Tunneling with Ribs and Lagging	CM-4F Traditional Tunneling
Reach 1	450	-	-	450	450	-	-	-	-
Reach 2	650	-	-	650	650	-	-	-	-
Reach 3	415	415	415	415	415	-	-	-	-
Reach 4	1,280	-	1,280	-	1,280	1,280	-	-	-
Reach 5	455	455	-	455	455	455	-	-	-
Reach 6	-	-	-	-	-	-	-	-	769
Reach 7	515	535	-	-	-	-	-	535	535
Reach 8	300	300	300	-	-	-	300	300	-

Reach 5: Add 250 days for[CM-1, CM-2] fiber optic duct bank. For CM-1 and CM-2, 455 days for pipeline construction, 705 days for fiber optic duct bank
Reach 7: Add 20 days for [CM-1, CM-2] pipeline construction, 100 days for CM-2 fiber optic duct bank, 20 days for CM-4E, 20 days for CM-4F. CM-1, 535 days for pipeline construction, 515 for fiber optic duct bank. For CM-2, 535 for pipeline construction, 615 for fiber optic duct bank.
Reach 8: Add 215 days for [CM-1, CM-2, CM-3A] fiber optic duct bank. CM-1, CM-2, and CM-3A, 300 for pipeline construction, 515 days for fiber optic duct bank

APPENDIX E – PUMP STATION DATA NEEDS

BACKBONE PUMP STATION DATA NEEDS MATRIX					DATA SOURCE/CITATION (document/page)
GENERAL PROJECT INFORMATION					
Pump Station (if analyzing multiple locations, add new columns)	**PS-1: does not include associated storage**	**PS-3 Alternative: includes offsite piping connecting to transmission main (PS-3 aka Whittier Narrows PS)**	**Santa Fe Spreading Grounds PS**		
Site Locations	Adjacent to AWT at JWPCP	Whittier Narrows Area: vicinity of I-605 and Peck Rd	Near Santa Fe Spreading Grounds		FLDR Chapter 8 and Vol 3 Appendix
Relocate PS-2 wet well and use can pumps at PS-2? (FLDR Section 5.1.2)					
Additional pump station(s) needed to connect backbone system to FEWWTP? (FLDR p. 5-15)					
Site configuration - acres/dimensions (site plan for major operating components)	4.1 acre (Scaled from Appendix L, minus area previously assigned to 7.5MG storage tank)	Assume up to 8 acres total needed; of this, most facilities will be located within 4.2 acres. Onsite: 4.2 acre (estimated from 300'x400' site size in CDR and conservatively increased by 50% to account for potential changes in siting layout or site improvements.) Offsite: Overflow pipe is 700' of 102" trenched. Offsite: Inlet pipe is 600' of 84" trenched + 600' of 84" pipe jacking. Offsite: Disch pipe is 600' of 84" trenched + 600' of 84" pipe jacking. Onsite/Offsite: 1.0 acre Electrical substation	Assume up to 8 acres total needed; of this, most facilities will be located within 4.2 acres. Onsite: 4.2 acre (estimated from 300'x400' site size in CDR and conservatively increased by 50% to account for potential changes in siting layout or site improvements.) Offsite: Overflow pipe is 700' of 102" trenched. Offsite: Inlet pipe is 600' of 84" trenched + 600' of 84" pipe jacking		FLDR Volume 3, Appendix L; description in Section 8.1.2; but note Backbone System would likely require larger footprint than studied for PS-3 (FLDR p. 8-24)
Completion of Construction (When will project be operational?)	Assume construction would take up to 3 years.	Onsite: Assume construction would take up to 3 years. Offsite: Assume construcion would take approx 1 year, overlapping with PS-3 construction. If substation is build offsite that would take about 1 year of active construction.	Onsite: Assume construction would take up to 3 years. Offsite: Assume construcion would take approx 1 year, overlapping with SFSG construction. If substation is build offsite that would take about 1 year of active construction.		
CONSTRUCTION PHASE					
Pump Station (if analyzing multiple locations, add new columns)	**PS-1: does not include associated storage**	**PS-3 Alternative: includes offsite piping connecting to transmission main**	**Santa Fe Spreading Grounds PS**		
Will there be pile driving or rock crushing? If so, where, for what duration, and will it be limited to daytime hours?	Need geotech. Doubt there will be rock crushing, but potential for pile driving. It can happen during the day.	Need geotech. Doubt there will be rock crushing, but potential for pile driving. It can happen during the day.	Need geotech. Doubt there will be rock crushing, but potential for pile driving. It can happen during the day.		
Depths/quantities of excavation/fill	Onsite excavation approx 75,000 cy. Onsite fill approx 61,000 cy (8,000 cy of this is imported material) Offsite excavation/fill approx 0 cy.	Onsite excavation approx 45,000 cy. Assume additional 15,000 cy of existing soil excavated and reused during site grading activities. Onsite fill approx 33,000 cy (2,000 cy of this is imported material). Offsite excavation approx 35,000 cy. Offsite fill approx 29,000 cy (6,000 cy of this is imported material). Onsite/Offsite: Substation 4,000 cy excavation and fill	Onsite excavation approx 45,000 cy. Assume additional 15,000 cy of existing soil excavated and reused during site grading activities. Onsite fill approx 33,000 cy (2,000 cy of this is imported material). Offsite excavation approx 35,000 cy. Offsite fill approx 29,000 cy (6,000 cy of this is imported material). Onsite/Offsite: Substation 4,000 cy excavation and fill		
Estimated number of construction workers per day	28 (5 GC, 5 mechanical, 5 electrical, 5 structural, 5 site, 3 pipelines) on average	34 (7 GC, 5 mechanical, 8 electrical, 5 structural, 6 site, 3 pipelines) on average for PS construction; +9 (on average) during offsite pipeline construction	34 (7 GC, 5 mechanical, 8 electrical, 5 structural, 6 site, 3 pipelines) on average for PS construction; +9 (on average) during offsite pipeline construction		
Estimated number of one-way construction worker vehicle trips per day	85 (assume 28 workers come and go to site; some may leave for lunch and return)	PS-3: 100 (assume 34 workers come and go to site; some may leave for lunch and return) Offsite pipeline: 30 (assumes 9 workers come and go to site; most may leave for lunch and return)	SFSG PS: 100 (assume 34 workers come and go to site; some may leave for lunch and return) Offsite pipeline: 30 (assumes 9 workers come and go to site; most may leave for lunch and return)		
Will there be weekend or nighttime construction? Will we likely comply with noise ordinance or will we request variance?	Weekend or nighttime work not anticipated as there are no tie-ins to existing systems. Only reason would be if behind schedule.	Nighttime work possible during pipe jacking activities during construcion of offsite pipelines. Other weekend or nighttime work only if behind schedule.	Nighttime work possible during pipe jacking activities during construcion of offsite pipelines. Other weekend or nighttime work only if behind schedule.		
Construction staging area and storage location(s)	This is at the AWT site. There should be space available there.	If cannot accommodate on-site possibly use one of the other potential PS sites or just require offsite.	If cannot accommodate on-site possibly use one of the other potential PS sites or just require offsite.		
Construction worker vehicle parking location(s)	This is at the AWT site. There should be space available there.	Street parking should be feasible for 25 cars.	Street parking should be feasible for 25 cars.		

Special access routes in the riverbed or for oversized materials or equipment	Largest equipment will be surge tanks. They could be up to 12'x85'. This is an oversize load. Contractor may elect to fabricate and certify/test on site. Materials located within 400 miles.	Largest equipment will be surge tanks. They could be up to 12'x85'. This is an oversize load. Contractor may elect to fabricate and certify/test on site. Materials located within 400 miles.	Largest equipment will be surge tanks. They could be up to 12'x85'. This is an oversize load. Contractor may elect to fabricate and certify/test on site. Materials located within 400 miles.		
Power Supply (generators?)	Demands during construction should be able to be served by temp site power.	Demands during construction should be able to be served by temp site power.	Demands during construction should be able to be served by temp site power.		
Temporary Lighting	Temp lighting not anticipated.	Expect any lighting to be minimal and supporting roadway work. Minimal lighting of site for security at night. Lights directed away from receptors.	Expect any lighting to be minimal and supporting roadway work. Minimal lighting of site for security at night. Lights directed away from receptors.		
Water Supply (hydrants? water trucks?)	Water needed for dust control and hydrotesting. Should be available from hydrants from water utility.	Water needed for dust control and hydrotesting. Should be available from hydrants from water utility.	Water needed for dust control and hydrotesting. Should be available from hydrants from water utility.		
Temporary or Permanent Right-of-Way/Easements	This is at the AWT site.	Likely needing to purchase existing property and potentially demo existing structure. Power feed from utility to substation and substation to pump station will likely require new easements	Likely needing to purchase existing property and potentially demo existing structure. Power feed from utility to substation and substation to pump station will likely require new easements		
Maximum number of daily one-way haul truck trips due to material transportation (e.g., off-haul/disposal, supplies, material); type of trucks; estimated distance	Assume a peak day could be 400 truck trips, assuming pump station site and at least one pipeline crew is simultaneously under construction. Average day more likely 200 truck trips. (Based on assumed 50' per day pipe installation rate = 180 truck trips) Assume average one-way haul is 5 miles to/from storage yard. Assume 75% are 13 yd dump trucks; 5% concrete trucks; 20% are long bed trucks	Assume a peak day could be 500 truck trips, assuming pump station site and at least one pipeline crew is simultaneously under construction. Average day more likely 200 truck trips. (Based on assumed 50' per day pipe installation rate = 180 truck trips) Assume average one-way haul is 5 miles to/from storage yard. Assume 75% are 13 yd dump trucks; 5% concrete trucks; 20% are long bed trucks	Assume a peak day could be 500 truck trips, assuming pump station site and at least one pipeline crew is simultaneously under construction. Average day more likely 200 truck trips. (Based on assumed 50' per day pipe installation rate = 180 truck trips) Assume average one-way haul is 5 miles to/from storage yard. Assume 75% are 13 yd dump trucks; 5% concrete trucks; 20% are long bed trucks		
Volume of any material imported/exported, including demolition waste (asphalt/concrete, soils, hazardous soils, slurry, steel/metals) and clean construction materials (concrete, pipeline segments, rebar, base material/sand/gravel, etc.).	Soil import: 8,000 cy Clean Soil export/demo: 17,000 cy Haz Soil export/demo (5% of initial excavation): 4,000 cy Concrete: 4,000 cy	Soil import: 12,000 cy Clean Soil export/demo: 23,000 cy Haz Soil export/demo (5% of initial excavation): 4,000 cy Concrete: 3,200 cy	Soil import: 12,000 cy Clean Soil export/demo: 23,000 cy Haz Soil export/demo (5% of initial excavation): 4,000 cy Concrete: 3,200 cy		
Plans for recycling of materials as applicable	Not likely/necessary at AWT site.	Building demo anticipated; anticiapte limited opportunity to reuse any related materials.	Building demo anticipated; anticiapte limited opportunity to reuse any related materials.		
Disposal location for construction debris	Assume 50 miles away for disposal of non-haz construction debris. Assume 200 miles away for hazardous materials.	Assume 50 miles away for disposal of non-haz construction debris. Assume 200 miles away for hazardous materials.	Assume 50 miles away for disposal of non-haz construction debris. Assume 200 miles away for hazardous materials.		

Construction Features	**Start and End Dates (or number of days/ weeks/months)**	**Equipment Used (Types [incl hp], Quantities, Max Hrs. Use/Day)***	**Haul or Material Truck Loads (in truckloads)**	**Truck Travel Distance (in miles)**	
Demolition?	PS-1 currently planned in an undeveloped area, so significant demo is not expected. SFSG PS site is still being determined. It will likely be in undeveloped area so signficant demo is not expected.	PS-3 and SFSG PS location likely has a light industrial building that will need to be demo'd. Assume 1 month. Assume substation site could also require light demo. Assume 1 month.	PS-1: None PS-3 and SFSG PS: Depends on size and nature of facility demolished. Assuming a 200'x200' building, at 1.3 tons per sqyd is 5,800 tons, requiring 410 14-ton dump trucks.	Assume landfill is approx 50 miles away	
Remediation	Local site information currenlty not available. Given project is intended for currenlty unused area of AWT property, existing contamination seems unlikely.	USEPA website indicates only a few small industrial-related cleanups in the vicinity. Issues not likely, but need additional information.	PS-1: Unknown. Not anticipated. PS-3: Unknown. Not anticipated. SFSG PS: Unknown. Not anticipated.	200 mi each way for haz disposal to Kettleman Hills Landfill	
Site Preparation	Clear and grub (C&G)	Existing asphalt removal, possible clear and grub.	PS-1: Assume avg 6" C&G across 5.3 ac site is 4,300 cy into 430 dump trucks. PS-3 and SFSG PS: Assume 3,700 cy asphalt removal into 400 dump trucks; plus another 80 dump trucks for 1 acre of C&G	Assume landfill is approx 50 miles away	
Foundation and below grade infrastructure	Excavate approx 40'Dx60'Wx160'L for pump cans and valve vault	Excavate approx 40'Dx60'Wx90'L for pump cans and valve vault	Most excavated materials stored and reused on pump station sites. PS-1 Foundations and Vaults: 8,300 cy as spoils into 83 dump trucks. PS-3 and SFSG PS Foundations and Vaults: 9,400 cy as spoils into 94 dump trucks.	Assume landfill is approx 50 miles away	
Excavation/Trenching	Pipe trenches @102" = 1,500 ft x 12' W x 23' deep @84" = 525 ft x 11' W x 15' deep @66" = 150 ft x 10' W x 22' deep @36" = 600 ft x 6' W x 8' deep @30" = 565 ft x 5' W x 13' deep @30" = 120 ft x 5' W x 22' deep	Onsite pipe trenches: @102" = 144 ft x 12' W x 26' deep @84" = 300 ft x 11' W x 15' deep @66" = 150 ft x 10' W x 26' deep @30" = 160 ft x 5' W x 14' deep Offsite pipe trenches: 102" overflow @ 700 ft x 12' W x 20' deep 84" inlet @ 600 ft x 11' W x 15' deep 84" outlet @ 600 ft x 11' W x 15' deep	PS-1: Based on soil import: 8,000 cy; clean soil export/demo: 17,000 cy; haz soil export/demo (5% of initial excavation): 4,000 cy = 2,900 dump trucks PS-3 and SFSG PS: Based on soil import: 12,000 cy; clean soil export/demo: 23,000 cy; haz soil export/demo (5% of initial excavation): 4,000 cy = 3,100 dump trucks (assumes a 13 yd truck can only hold 10 yds of material accounting for bulking and freeboard reqmts)	Assume soil import and clean soil export within 50 miles. Haz material demo landfill is 200 miles.	

Above grade facilities/equipment and site improvements	New buildings for pumps and electrical room; above grade concrete tank; above grade surge tanks protected by wall; dechlor vault	New buildings for pumps and electrical room; above grade concrete tank; above grade surge tanks protected by wall; dechlor vault	All sites: Assume 2,500 equipment loads over the 3 years of construction. Medium cranes likely required for unloading and setting hydropneumatic tanks, assisting with storage tank fabrication, and setting pumps and motors and transformers.	Assume 2,500 equipment loads come from within 50 miles of site. Assume pumps, motors, and transformers may come from as far away as eastern US (2,000 miles). Cranes may have to come from within 300 miles.	
Paving	2.6 acre (assume will match paving for PS-3 site)	2.6 acre (based on OPCC)	PS-1: for 350 cy AB and 700 tons asphalt, 85 14-cy truck trips PS-3 and SFSG PS: for 2,900 cy AB and 5,800 tons asphalt, 700 14-cy truck trips	Assume travel distances within 50 miles.	
Architectural coatings	Buildings will be industrial in appearance.	Buildings will be industrial in appearance.	PS-1: Assume 8 loads of materials PS-3: Assume 15 loads of materials	Assume travel distances within 50 miles.	
Power substation	99'x68' High Voltage Transformer yard	99'x66' High Voltage Transformer yard	For each site: 30 loads of equipment and materials. Medium cranes likely required for unloading and setting large/heavy transformers and electrical cabinets.	Assume travel distances within 50 miles for most loads. Small cranes may need to come from within 150 miles.	
Pipeline stub out to Conveyance System	102" inlet from conveyance main 84" and 30" outlet pipes to conveyance main 102" overflow pipe	84" inlet from conveyance main 84" outlet to conveyance main 102" overflow	Most large pipe >48" will come with just one 25-ft length per truck. PS-1: Assume 130 pipe loads. PS-3: Assume 130 pipe loads. (same assumptions used in PL table)	Assume 50% of the pipe will be produced within 100 miles of the project sites, and 50% within 350 miles of the project sites.	
OPERATIONS PHASE					
	PS-1: does not include associated storage	**PS-3 Alternative: includes offsite piping connecting to transmission main**	**Santa Fe Spreading Grounds PS**		
Height and materials of structures	35' high concrete tank 15' high metal composite building Other vaults and dechlorination trench expected to be set with tops at grade or within 4-ft of grade.	30' high concrete tank 25' high metal composite building 15' high CMU curtain wall Other vaults and dechlorination trench expected to be set with tops at grade or within 4-ft of grade. 8' high CMU wall around substation 100' high power poles and overhead powerlines feeding the substation	30' high concrete tank 25' high metal composite building 15' high CMU curtain wall Other vaults and dechlorination trench expected to be set with tops at grade or within 4-ft of grade. 8' high CMU wall around substation 100' high power poles and overhead powerlines feeding the substation		
General design characteristics (architecture/coatings, lighting, landscaping/screening)	Pumps, concrete storage tank, and surge tanks exposed. Electrical room expected to have industrial appearance. Minimal lighting in the area; primarily for site security.	Concrete storage tank and surge tanks exposed. Pump building expected to have industrial appearance. Minimal lighting in the area; primarily for site security. Sustation will have electrical transformers, powerlines, and poles visible above the CMU curtain wall.	Concrete storage tank and surge tanks exposed. Pump building expected to have industrial appearance. Minimal lighting in the area; primarily for site security. Sustation will have electrical transformers, powerlines, and poles visible above the CMU curtain wall.		
Total footprint/acreage of new paved/impervious areas	3.0 acre	2.5 acre	2.5 acre		
Measures for detention/treatment of stormwater runoff	Follow county requirements for detention/storage and infiltration of runoff.	Follow county requirements for detention/storage and infiltration of runoff.	Follow county requirements for detention/storage and infiltration of runoff.		
Preferred site access- employee parking and emergency vehicle access	Onsite- assume 6 permanent spots.	Onsite- assume 6 permanent spots + 2 at substation site if not at pump station site.	Onsite- assume 6 permanent spots + 2 at substation site if not at pump station site.		
Estimated number of employees on-site per day/week	Likely staffed from AWT. Assume 1 staff, 8 hrs/day, 7 days/week. 24 hr staffing not likely necessary.	Assume 1 staff, 8 hrs/day, 7 days/week. 24 hr staffing not likely necessary.	Assume 1 staff, 8 hrs/day, 7 days/week. 24 hr staffing not likely necessary.		
Employee shifts per day	1	1	1		
Number of employees per shift	1	1	1		

Estimated number of vehicle trips per day/week/month (project operation)	4 per day (arrive, leave, go and return for lunch)	4 per day (arrive, leave, go and return for lunch)	4 per day (arrive, leave, go and return for lunch)		
Maintenance schedule/requirements	Minor mechanical or electircal maintenance expected 1x/month (change seal, etc.)	Minor mechanical or electircal maintenance expected 1x/month (change seal, etc.)	Minor mechanical or electircal maintenance expected 1x/month (change seal, etc.)		
Average trip distance (miles) for employees (project operation)	Assume most workers live within 50 miles of project site.	Assume most workers live within 50 miles of project site.	Assume most workers live within 50 miles of project site.		
Pump size/discharge pipelines	Set A: early delivery: 5 mgd, 1 duty, 1 standby, 250 HP. Set B to PS-3: 150 mgd; 3500-4000 hp; 5 duty, 1 standby; 84" discharge pipe to PS-3	To SFSG: 150 mgd; 4000-4500 hp; 5 duty, 1 standby 84" discharge pipeline	To Canyon SG: 40 mgd; 1000-1500 hp; 3 duty, 1 standby 48" discharge pipeline To DPR: 60 mgd; 2000 hp; 3 duty, 1 standby. 54" discharge pipeline		FLDR ES-12
Standby Generator(s) - Please provide locations, sizing, frequency of testing, and how often it will be used on a yearly basis.	175 kW standby generator for 480V loads (i.e. surge tank air compressors and motorized valves).	175 kW standby generator for 480V loads (i.e. surge tank air compressors and motorized valves).	175 kW standby generator for 480V loads (i.e. surge tank air compressors and motorized valves).		
Other operating equipment that generates emissions (locations and specifications)	Standby generators only	Standby generators only	Standby generators only		
HVAC equipment requirements	Cooling for VFD's and motors could be signficant. Needs further design consideration. Anticipate Aircon for control room; specific design of pump motor colling not yet determined but will be required.	Cooling for VFD's and motors could be signficant. Needs further design consideration. Anticipate Aircon for control room; specific design of pump motor colling not yet determined but will be required.	Cooling for VFD's and motors could be signficant. Needs further design consideration. Anticipate Aircon for control room; specific design of pump motor colling not yet determined but will be required.		
Please provide annual electricity for pumps and facility	75,300 MW-hrs/year (assumes 150 mgd continuous operation, 92% of the year)	96,200 MW-hrs/year (assumes 150 mgd continuous operation, 92% of the year)	50,100 MW-hrs/year (assumes 100 mgd continuous operation, 92% of the year)		FLDR Section 9.4
Annual natural gas use	Should be minimal	Should be minimal	Should be minimal		
Any alternative energy generation (e.g., solar)?	This has not yet been discussed with Met in this project, but could be looked into.	This has not yet been discussed with Met in this project, but could be looked into.	This has not yet been discussed with Met in this project, but could be looked into.		
Please indicate what SCAQMD air pollutant permits are required for project components.	Anticiapte SCAQMD permit will be required for emergency generator.	Anticiapte SCAQMD permit will be required for emergency generator.	Anticiapte SCAQMD permit will be required for emergency generator.		
SCAQMD Rule 402 prohibits public nuisances related to odors. Please describe if the emergency storage basin would result in a public nuisance related to odors.	No. It is chlorinated water and tank is covered	No. It is chlorinated water and tank is covered	No. It is chlorinated water and tank is covered		
Detail chemical delivery and storage (type/amount of chemicals, delivery schedule, storage location/condition)	Dechlorination media will need to be refreshed after use, or after extended period of non-use and eventual expiration (could be 1+ years if not used). Other basic lubricants and cleaners as required for mainenance.	Dechlorination media will need to be refreshed after use, or after extended period of non-use and eventual expiration (could be 1+ years if not used). Other basic lubricants and cleaners as required for mainenance.	Dechlorination media will need to be refreshed after use, or after extended period of non-use and eventual expiration (could be 1+ years if not used). Other basic lubricants and cleaners as required for mainenance.		
Methods to address potential discharge, including potential dechlorination system	Assumes passive dechlorination system in a vaulted trench using solid/granular media. For dechlor of 150 mgd flowrate, assume a facility 150'Lx40'Wx10'D, with approx 2,000 cy of media.	Assumes passive dechlorination system in a vaulted trench using solid/granular media. For dechlor of 150 mgd flowrate, assume a facility 150'Lx40'Wx10'D, with approx 2,000 cy of media.	Assumes passive dechlorination system in a vaulted trench using solid/granular media. For dechlor of 150 mgd flowrate, assume a facility 150'Lx40'Wx10'D, with approx 2,000 cy of media.		FLDR Section 8.6, 8.7
TECHNICAL INFORMATION					
	PS-1: does not include associated storage	**PS-3 Alternative: includes offsite piping connecting to transmission main (PS-3 aka Whittier Narrows PS)**	**Santa Fe Spreading Grounds PS**		
Geology/Soils Report	Performed during preliminary design. Assume 5 borings on site.	Performed during preliminary design. Assume 5 borings on site.	Performed during preliminary design. Assume 5 borings on site.		
Hazardous Materials (Phase 1 ESA, Phase 2, Remedial Action Plan, etc.)	Not likely, but need additional information.	USEPA website indicates only a few small industrial-related cleanups in the vicinity. Issues not likely, but need additional information.	USEPA website indicates only a few small industrial-related cleanups in the vicinity. Issues not likely, but need additional information.		
Conceptual grading/site plan/water quality BMPs	Appropriate BMPs as part of contractor's general permit, and as required by county for permanent site runoff.	Appropriate BMPs as part of contractor's general permit, and as required by county for permanent site runoff.	Appropriate BMPs as part of contractor's general permit, and as required by county for permanent site runoff.		
Municipal Water Demand and Supply	Minimal; equivalent to a single family residence	Minimal; equivalent to a single family residence	Minimal; equivalent to a single family residence		

Wastewater Generation	Minimal; equivalent to a single family residence	Minimal; equivalent to a single family residence	Minimal; equivalent to a single family residence		
Solid Waste Generation and Disposal	Minimal; picked up by local trash company	Minimal; picked up by local trash company	Minimal; picked up by local trash company		
Data Network/Communication Backbone	Assume internet-based, with cellular modem backup.	Assume internet-based, with cellular modem backup.	Assume internet-based, with cellular modem backup.		

*Typical Construction Equipment May Include: backhoes, dozers, scrapers, compactors, trackhoe, trencher, loader, roller, cranes, heavy trucks

APPENDIX F – PUMP STATION ADT AND VMT CALCULATIONS

Reference (Row)	**PS1 - Construction VMT - Joint Treatment Site Pump Station**	Located in Reach 1	

	Trip Distance Assumptions (one-way)		
SCAG	Avg. Worker Commute Distance	19.66	miles
VMT Calculation-V4	To Class II landfill - Kettleman Hills Hazardous Waste Facility	200	miles
VMT Calculation-V4	To regular landfill - Scholl Canyon Landfill	31.5	miles
	Santa Fe Spreading Ground PS	40	miles
	Whittier Narrows PS	30	miles
VMT Calculation-V4	Paving Materials	50	miles
	Avg. trip for construction equipment traveling to work site	30	miles
	Architectural Coating	15	miles

Construction Phase

e Water Conveyance Schedule_v5.1	***Assumed Construction Duration (20230901_Pure Water Conveyan***	***620***	***days***	***1.7 years (workdays only)***
23	Hual Truck Trips (Off-haul/disposal, supplies, material)			
	minimum	200	one-way trips	
	maximum	400	one-way trips	
	Construction Workers			
13	Construction Workers per day			
	average	28	workers/day	
14	**Est. Num of Construction Workers vehicle trips per day**			
	average	85	one-way trips/day	
		85	**avg. one-way trips/day** (to and from site)	

Roadway

	Arterial	Collector	Local	***Assumptions***
Regular Landfill Haul Trips	7.30			*100% to/from I-110*
Hazardous Landfill Haul Trips	1.37			*100% to/from I-110*
Base Materials Haul Trips	8.08		0.80	*45% travel on E/W arterials; 45% on N/S arterials, 10% to/from I-110*
Construction Workers	82.45		2.55	*20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110*
Construction Equipment	0.11		0.00	*30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110*

	ADT to/from freeway	**ADT E/W arterials or N/S arterials**
LV	57.72	27.29
HV	9.55	8.12
Total	67.26	35.41

	Construction Phase and Duration	**Amount**		**# of Dump Tuck Needed**		**Haul & Delivery Trips**		**Miles/Trips**	**VMT**
32	**Site Preparation**	4,300	CY	860	Dump Truck		Whittier Narrow PS	30	
							Santa Fe Spreading Ground PS	40	
						44	Hazardous Waste	200	8800
						816	Scholl Canyon Landfill	32	25704
33	**Foundation and below grade infrastructure**	8,300	CY	166	Dump Truck		Whittier Narrow PS	30	
							Santa Fe Spreading Ground PS	40	
						8	Hazardous Waste	200	1600
						158	Scholl Canyon Landfill	32	4977
34	**Excavation/Trenching**	8,000	CY soil import	1600	13 yd Dump Truck (holds 10 yd only)	1450	Whittier Narrow PS	30	43500
		17,000	CY clean soil export/demo	3400	13 yd Dump Truck (holds 10 yd only)	1450	Santa Fe Spreading Ground PS	40	58000
		4,000	CY haz soil export/demo	800	13 yd Dump Truck (holds 10 yd only)	800	Hazardous Waste	200	160000
						650	Scholl Canyon Landfill	32	20475
						1450	AWP Facility		
35	**Above grade facilities/equipment and site improvements**			5,000	Equipment Loads	5,000	Equipment site	30	150000
36	**Paving**	350	CY AB	170	14 CY Truck	170	Concrete/Asphalt Plant	50	8500
		700	Tons asphalt						
37	**Architectural coatings**			16	Loads of Materials	16	Architectural coatings	15	240
38	**Power substation**			60	Loads of Equipment and Materials	60	Equipment site	30	1800
39	**Pipeline Stub out to Coveyance System**			260	Pipe Loads	260	Equipment site	30	7800

Reference (Row) **PS-3 - Construction VMT - Whittier Narrows Pump Station** Located in Reach 6

	Trip Distance Assumptions (one-way)		
SCAG	Avg. Worker Commute Distance	19.66	miles
VMT Calculation-V4	To Class II landfill - Kettleman Hills Hazardous Waste Facility	200	miles
VMT Calculation-V4	To regular landfill - Scholl Canyon Landfill	26	miles
	Santa Fe Spreading Ground PS	15	miles
	AWP Facility	30	miles
VMT Calculation-V4	Paving Materials	50	miles
	Avg. trip for construction equipment traveling to work site	30	miles
	Architectural Coating	15	miles

Construction Phase

e Water Conveyance Schedule_v5.1	***Assumed Construction Duration (20230901_Pure Water Conveyan***	***620***	***days***	***1.7 years (workdays only)***
23	Hual Truck Trips (Off-haul/disposal, supplies, material)			
	minimum	200	one-way trips	
	maximum	500	one-way trips	
	Construction Workers			
13	Construction Workers per day			
	average	34	workers/day	
	peak	43	workers/day	
14	**Est. Num of Construction Workers vehicle trips per day**			
	average	130	one-way trips/day	
		130	**avg. one-way trips/day** (to and from site)	

Roadway

	Arterial	Collector	Local	***Assumptions***
Regular Landfill Haul Trips	11.16			*100% to/from I-605*
Hazardous Landfill Haul Trips	1.45			*100% to/from SR-60*
Base Materials Haul Trips	10.15	0.73		*45% travel on E/W arterials; 45% on N/S arterials, 10% to/from I-605*
Construction Workers	126.10	3.90		*20% travel on E/W arterials; 20% on N/S arterials, 60% to/from I-605*
Construction Equipment	0.11	0.01		*30% travel on E/W arterials; 30% on N/S arterials, 40% to/from I-605*

	ADT to/from freeway	**ADT E/W arterials or N/S arterials**
LV	75.66	54.34
HV	13.67	9.95
Total	89.33	64.29

	Construction Phase and Duration	**Amount**	**# of Dump Tuck Needed**	**Haul & Delivery Trips**	**Miles/Trips**	**VMT**
30	**Demolition**	5,800 tons	820 14-ton Dump Truck	Whittier Narrow PS		
				Santa Fe Spreading Ground PS	15	
				42 Hazardous Waste	200	8400
				778 Scholl Canyon Landfill	26	20228
				AWP Facility	30	
32	**Site Preparation**	3,700 CY	800 Dump Truck	Whittier Narrow PS		
		1 acre of C&G	160 Dump Truck	Santa Fe Spreading Ground PS	15	
				48 Hazardous Waste	200	9600
				912 Scholl Canyon Landfill	26	23712
33	**Foundation and below grade infrastructure**	9,400 CY	188 Dump Truck	Whittier Narrow PS		
				Santa Fe Spreading Ground PS	15	
				10 Hazardous Waste	200	2000
				178 Scholl Canyon Landfill	26	4628
34	**Excavation/Trenching**	12,000 CY soil import	2400 13 yd Dump Truck (holds 10 yd only)	1950 Whittier Narrow PS		
		23,000 CY clean soil export/demo	4600 13 yd Dump Truck (holds 10 yd only)	1950 Santa Fe Spreading Ground PS	15	29250
		4,000 CY haz soil export/demo	800 13 yd Dump Truck (holds 10 yd only)	800 Hazardous Waste	200	160000
				1150 Scholl Canyon Landfill	26	29900
				1950 AWP Facility	30	58500
35	**Above grade facilities/equipment and site improvements**		5,000 Equipment Loads	5,000 Equipment site	30	150000
36	**Paving**	2,900 CY AB	1,400 14 CY Truck	1,400 Concrete/Asphalt Plant	50	70000
		5,800 Tons asphalt				
37	**Architectural coatings**		30 Loads of Materials	30 Architectural coatings	15	450
38	**Power substation**		60 Loads of Equipment and Materials	60 Equipment site	30	1800
39	**Pipeline Stub out to Coveyance System**		260 Pipe Loads	260 Equipment site	30	7800

Reference (Row)	**Construction VMT - Santa Fe Spreading Grounds PS**	Located in Reach 8		
	Trip Distance Assumptions (one-way)			
SCAG	Avg. Worker Commute Distance	19.66	miles	
VMT Calculation-V4	To Class II landfill - Kettleman Hills Hazardous Waste Facility	200	miles	
VMT Calculation-V4	To regular landfill - Scholl Canyon Landfill	20	miles	
	Whittier Narrows PS	15	miles	
	AWP Facility	40	miles	
VMT Calculation-V4	Paving Materials	50	miles	
	Avg. trip for construction equipment traveling to work site	30	miles	
	Chemical Deliveries (operations phase)	30	miles	

Construction Phase

e Water Conveyance Schedule_v5.1	***Assumed Construction Duration (20230901_Pure Water Conveyan***	***620***	***days***	***1.7 years (workdays only)***
23	Hual Truck Trips (Off-haul/disposal, supplies, material)			
	minimum	200	one-way trips	
	maximum	500	one-way trips	
	Construction Workers			
13	Construction Workers per day			
	average	34	workers/day	
	peak	43	workers/day	
14	**Est. Num of Construction Workers vehicle trips per day**			
	average	130	one-way trips/day	
		130	**avg. one-way trips/day** (to and from site)	

Roadway

	Arterial	Collector	Local	***Assumptions***
Regular Landfill Haul Trips	11.16			*100% to/from I-605*
Hazardous Landfill Haul Trips	1.45			*100% to/from I-210*
Base Materials Haul Trips	9.72	0.70		*45% travel on E/W arterials; 45% on N/S arterials, 10% to/from I-605*
Construction Workers	128.05	1.95		*10% travel on E/W arterials; 10% on N/S arterials, 80% to/from I-605*
Construction Equipment	0.11	0.01		*30% travel on E/W arterials; 30% on N/S arterials, 40% to/from I-605*

	ADT to/from freeway	**ADT E/W arterials or N/S arterials**
LV	102.44	27.56
HV	13.63	9.52
Total	116.07	37.08

	Construction Phase and Duration	**Amount**	**# of Dump Tuck Needed**	**Haul & Delivery Trips**		**Miles/Trips**	**VMT**
30	**Demolition**	5,800 tons	820 14-ton Dump Truck		Whittier Narrow PS	15	
					Santa Fe Spreading Ground PS		
				42	Hazardous Waste	200	8400
				778	Scholl Canyon Landfill	20	15560
					AWP Facility	40	
32	**Site Preparation**	3,700 CY	800 Dump Truck		Whittier Narrow PS	15	
		1 acre	160 Dump Truck		Santa Fe Spreading Ground PS		
				48	Hazardous Waste	200	9600
				912	Scholl Canyon Landfill	20	18240
33	**Foundation and below grade infrasture**	9,400 CY	188 Dump Truck		Whittier Narrow PS	15	
					Santa Fe Spreading Ground PS		
				10	Hazardous Waste	200	2000
				178	Scholl Canyon Landfill	20	3560
34	**Excavation/Trenching**	12,000 CY soil import	2400 13 yd Dump Truck (holds 10 yd only)	1950	Whittier Narrow PS	15	29250
		23,000 CY clean soil export/demo	4600 13 yd Dump Truck (holds 10 yd only)	1950	Santa Fe Spreading Ground PS		
		4,000 CY haz soil export/demo	800 13 yd Dump Truck (holds 10 yd only)	800	Hazardous Waste	200	160000
				1150	Scholl Canyon Landfill	20	23000
				1950	AWP Facility	40	78000
35	**Above grade facilities/equipment and site improvements**		5,000 Equipment Loads	5,000	Equipment site	30	150000
36	**Paving**	2,900 CY AB	1,400 14 CY Truck	1,400	Concert/Asphalt Plant	50	70000
		5,800 Tons asphalt					
38	**Power substation**		60 Loads of Equipment and Materials	60	Equipment site	30	1800

Summary - Daily ADT (Average Daily Throughout the Construction Schedule)				
		Joint Treatment Site Pump Station	WNPS	SFSGPS
Construction Worker and Non-Haul Truck ADT Per Day	Light Vehicle	85	130	130
	Heavy Vehicle	0	0	0
	Total	85	130	130
Haul Truck Trips ADT Per Day	Light Vehicle	-	-	-
	Heavy Vehicle	20	27	26
	Total	20	27	26
Total ADT Per Day	Light Vehicle	85	130	130
	Heavy Vehicle	20	27	26
	Total	105	157	156

Summary - Daily VMT (Average Daily Throughout the Construction Schedule)				
		Joint Treatment Site Pump Station	WNPS	SFSGPS
Construction Worker and Non-Haul Truck VMT	Light Vehicle	1671	2,556	2,556
	Heavy Vehicle	4	4	4
	Total	1,675	2,559	2,559
Haul Truck Trips VMT	Light Vehicle	-	-	-
	Heavy Vehicle	793	929	918
	Total	793	929	918
Total VMT	Light Vehicle	1,671	2,556	2,556
	Heavy Vehicle	796	933	922
	Total	2,467	3,489	3,478

Summary - Construction Schedule # of Days			
	Joint Treatment Site Pump Station	WNPS	SFSGPS
Number of Construction Days	620	620	620

Summary - ADT (Throughout the Construction Schedule)					
		Joint Treatment Site Pump Station	WNPS	SFSGPS	Total
Construction Worker and Non-Haul Truck ADT Per Day	Light Vehicle	52,700	80,600	80,600	213,900
	Heavy Vehicle	74	74	74	222
	Total	52,774	80,674	80,674	214,122
Haul Truck Trips ADT Per Day	Light Vehicle	-	-	-	-
	Heavy Vehicle	12,332	16,518	16,228	45,078
	Total	12,332	16,518	16,228	45,078
Total ADT Per Day	Light Vehicle	52,700	80,600	80,600	213,900
	Heavy Vehicle	12,406	16,592	16,302	45,300
	Total	65,106	97,192	96,902	259,200

Summary - VMT (Throughout the Construction Schedule)					
		Joint Treatment Site Pump Station	WNPS	SFSGPS	Total
Construction Worker and Non-Haul Truck VMT	Light Vehicle	1,036,027	1,584,511	1,584,511	4,205,049
	Heavy Vehicle	2,220	2,220	2,220	6,660
	Total	1,038,247	1,586,731	1,586,731	4,211,709
Haul Truck Trips VMT	Light Vehicle	-	-	-	-
	Heavy Vehicle	491,396	576,268	569,410	1,637,074
	Total	491,396	576,268	569,410	1,637,074
Total VMT	Light Vehicle	1,036,027	1,584,511	1,584,511	4,205,049
	Heavy Vehicle	493,616	578,488	571,630	1,643,734
	Total	1,529,643	2,162,999	2,156,141	5,848,783

Distribution of Daily Project Trips ADT by Roadway Classification					
Vehicle Type	Roadway Class	Joint Treatment Site Pump Station	WNPS	SFSGPS	Total
Light Vehicle	Arterial	81	121	125	327
	Collector	2	4	2	8
	Local	3	4	3	10
Heavy Vehicle	Arterial	15	22	21	58
	Collector	2	1	1	3
	Local	1	1	1	3
Total	Arterial	96	143	146	385
	Collector	3	5	3	12
	Local	3	5	4	13

Daily Project Trips ADT on Route to Freeway				
Vehicle Type	Roadway Class	Joint Treatment Site Pump Station	WNPS	SFSGPS
Light Vehicle	Arterial	58	76	102
Heavy Vehicle	Arterial	10	14	14
Total	Arterial	67	89	116

Daily ADT per Link by Roadway Classification - Within 5 mile buffer of reach							Daily ADT per link on Route to Freeway					
Scenario	Vehicle Type	Roadway Class	Joint Treatment Site Pump Station	WNPS	SFSGPS	Total	Scenario	Vehicle Type	Roadway Class	Joint Treatment Site Pump Station	WNPS	SFSGPS
NP	TruckADT	Arterial	1,329	692	419	2,440	NP	TruckADT	Arterial	1,710	1,710	1,710
		Collector	424	77	34	536						
		Local	177	79	59	315						
	All ADT	Arterial	19,877	23,097	17,020	59,994		All ADT	Arterial	39,257	39,257	39,257
		Collector	1,741	2,294	1,696	5,731						
		Local	2,279	2,238	2,321	6,837						
Project Trips	TruckADT	Arterial	15	22	21	58	Project Trips	TruckADT	Arterial	10	14	14
		Collector	2	1	1	3						
		Local	1	1	1	3						
	All ADT	Arterial	96	143	146	385		All ADT	Arterial	67	89	116
		Collector	3	5	3	12						
		Local	3	5	4	13						
NP + Project Trips	TruckADT	Arterial	1,344	714	440	2,498	NP + Project Trips	TruckADT	Arterial	1,719	1,723	1,723
		Collector	426	78	35	539						
		Local	178	80	60	318						
	All ADT	Arterial	19,973	23,240	17,166	60,379		All ADT	Arterial	39,324	39,346	39,373
		Collector	1,744	2,300	1,699	5,743						
		Local	2,282	2,243	2,325	6,850						
% Change (NP + Project Trips) - (NP)	TruckADT	Arterial	1%	3%	5%	2%	% Change (NP + Project Trips) - (NP)	TruckADT	Arterial	1%	1%	1%
		Collector	0%	1%	2%	1%						
		Local	0%	1%	2%	1%						
	All ADT	Arterial	0%	1%	1%	1%		All ADT	Arterial	0%	0%	0%
		Collector	0%	0%	0%	0%						
		Local	0%	0%	0%	0%						

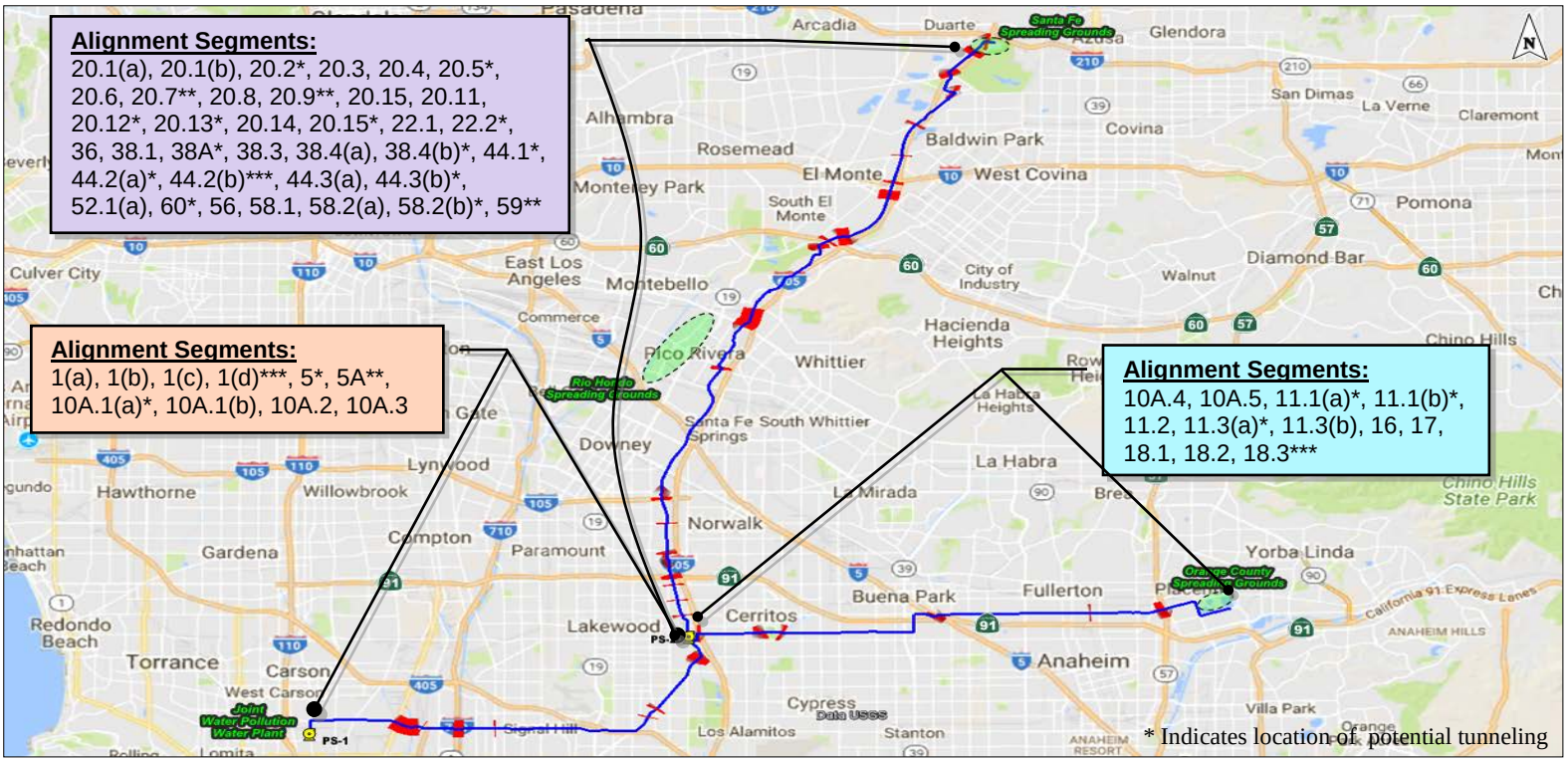
APPENDIX G – TRAFFIC CONTROL PLANS

Preliminary Traffic Control Assessment for The Metropolitan Water District of Southern California's Potential Regional Recycled Water Supply Program Feasibilities Studies

Final Traffic Control Assessment

for the

Metropolitan Water District of Southern California's
Regional Recycled Water Supply Program (RRWSP) Feasibilities Studies









PRESENTED TO:

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
700 North Alameda Street
Los Angeles, CA 90012-2944

Black & Veatch
5 Peters Canyon Road
Irvine, CA 92606

PREPARED BY:

MINAGAR & ASSOCIATES, INC.
Traffic Engineering – Transportation Planning – ITS – CEM
23272 Mill Creek Drive
Suite 240
Tel: (949)707-1199
Web: www.minagarinc.com • E-mail: minagarf@minagarinc.com

25 Years of Excellence

August 25, 2018

1 GENERAL

1A **Overview**. The Metropolitan Water District of Southern California (MWD), in collaboration with the Los Angeles County Sanitation District (LACSD), is developing a new regional water supply program to deliver recharge water of groundwater basins for conservation, desalination, recycling and potable reuse purposes, and to improve and diversify storage and delivery capabilities and water supply throughout the region. MWD is contemplating a long-term phased approach, with an initial demonstration phase requiring the completion of several feasibility studies. An important part of the feasibility studies pertains to satisfying the comprehensive and multi-jurisdictional set of traffic control requirements, and managing the impacts of project construction on the surface transportation system. The proposed RRWSP pipeline alignment will traverse the following local jurisdictions in Los Angeles and Orange Counties:

Los Angeles County	
City of Arcadia	City of Lakwood
City of Baldwin Park	City of Long Beach
City of Bell Gardens	City of Los Angeles
City of Bellflower	City of Montebello
City of Carson	City of Norwalk
City of Cerritos	City of Paramount
City of Commerce	City of Pico Rivera
City of Compton	City of Santa Fe Springs
City of Downey	City of Signal Hill
City of El Monte	City of South El Monte
City of Hawaiian Gardens	City of South Gate
City of Industry	Unincorporated
City of Irwindale	L.A. County

Orange County
City of La Palma
City of Cypress
City of Buena Park
City of Fullerton
City of Placentia
City of Anaheim

The project design contractor, Black & Veatch, has requested Minagar & Associates, Inc. to provide a preliminary, top-level assessment of the temporary traffic control and work zone-related construction impacts and associated costs involved with constructing the subject Preferred Alignment for MWD's Potential Regional Recycled Water Supply Program (RRWSP). The following discussions include a general overview of the expected procedures, impacts and costs associated with temporary traffic control/work zone set-ups for the various Project alignments.

While there are a number of Potential RRWSP route alternatives that are located off-road, or only cross relatively short widths through city streets which would not require any significant traffic control set-ups within the public right-of-way, most of the alignments are located on public highways and would require MWD to implement proper traffic control methods to ensure construction worker and public safety. Boring/tunneling methods are undetectable to the public and would not interfere with traffic, with the exception of bore pits required at excavation exit and entry points.

1B **General Requirements.** The nature of the project construction involves a moving operation both on and off of the public right-of-way to sawcut and excavate pavement;

load and haul soils to the laydown area; install trench shoring; install, weld, inspect and test pipeline and valve appurtenances; grade, compact and backfill the site; and conduct other site restoration/cleanup on an ongoing basis. Daily construction will operate as a "rolling work zone" that is approximately 600 feet in length along any given alignment, and 36 feet wide. The typical construction method for use in all roadway-street locations requires a 10-foot lateral clearance from the trench or boring pit centerline to the nearside work zone edge, and 26 feet to the far-side work zone edge. Metropolitan estimates that daily trench-based work will be completed at a rate of 40 feet of pipeline construction per day within public roadways, and 200 feet per day within off-street easements. Trenchless-based construction between contiguous boring pits along the alignment is estimated to be completed at a rate ranging between 35 and 60 feet per day, depending on the soil conditions and trenchless method.

1C Specific/Special Requirements.

1C.1 Meeting Minutes. MWD has conducted a preliminary agency outreach effort with several local jurisdictions through which the project alignment will be constructed. MWD prepared a minutes summary of these meetings for the following agencies:

- City of Anaheim
- City of Buena Park
- City of Carson
- City of Cypress
- City of Fullerton
- City of La Palma
- City of Long Beach
- Los Angeles County Department of Public Works (LACDPW)
- Southern California Edison (SCE)

For each meeting, the following questions/concerns were raised:

- Traffic management and detour requirements;
- Need to obtain the width of public right-of-way for streets affected by the potential alignment;
- Encroachment permit process/timeframe;
- Utility relocation and median issues, where applicable;
- Upcoming projects or street improvements along the potential alignment?;
- Specification of City ordinances regarding pipeline construction (repaving/backfill requirements, etc.);
- Environmentally sensitive and restricted areas;
- Knowledge of any hazardous materials, contaminated soils, or chemical facilities in the vicinity of the project;
- Availability of electronic files (e.g., Microstation, AutoCad, GIS or PDF utility maps);
- Points of contact for Traffic, Environmental, Permits, Property Access and Street Parking Impacts, Other
- For corridor alignments:

- Need City contact for permanent easement and temporary construction easement process/timeframe;
- Need City contact for coordination of any park closures/impacts during construction

1C.2 Municipal Regulations, local concerns and potential nighttime work.

The following includes the traffic control related concerns and feedback provided from each local agency during the outreach meetings:

City of Carson

- The city had concerns that 223rd Street is busy, might want to stay out. Avalon (or Main) to Del Amo could be an option.
- Avoid Wilmington because it's a busy street with a lot of utilities.
- Construction Means and Methods: Maintain at least one lane of traffic in each direction. If you're at an intersection, maintain the left turn open. For trenching, you would need to reroute one block at a time.
- Working hours: 9am to 3pm weekdays. Times may change depending on the project. The City had a previous project with a starting time at 7am.
- We would need a detour plan which would serve as guidance to the contractors
- Sepulveda is busy with a lot of pipes/utilities, traffic is not as much of an issue
- Streets to stay away from:
  - Intersection of Wilmington/223rd. There's an ongoing construction project.
  - Carson from 405 to Figueroa

City of Long Beach

- Major streets will need to maintain one (1) lane of traffic in each direction at all times. The City does not want to detour any streets completely, but may approve flagging for minor streets on a case by case basis.
- Working hours are restricted to 8:30am to 3:30pm. A special permit request will need to be submitted to work outside of these hours. The City does not allow work on Sundays, however, Saturday work may be allowed with a special permit. Any requests are considered on a case by case basis. Refer to the City's noise ordinance for more information or contact the City's Noise Ordinance Officer to discuss further.

City of Cypress

- A traffic control plan will be required along with advance notification to residents and businesses.
- Working hours in the City are 8:30am to 3:30pm for cone traffic. If k-rails are installed, the working hours can be extended.
- With k-rail installed, there are no restrictions on the length of the open trench. If k-rail is not installed, the trench will need to be covered daily (back filled or covered with traffic bearing plates).
- The subdivisions to the east of Coyote Creek, on the north and south side of Crescent Avenue (Carob Street and Acacia Street), have only one point of access. Coordinate construction to accommodate these residents.

- A comment was made that Moody Street or Bloomfield Avenue may be better choice for the north/south alignment over Walker Street. All three of these options are within the City of La Palma. Kamran also mentioned that Holder Street in Buena Park is a quiet street. Valley View Street and Knott Avenue are busy north/south streets in Buena Park.
- Crescent Avenue is the best east/west option in the City of Cypress as there would be minimal traffic impacts in this area relative to the other east/west streets in the City.
- The intersection of Walker Street and Crescent Avenue is busy.
- Forest Lawn Cemetery has an access gate onto Crescent Avenue (adjacent to Moody Creek) that is used frequently. Prior to construction, MWD should meet with Forest Lawn to discuss any impacts to this access point and the cemetery. The main entrance to the cemetery is off of Lincoln Avenue.

City of Fullerton

- The City would like for MWD to establish guidelines related to traffic and detour management.
- Working daytime hours in the City are 7am to 4pm.
- Will need to do nighttime work through major intersections (i.e., Harbor & Orangethorpe). The Harbor intersection will be the biggest issue for this alignment.
- The City can give us as-built drawings of Orangethorpe as well as Orange County pipeline drawings. Contact Brian K.

L.A. County

- MWD should try to stay away from using bicycle and other multi-use trails. The public may protest our use of these trails.

City of La Palma

- The City uses MUTCD standards for traffic control. Generally one lane must remain open in each direction. A preliminary traffic control plan should be submitted with MWD's construction plans.
- There is no paving currently planned for Walker Street or Crescent Avenue. They will start slurry seal in 2 years. La Palma Avenue will have grind/overlay completed this summer.
- There are no specific City ordinances regarding pipeline construction.
- Walker Street has less traffic than Moody Street. It operates as a collector street and has less traffic than streets to the east as well (i.e., Valley View Street and Knott Avenue).

2 ROADWAYS AND INTERSECTIONS

2A Roadways

2A.1 Roadway Designation and Definitions. All public streets and highways are sorted within three general classes, or functional classifications, established by the Federal Highway Administration (FHWA) and the American Association of State Highway Transportation Officials (AASHTO). They are as follows:

- *Arterials*. Provide the highest level of service at the greatest speed for the longest uninterrupted distance, with some degree of access control.
- *Collectors*. Provide a less highly developed level of service at a lower speed for shorter distances by collecting traffic from local roads and connecting them with arterials.
- *Local roads*. Consist of all streets not defined as arterials or collectors; primarily provides access to land with the least amount of mobility (lower travel speeds, narrower streets, fewer lanes, more driveways, etc.).

The roadway functional classifications are based on the character of traffic service that they are intended to provide and the degree of land access that they allow. Therefore, the degree to which a project roadway segment will be limited or closed off to public use during construction will largely depend on its functional classification, since this represents how the roadway is currently being used and whether or not lane closures are feasible or will be acceptable to the local governing agency.

Due to the diverse combinations of land use patterns, street access, local roadway standards, and individual public interests, local municipalities in Southern California often use functional classifications in their General Plans which do not align verbatim with the FHWA's above three-tiered system. Oftentimes, roadway type designations may not even correlate over jurisdictional boundaries. Generally speaking, however, the FHWA's functional classes are consistent with the urban context of Los Angeles and Orange Counties where the project will be constructed, and can be represented as:

- ***Arterials***

    - ***Principal Arterials*** (Interstates, Freeways, Expressways, and major conventional highways) carry the large majority of through movements wishing to bypass the central city of an urban area. Although there are no Principal Arterials along which the project will be constructed, there are several base and alternative alignments which would cross underneath Principal Arterials at a handful of locations, including across Interstates (I-) 5, 10, 105, and 605, and State Routes (SR-) 91 and 57.

    - In the local context of Los Angeles and Orange Counties, FHWA's ***Minor Arterials*** classification is represented by what many cities separate into individual categories termed "Major Arterials" and "Primary Arterials". These facilities serve as multi-lane divided highways providing cars, trucks and buses with a high degree of intercity travel, as well as direct access to Principal Arterial facilities. In fully developed areas minor arterials are usually spaced at about 1 mile apart; however, they may be spaced more closely within central business districts and further apart (up to 2-3 miles) in suburban fringes.

- ***Collector Streets*** in the project area are represented by local jurisdictions by the "Collector" and "Secondary Arterial" (intermediary roadways between collectors and major arterials) functional classifications, and are most often found to be two-lane divided highways or four-lane highways both divided and undivided, providing a mix of intercity and intracity travel with simultaneous access to adjacent land uses.

- ***Local Streets*** are comprised of all other functionally unclassified roadways which provide direct access to abutting land and access to the above higher service facilities. Within the project limits these are generally undivided, two-lane streets in residential neighborhoods, often with curbside width for on-street parking. Service to through-traffic movements is usually deliberately discouraged, and bus routes are usually not located on local streets.

From a temporary traffic control standpoint, in terms of mobility impacts and costs, local agencies will generally not permit Principal or Minor Arterials to be fully closed at any time. With proper mitigation and traffic detours, cities may possibly grant the full closure of certain collector roads and local streets during their off-peak usage periods, with seasonal/day-of-week/time-of-day factors considered. However, this will require that MWD address the long-term impacts associated with the affected residents and businesses for whom direct vehicular access from the public right-of-way would be restricted during construction.

2A.2 Roadway Map and List. A map of the RRWSP Preferred Alignment is shown on ***Figure 1.*** A list of the project segments located on public roadways where temporary traffic control will be required is provided under ***Attachment 1A***. A truncated list of project segments composed of the current preferred alternative project routing is provided under ***Attachment 1B***.

2A.3 Roadway Traffic Control Types and Descriptions. Minagar & Associates, Inc. developed four basic traffic control configurations which might be used for pipeline construction along open roadway segments. Traffic control set-ups along the roadway would fall under one of the following basic conditions along the highway:

- **TC Configuration #1 (two-way traffic, both sides of work zone)**
  - Interior lanes closure for all roadways ≥ 60' wide
  - Pipeline along center of the street, or offset from street centerline with at least 12' available on both sides of the work zone.

- **TC Configuration #2 (two-way traffic, one side of work zone)**
  - Closure of one side for all roadways ≥ 60' wide
  - Pipeline offset from street centerline with ≥ 24' available on one side of the work zone.

- **TC Configuration #3 (one traffic lane alongside the work zone)**
  - Closure of one side for all roadways 48-60' wide
  - Pipeline offset from street centerline with < 24' available on one side of the work zone.

  - Depending on the needs and requirements of the local agency, the traffic control configuration may include: (1) two-way traffic alternating back and forth on one lane with the use of flagmen; (2) temporary restriction of the segment to one-way traffic with the implementation of detour routes for the closed direction; or (3) a combination of flagmen and/or detouring during designated hours of the day.
  - Depending on the traffic volume and capacity of the street in question, the implementation of one-way restrictions with detours or the use flagmen to manage two-way traffic on one travel lane would be feasible on all streets; however, the configuration will likely be limited to Collectors and Local Streets. In the case of collector roads, many local agencies will typically not allow peak traffic flows (e.g., 7:00-9:00AM and 4:00-6:00PM) to be obstructed in this way, and thus may be more amenable to nighttime work where one open lane of traffic is desirable.

- **TC Configuration #4 (closed to through traffic)**—full street closure for local roads and city-approved collector streets
  - Available lane width for through traffic outside of the work zone < 12' on both side of the construction area.

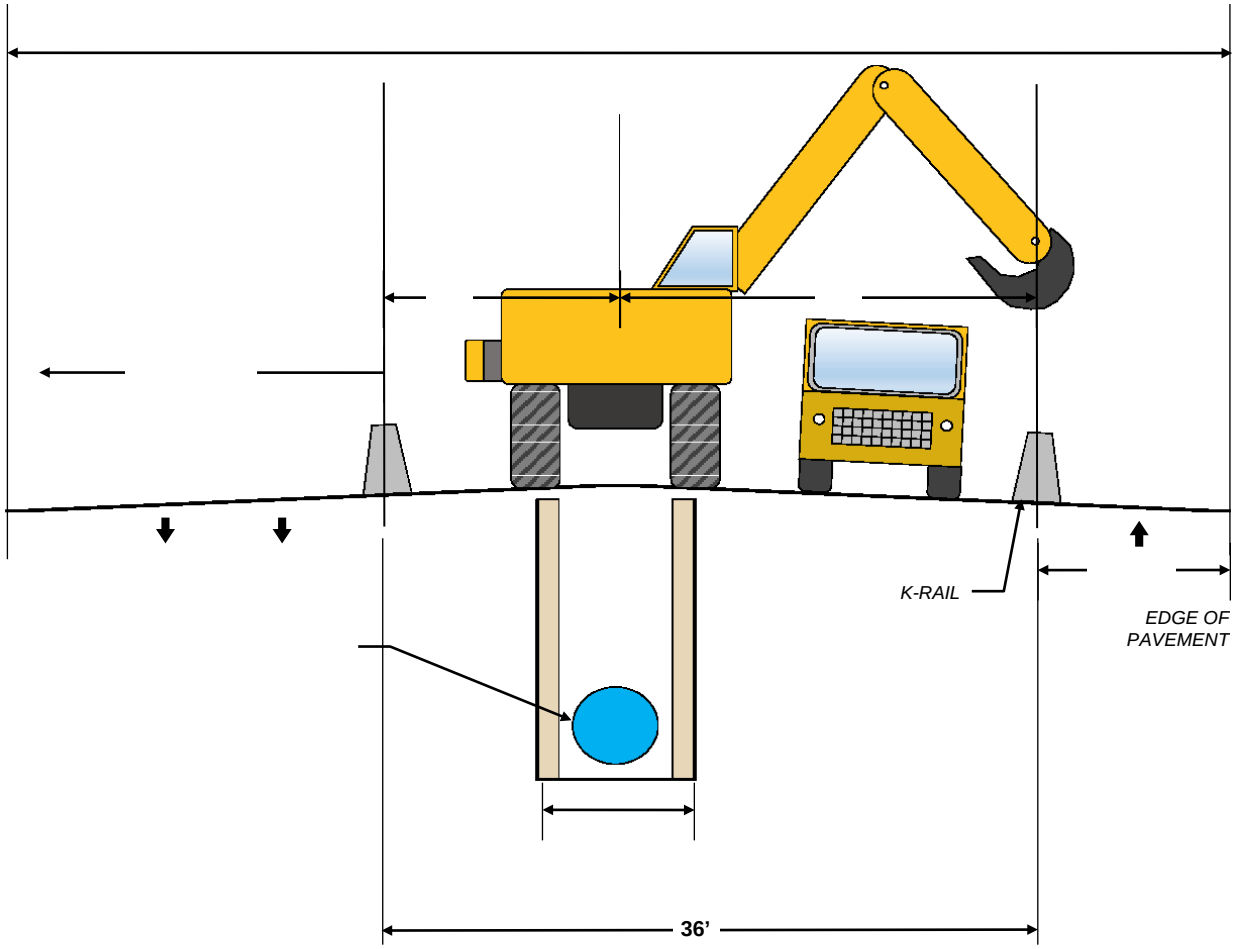
Conceptual layouts of the above generalized traffic control patterns are shown in the diagrams below. Where the project alignment crosses a freeway, at-grade railroad or storm water/flood control channel, the construction method will be trenchless with launching/receiving pits located 25 feet from the controlling jurisdiction's right-of-way line.

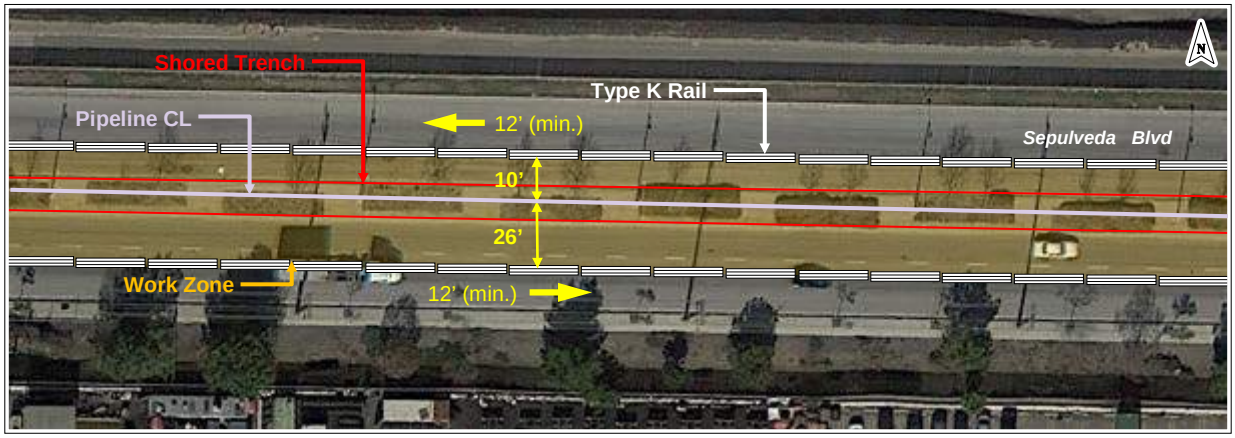
Based on Minagar & Associates, Inc.'s assessment of the Preferred Alignment, there is one (1) roadway segment which would potentially require full-roadway closure (TC Configuration #4) and detour-based temporary traffic control while construction is underway. The segment is described as follows:

- <u>52 – Rivergrade Road between Lower Azusa and Brooks (0.41-mile segment)</u>
  - Cities of Irwindale and Baldwin Park – *Local Street*
  - 32-foot wide, 2-lane street, no median
  - Adjacent land use: Industrial (auto and boating service centers)

Traffic Control Configuration #1 (two-way traffic, both sides)

Interior lanes closure for arterials ≥ 60' wide. Pipeline alignment is located along the center of the street, or is offset from the street centerline with ≥ 12 feet available on both sides of the work zone.



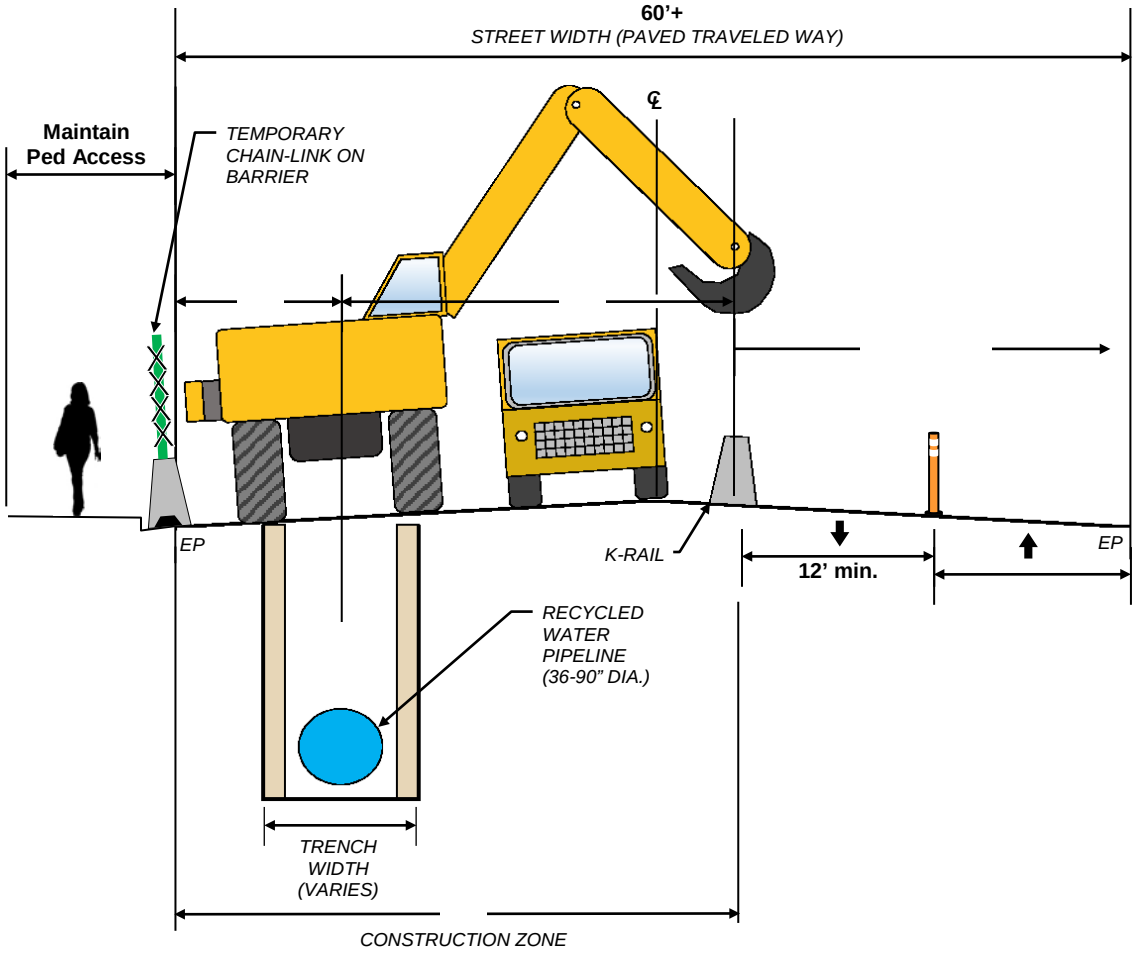


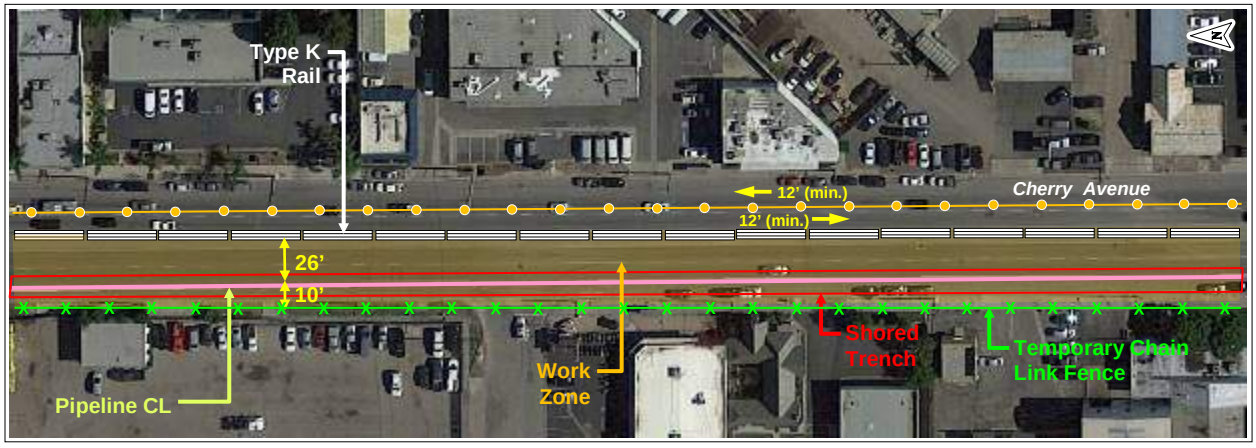
Traffic Control Configuration #1 (Plan View) **– Two-way traffic, both sides of work zone**

Traffic Control Configuration #2 (two-way traffic, one side)

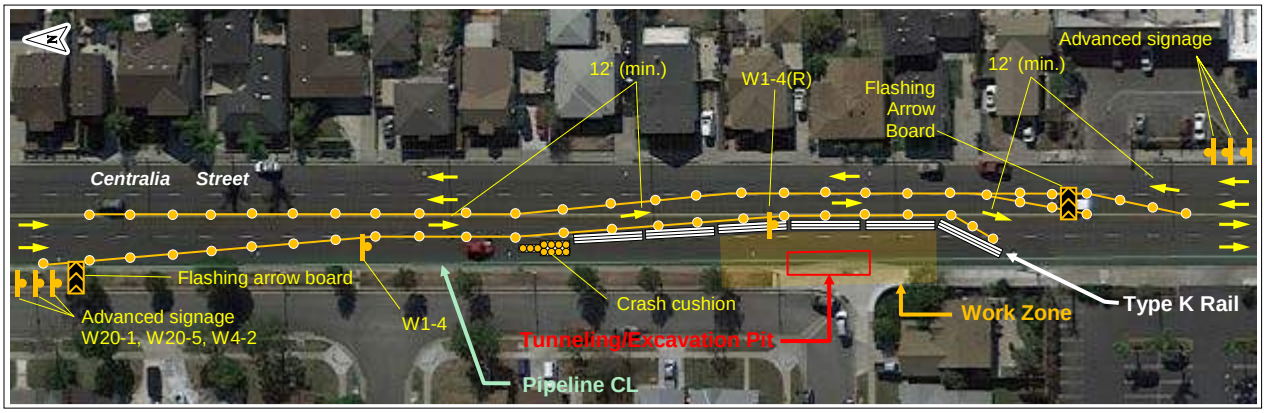
Closure of one side for all roadways ≥ 60' wide

Pipeline offset from street centerline with ≥ 24' available on one side of the work zone



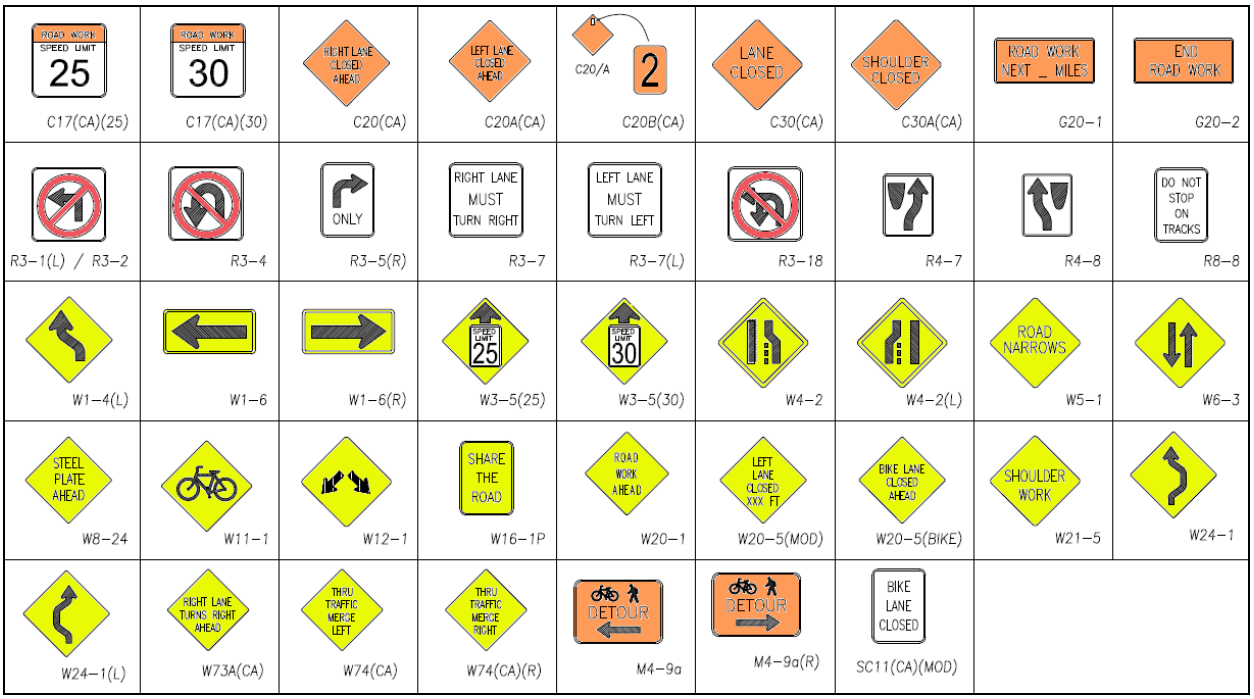


Traffic Control Configuration #2 (Plan View)
Two-way traffic, one side of work zone



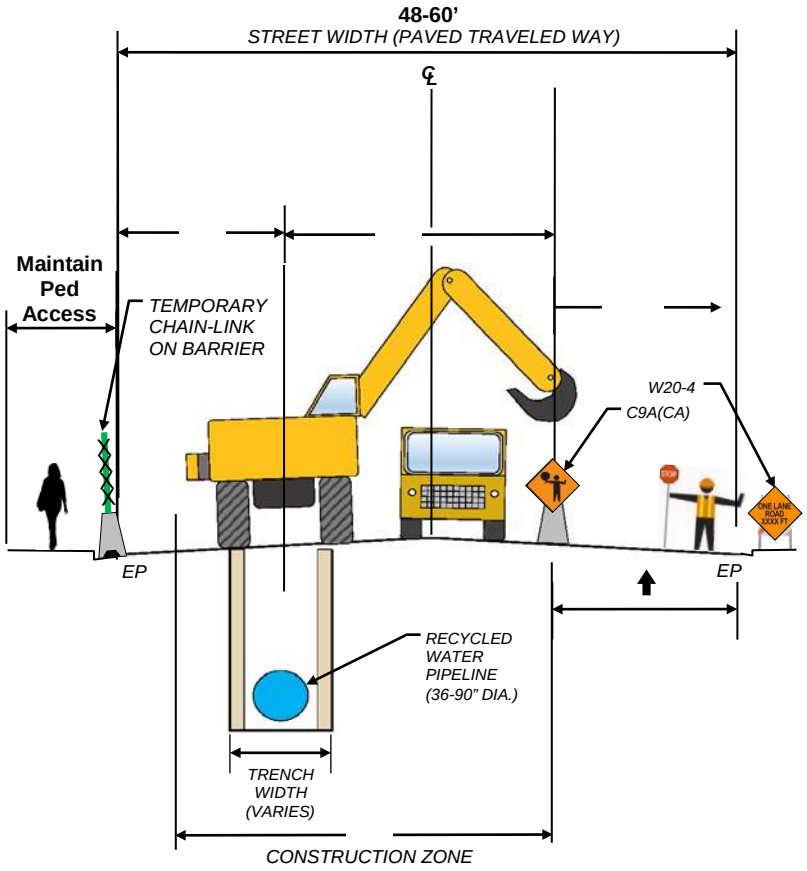
Traffic Control Configuration #2 (Alternative Pattern)
Transition to half roadway closure with lane merge

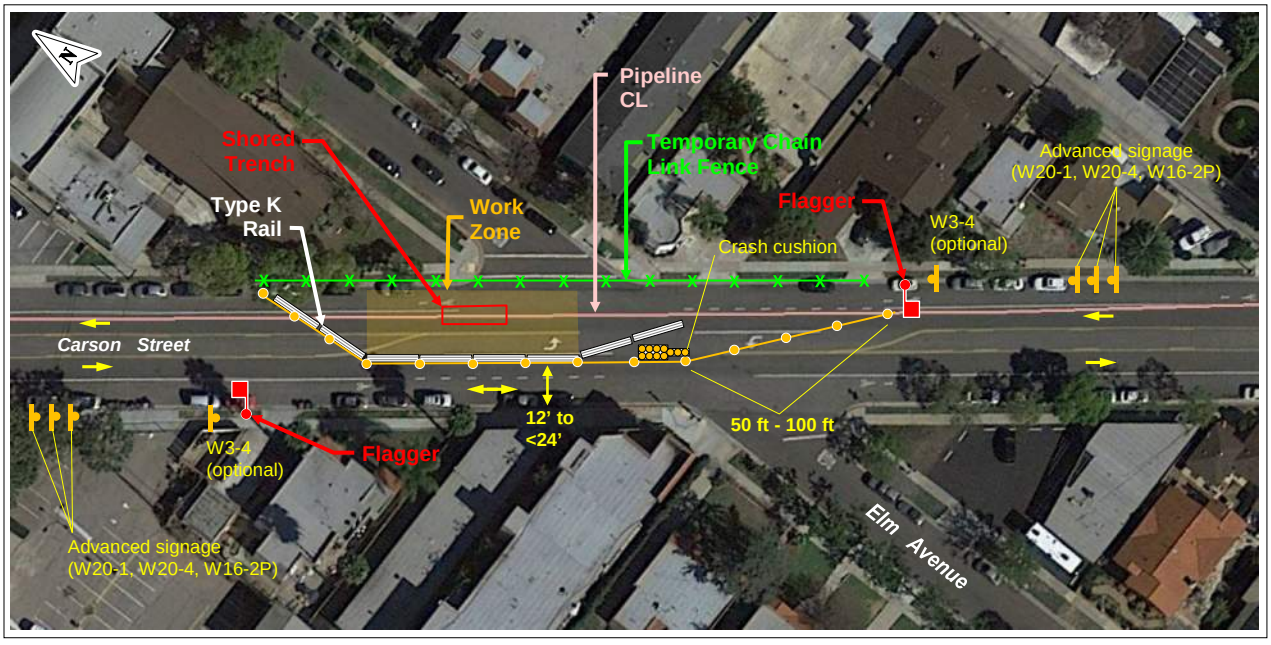
The sign chart below is based on the latest California MUTCD and depicts the typical temporary traffic control/work zone signage which would be used for the proposed project construction along both roadway segments and at intersections.



Traffic Control Configuration #3 (one-way traffic alongside work work)

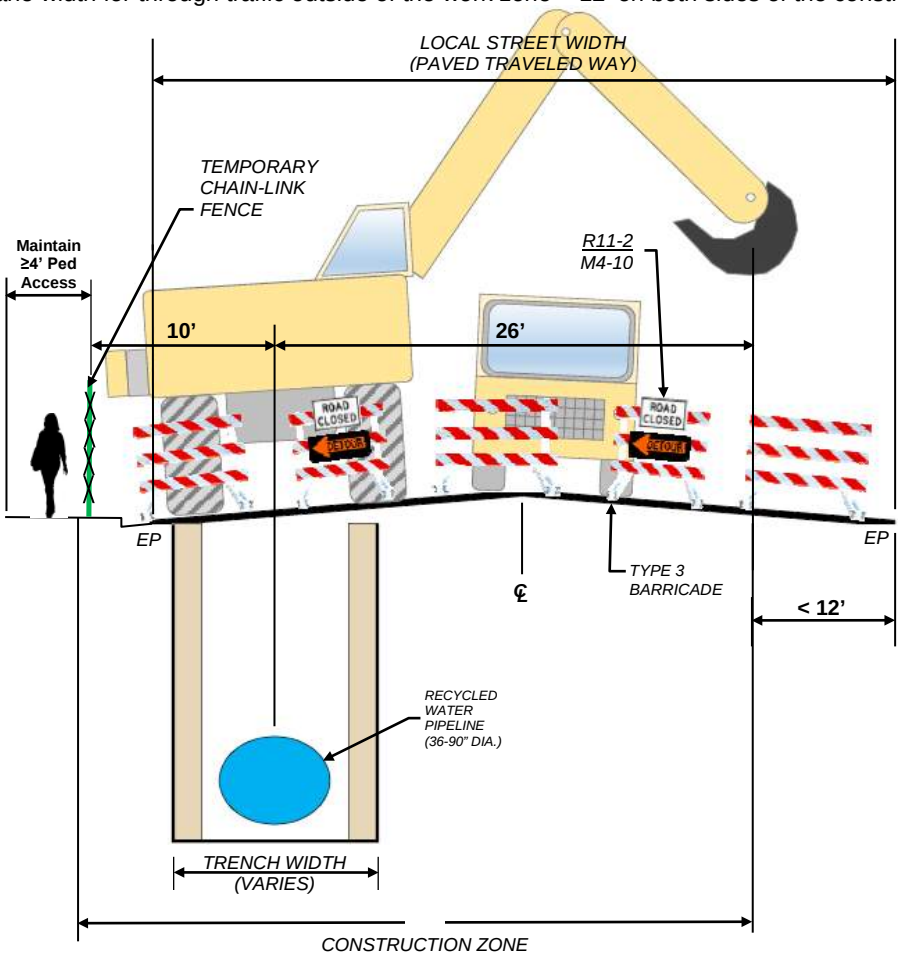
Closure of one side for all roadways 48-60' wide. Pipeline offset from street centerline with < 24' available on one side of the work zone. Implement one-way closure with detour or two-way flagger station (shown below)





Traffic Control Configuration #4 (closed to through traffic)

Full street closure for local roads and city-approved collector streets.
Available lane width for through traffic outside of the work zone < 12' on both sides of the construction area



2A.4 Roadway Traffic Control Cost Estimate. Minagar & Associates, Inc. developed four basic temporary traffic control cost estimates to correspond to each of the above four configurations. Cost estimates were developed using a method-based specification based on the types of devices which might to be used (signs, barricades, channelizing devices, etc.), their locations and quantities in advance of and through the work zone construction area.

TC Configuration #1 Cost Estimate (two-way traffic, both sides of work zone):

- 600' work zone @ 25 mph reduced speed
  - Direction 1 Transition: 125' Right Merge
  - Assumed 750' two-way TTC transition zone (not including advanced signage)
- Traffic Control Quantities:
  - K-Rail, Direction 1: (600 LF) / (20 ft per railing) = 30 ct Type K Rail
  - K-Rail, Direction 2: (600 LF) / (20 ft per railing) = 30 ct Type K Rail

  - Construction Signs: 10 ct (approx..)
  - Temporary Crash Cushions (unidirectional): 2 ct
  - Flashing Arrow Boards: 2 ct
  - If far-side lane width ≥ 24 ft, add: 1,000 LF remove lane striping and install temporary lane markings
- TTC Cost Estimate:
  - **$64,100 per 750 ft. "rolling work zone"**
    + $8/LF temporary lane marking removals/installations (2-way)

TC Configuration #2 Cost Estimate (two-way traffic, one side of work zone):

- 600' work zone @ 25 mph reduced speed
  - Direction 1 Transition: 125' Merge + 100' Tangent + 63' Shift + 100' Tangent + 63' Shift = 451'
  - Direction 2 Transition: 125' Right Merge
  - Assumed 1,200' two-way TTC transition zone (not including advanced signage)
- Traffic Control Quantities:
  - K-Rail, Direction 1: (600 LF) / (20' ft per railing) = 30 ct Type K Rail
  - Install temporary chain link fence: 600 LF
  - Construction Signs: 10 ct (approx..)
  - Temporary Crash Cushions (unidirectional): 1 ct
  - Flashing Arrow Boards: 2 ct
  - Remove lane striping: 1,000 LF
  - Install delineators: [(1,000 LF)/(20 ft spacing)] x 2 rows = 100 delineators
- TTC Cost Estimate:
  - **$63,800 per 1,200 ft. "rolling work zone"**
    + $8/LF temporary lane marking removals/installations (2-way)

TC Configuration #3 (one traffic lane alongside the work zone)

- 600' work zone @ 25 mph reduced speed
  - Direction 1 Transition: 125' Merge
  - Direction 2 Transition: 63' Shift
  - Assumed 800' two-way TTC transition zone (not including advanced signage)
- Traffic Control Quantities:
  - K-Rail, Direction 1: (600 LF) / (20' ft per railing) = 30 ct Type K Rail
  - Install temporary chain link fence: 600 LF
  - Construction Signs: 10 ct (approx..)
  - Temporary Crash Cushions (unidirectional): 1 ct
  - Remove lane striping: 1,000 LF
  - Flagger: 2 ct
- TTC Cost Estimate:
  - **$65,380 per 800 ft. "rolling work zone"**

TC Configuration #4 (closed to through traffic)

- Traffic Control Quantities:
  - Install temporary chain link fence: (Length of segment, LF)

  - Type III Barricade (4-8'): 20 ct
  - Construction Signs: 20 ct (approx..)
  - Detour Signs: 10 ct (approx..)
  - Traffic Signal Modification: (Varies)
  - Modify lane striping at signal: (Varies)
- TTC Cost Estimate:
  - **$1,200 per street closure +**
    + $4/LF temporary chain link fence
    + traffic signal modification (if needed, per Attachment 2)

Per-segment cost estimates are provided in Attachments 1A and 1B. It should be noted that the temporary traffic control costs are independent from one another and should not be considered cumulatively. All segments will not be under construction simultaneously, nor are they expected to be completed by the same contractor; thus, traffic control cost estimates will be affected by lump sum bids and varying mobilization costs, depending on the scope of each contract.

2B Intersections

2B.1 Intersection Designation and Definitions. Minagar & Associates, Inc. has identified, listed and described all of the signalized intersections through which the proposed pipeline alignments, segments and alternatives, would cross. The proposed construction method for each signalized intersection (either Open Trench or Tunnel) was considered by weighing the degree to which local and sub-regional traffic would be affected with other factors such as jurisdictional requirements and the potential for various underground and/or overhead utilities within the intersection. With open trenching methods, the crossing street perpendicular to the project alignment would be closed to through traffic at the intersection since the work zone would continue through the intersection in both directions upstream and downstream.

In general, where the project alignment crosses a multi-lane arterial highway or major collector roadway at an intersection, and/or provides protected left-turn signal phasing on all four intersection approaches, is a designated regional truck route, or serves multiple municipal fixed bus routes, Minagar & Associates, Inc. has considered the intersection to be a "Major Intersection". Conversely, where the project alignment intersects a cross street at a signalized intersection that operates on a two-phase signal, is not a designated truck route, or does not serve local bus routes, Minagar has considered the intersection to be a "Minor Intersection".

For the majority of major signalized intersections, it is recommended that standard trenching methods be used in the absence of any known jurisdictional requirements prohibiting it (e.g., railroad tracks, rivers, bridges, Caltrans facilities). Open trenching construction would likely occur at a much slower rate across these intersections and more significantly impact vehicle traffic and mobility. For all minor signalized intersections listed, shored trenching methods would be allowed with the concurrence of the local agency, to permit closing of the intersection to through traffic on the crossing street while the intersection is under construction.

2B.2 Intersection List. A list of the signalized intersections through which project alignment will traverse, and require temporary traffic control, is provided under ***Attachment 2A***. The list of Perferred Alignment signalized intersections also includes a probable cost to implement the proposed traffic control method. A truncated list of impacted signalized intersections along the current preferred alternative project routing is provided under ***Attachment 2B***.

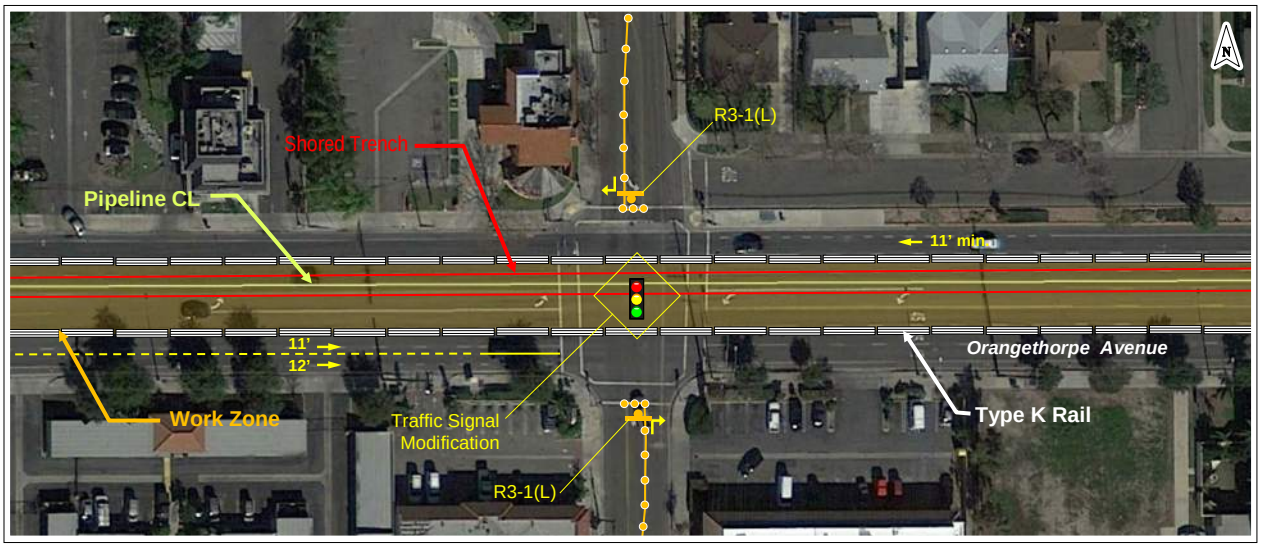
2B.3 Intersection Traffic Control Types and Descriptions. At roadway intersections, the traffic control configuration would be set-up as one of two general variations:

- For tunneling, at major intersections (**TC Configuration #5**)
- For intersection half-closure set-up (**TC Configuration #6**)

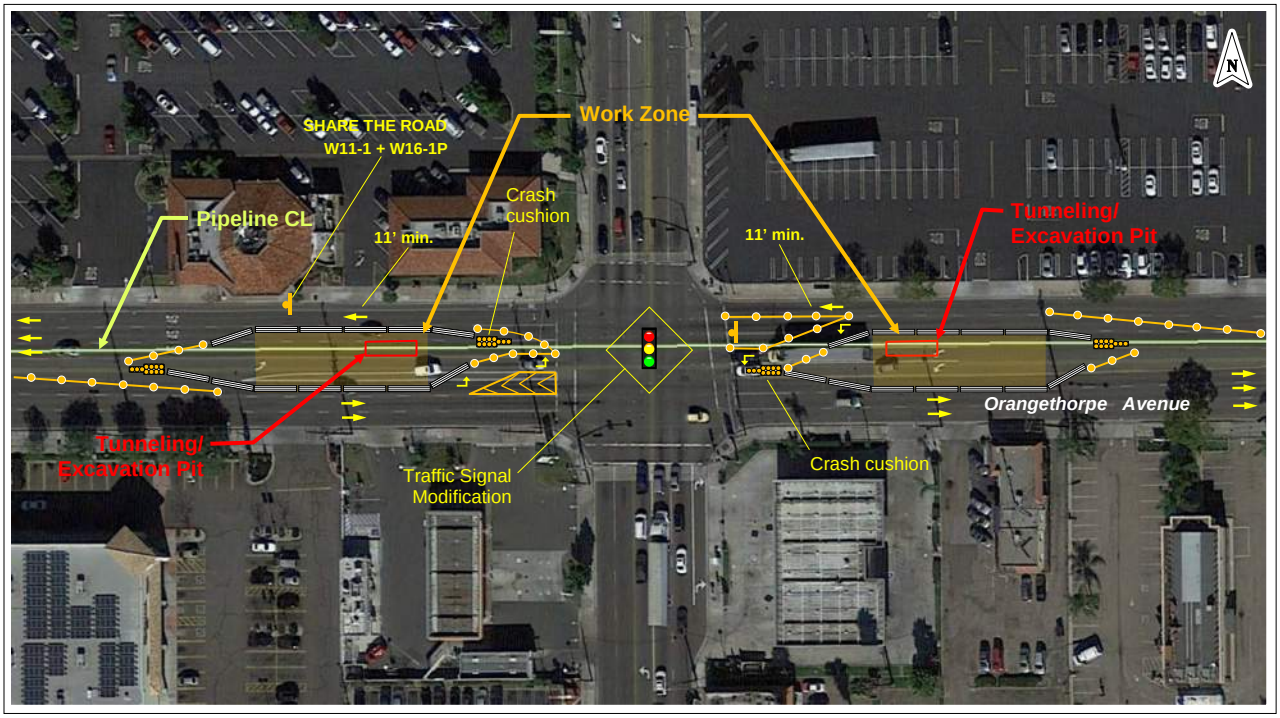
Conceptual layouts of the above generalized traffic control patterns are shown in the figures below. For shored trench methods, jersey barriers of K-Rail (Caltrans type) would be used along both sides of the work zone in parallel with the pipeline alignment through the intersection. Traffic movements approaching the construction site from side streets at the intersection would be prohibited from crossing the street or turning left.

Such movements would be directed to make Right Turns Only with appropriate detour signage installed as needed downstream from the intersection. In addition, manual traffic signal timing and/or detector setting modifications would be implemented at each signalized intersection to ensure that proper signal operations are maintained during the construction period.

For trenchless (tunneling) construction methods, the intersection would be kept clear for traffic to pass in each direction. On the primary street where the pipeline is being constructed, the work zone width would taper off on one side as it approaches the crosswalk or limit line at each signalized intersection to provide the needed space for left turns onto the crossing street. On streets where there are marked bike lanes which must be narrowed or temporarily overtaken for the use of vehicle traffic, the traffic control plan will include appropriate warning signage notifying vehicles to share the roadway space with bicyclists.

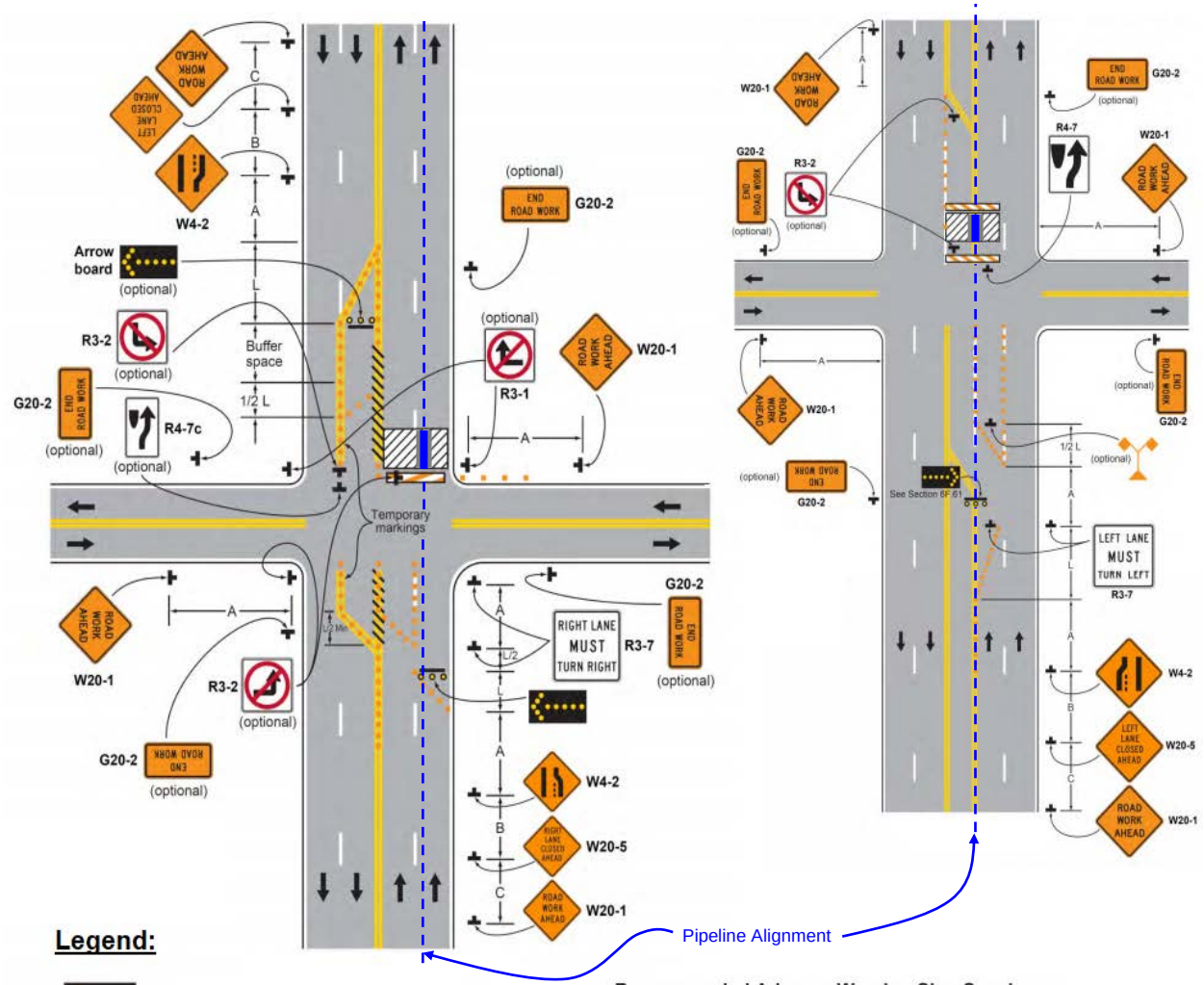


Traffic Control Configuration #5 **– Half Signalized Intersection Closure (Open Trench Construction)**



Traffic Control Configuration #6 **– Interior Lanes Closure at Signalized Intersection (Trenchless Construction)**

Typical Applications for Trenching at Major Intersections
Multiple Lane Closures at an Intersection (Left) &
Half Road Closure, Far Side of the Intersection (Right)



Legend:

- Arrow board
- Arrow board support or trailer (shown facing down)
- Changeable message sign or support trailer
- Channelizing device
- Direction of temporary traffic detour
- Direction of traffic
- Pavement markings that should be removed for a long-term project
- Sign (shown facing left)
- Temporary barrier
- Type 3 barricade
- Warning light
- Work space

Recommended Advance Warning Sign Spacing

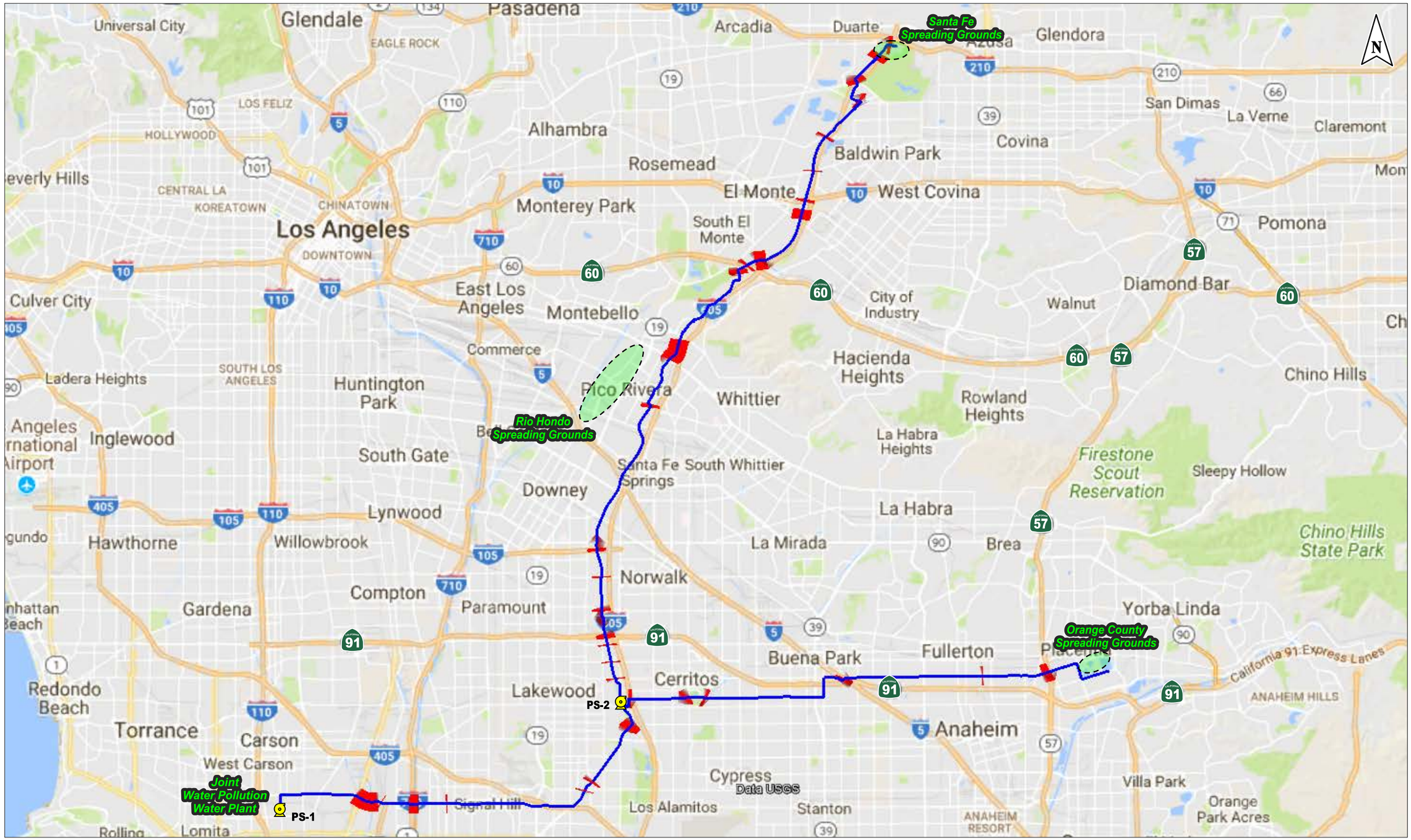
Road Type	Distance Between Signs**		
	A	B	C
Urban 25 mph or less***	100 feet	100 feet	100 feet
Urban - more than 25 mph to 40 mph***	250 feet	250 feet	250 feet
Urban - more than 40 mph***	350 feet	350 feet	350 feet
Rural	500 feet	500 feet	500 feet
Expressway / Freeway	1,000 feet	1,500 feet	2,640 feet

*** Posted speed limit, off-peak 85th-percentile speed prior to work starting, or other anticipated operating speed in mph.

Taper Length

Speed (S)	Taper Length (L) in feet
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or more	$L = WS$

Where: L = taper length in feet
W = width of offset in feet
S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph


Santa Fe Spreading Grounds
Rio Hondo Spreading Grounds
Orange County Spreading Grounds
Joint Water Pollution Water Plant
PS-1
PS-2
Data USGS
N
Universal City
Glendale
Pasadena
Arcadia
Duarte
Azusa
Glendora
EAGLE ROCK
LOS FELIZ
HOLLYWOOD
Alhambra
Rosemead
Baldwin Park
Covina
San Dimas
La Verne
Claremont
Beverly Hills
CENTRAL LA
KOREATOWN
CHINATOWN
Los Angeles
DOWNTOWN
Monterey Park
El Monte
West Covina
South El Monte
Pomona
Culver City
East Los Angeles
Montebello
Commerce
City of Industry
Walnut
Diamond Bar
Ladera Heights
SOUTH LOS ANGELES
Huntington Park
Pico Rivera
Whittier
Hacienda Heights
Rowland Heights
Chino Hills
Inglewood
South Gate
Santa Fe Springs
La Habra Heights
Firestone Scout Reservation
Sleepy Hollow
Downey
Lynwood
La Habra
Hawthorne
Willowbrook
La Mirada
Brea
Chino Hills State Park
Norwalk
Compton
Paramount
Gardena
Yorba Linda
Buena Park
Fullerton
Placentia
California 91 Express Lanes
ANAHEIM HILLS
Redondo Beach
Lakewood
Cerritos
Torrance
Carson
West Carson
Anaheim
Cypress
Villa Park
Orange Park Acres
Los Alamitos
Stanton
Signal Hill
ANAHEIM RESORT
Rolling
Lomita

ATTACHMENT 1B. Traffic Control Assessment for Public Highway Segments Along Preferred Alignment - as of 8/10/18

Key:	Roadway Segment				
Alignmt No.	Length (miles)			Length (feet)	
	N Lanes	RM	W	Pipe CL	LW_{AVAIL}

RM: Width of existing raised/curbed center median (value=0 if no raised median exists, or is flush with the pavement)
W: Width of the traveled way (between edge of pavements)
PIPE CL: Offset of proposed RRWSP pipeline centerline with respect to the nearest edge-of-pavement
LW_{AVAIL}: Roadway width available o/s of work zone for 2-way traffic (near-side curb || far-side curb), including any raised median

Color key:
- Recommend minor alignment modification to allow for two (2), 12-foot traffic lanes.
- Sufficient space for no more than one (1) 12-foot traffic lane.
- Candidate roadway for full street closure.

Alignmt No.	Roadway Segment	TC Config.	Cost Est	Length (miles)	Length (feet)	N	RM	W	Pipe CL	LW_{AVAIL} (near)	LW_{AVAIL} (far)
1	**Main St.**	TC-1	$75,000	0.327 miles	1,727 feet	N= 4	RM: 14'	W= 78'	26' off E.	16'	26'
1	**Sepulveda Blvd./Willow St.**	TC-2	$91,000	0.648 miles	3,421 feet	N= 4	RM: 16'	W= 80'	10' off S	0'	44'
5	**Willow St.**	TC-2	$152,000	2.09 miles	11,035 feet	N= 6	RM: 15'	W= 75'	17' off S.	7'	32'
5A	**Willow St.**	TC-2	$172,000	2.56 miles	13,517 feet	N= 6	RM: 18'	W= 89'	18' off S.	8'	45'
5A	**Los Coyotes Dia.**	TC-2	$169,000	2.5 miles	13,200 feet	N= 4	RM: 0'	W= 62'	8' off W.	-2'	28'
10A	**Los Coyotes Dia.**	TC-2	$108,000	1.04 miles	5,491 feet	N= 3	RM: 0'	W= 74'	20' off E.	10'	28'
10A	**Off-street** (under San Gabriel River)	-	-	0.133 miles	702 feet	Tunnel under SG River					
10A	**Off-street** (at Rynerson Park)	-	-	0.204 miles	1,077 feet	Trench through Rynerson Park					
10A	**Studebaker Rd.**	TC-2	$85,000	0.496 miles	2,619 feet	N= 4	RM: 0'	W= 75'	13' off E.	3'	36'
10A	**Studebaker Rd.** (off-street)	-	-	0.089 miles	470 feet	Trench through SCE easement					
10A	**Del Amo Blvd.**	TC-2	$67,000	0.082 miles	433 feet	N= 4	RM: 16'	W= 76'	13' off N.	3'	37'
10A	**State Rd.** (off-street)	-	-	0.173 miles	913 feet	Trench through Edison property					
10A	**State Rd.** (off-street)	-	-	0.051 miles	269 feet	Trench through Edison property					
17	**Stanton Ave.**	TC-3	$65,000	0.596 miles	3,147 feet	N= 4	RM: 0'	W= 60'	11' off W.	1'	23'
18	**Orangethorpe Ave.** (Stanton-Kass/I-5 Fwy.)	TC-2	$76,000	0.3 miles	1,584 feet	N= 4	RM: 0'	W= 81'	15' off S.	5'	40'
18	**(off-street)**	-	-	0.251 miles	1,325 feet	Trench between Kass Dr./I-5 Fwy.					
18	**Orangethorpe Ave.** (under I-5 Fwy.)	-	-	0.109 miles	576 feet	Tunnel under Caltrans R/W					
18	**Orangethorpe Ave.** (e/o I-5 Fwy.-Magnolia)	-	-	0.361 miles	1,906 feet	Trench through Rideshare Parking Lot					
18	**Orangethorpe Ave.** (Magnolia-57 Fwy.)	TC-1	$298,000	5.6 miles	29,568 feet	N= 6	RM: 0'	W= 77'	25' off S.	15'	26'
18	**Orangethorpe Ave.** (under SR-57 Fwy.)	-	-	0.14 miles	739 feet	Tunnel under Caltrans R/W					
18	**Orangethorpe Ave.** (57 Fwy.-Kraemer)	TC-2	$99,000	0.826 miles	4,361 feet	N= 4	RM: 0'	W= 61'	11' off S.	1'	24'
18	**Kraemer Blvd.**	TC-2	$85,000	0.5 miles	2,640 feet	N= 4	RM: 0'	W= 82'	20' off W.	10'	36'
18	**Miraloma Ave.**	TC-3	$65,000	0.844 miles	4,456 feet	N= 4	RM: 0'	W= 60'	16' off S.	6'	18'
20	**Studebaker Rd.** (Del Amo-195th)	TC-2	$85,000	0.493 miles	2,603 feet	N= 4	RM: 14'	W= 77'	19' off W.	9'	32'
20	**Studebaker Rd.** (195th-1,100' n'ly)	TC-2	$102,000	0.9 miles	4,752 feet	N= 4	RM: 15'	W= 76'	9' off W.	-1'	41'
20	**SG River** (Liberty Park - Firestone Blvd.)	-	-	5.517 miles	29,130 feet	*Segments 20.2-20.9, 20.15 and 20.11-20.14*					
38	**Whittier Blvd.**	TC-2	$81,000	0.417 miles	2,202 feet	N= 6	RM: 17'	W= 80'	14' off N.	4'	40'
38	**Durfee Ave.**	TC-4	$16,000	0.682 miles	3,601 feet	N= 2	RM: 0'	W= 35'	9' off W.	-1'	0'
38	**Beverly Blvd.** (Durfee-SG River Pkwy.)	TC-2	$78,000	0.335 miles	1,769 feet	N= 6	RM: 16'	W= 74'	4' off S.	-6'	44'
38	**Beverly Blvd.** (SGR Pkwy.-E. side SG River)	TC-3	$65,000	0.095 miles	502 feet	N= 4	RM: 0'	W= 48'	5' off S.	-5'	17'
38	**SG River Pkwy.**	TC-1	$86,000	0.572 miles	3,020 feet	N= 4	RM: 16'	W= 96'	8' off W.	-2'	62'
38	**Shepard St.**	TC-4	$2,000	0.061 miles	322 feet	N= 2	RM: 0'	W= 32'	7' off E.	-3'	-1'
38	**Rose Hills Rd.**	TC-3	$65,000	0.413 miles	2,181 feet	N= 4	RM: 0'	W= 56'	16' off W.	6'	14'
38	**Workman Mill Rd./Peck Rd.**	TC-2	$107,000	1.027 miles	5,423 feet	N= 4	RM: 15'	W= 80'	18' off E.	8'	36'
38	**Pellissier Pl/Workman Mill Rd.**	TC-2	$121,000	1.345 miles	7,102 feet	N= 4	RM: 0'	W= 55'	8' off E.	-2'	21'
38	**Workman Mill Rd.**	TC-1	$130,000	1.622 miles	8,564 feet	N= 4	RM: 14'	W= 82'	24' off S.	14'	32'
38	**Puente Ave.**	TC-2	$167,000	2.439 miles	12,878 feet	N= 4	RM: 16'	W= 76'	18' off E.	8'	32'
38	**Merced Ave.**	TC-2	$136,000	1.709 miles	9,024 feet	N= 4	RM: 0'	W= 56'	9' off E.	-1'	21'

ATTACHMENT 1B. Traffic Control Assessment for Public Highway Segments Along Preferred Alignment - as of 8/10/18

Key:	Roadway Segment					
Alignmt No.	Length (miles)			Length (feet)		
	N Lanes	RM	W	Pipe CL	LW_{AVAIL}	

RM: Width of existing raised/curbed center median (value=0 if no raised median exists, or is flush with the pavement)
W: Width of the traveled way (between edge of pavements)
PIPE CL: Offset of proposed RRWSP pipeline centerline with respect to the nearest edge-of-pavement

LW_{AVAIL}: Roadway width available o/s of work zone for 2-way traffic (near-side curb || far-side curb), including any raised median

Color key: Recommend minor alignment modification to allow for two (2), 12-foot traffic lanes. Sufficient space for no more than one (1) 12-foot traffic lane. Candidate roadway for full street closure.

Alignmt No.	Roadway Segment					
38A	E. side SG River					
	TC Config.	-	Cost Est	-		
	0.861 miles		4,546 feet			
	Tunnel under SG River					

Alignmt No.	Roadway Segment											
52/60									Across SG River			
	TC Config.	TC-4	Cost Est	$15,000	TC Config.	TC-3	Cost Est	$65,000	TC Config.	-	Cost Est	-
									0.114 miles		602 feet	
									Tunnel underneath SG River			

Alignmt No.	Roadway Segment						
56	Live Oak Ave.						
	TC Config.	TC-2	Cost Est	$72,000			
	0.205 miles		1,082 feet				
	N= 4	RM: 15'	W= 73'	11' off N.	1'	36'	

ATTACHMENT 2B. Traffic Control Cost Estimation at Signalized Intersections Along Preferred Alignment - as of 8/10/18

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)		
1	**25,064**	**4.75**	**Main Street**	S	1,650' s/o Sepulveda	N	Sepulveda Blvd.	Carson	Los Angeles	Long Beach
			Sepulveda Bl./Willow St.	W	Main St.	E	E. side L.A. River			

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Prop. Constr. Method: Tunnel	Probable TTC Cost
Rdwy Seg	Main - 1,650' s/o Sepulveda to Sepulveda	84' (34'/dir) Major Highway	2 lanes/direction + raised median	No	No	CMP- No			
Intersection	Sepulveda Blvd. @ Main St. (alignment turn)	4 Protected LT Signals; TT Bus Stops @ WNW, **SSW** & **ESE** Corners					1		$78,500
Rdwy Seg	Sepulveda/Willow - Main to L.A. River	84' (32-34'/dir) Maj. Hwy (CAR)/Boulevard(LB)	2 lanes/direction + raised median	Yes	No	CMP-No Truck-Yes			
Intersection	Sepulveda Blvd. @ Dolores St.	2 Protected-Permissive LT Signals; TT Bus Stop @ **ESE** Corner					1		$78,500
Intersection	Sepulveda Blvd. @ Marbella Ave.	T-Intersection; Protected LT Phase on Sepulveda					1		$78,500
Intersection	Sepulveda Blvd. @ Panama Ave.	2-Phase Signal; TT Bus Stops @ **WNW** & ESE Corners					1		$78,500
Intersection	Sepulveda Blvd. @ Avalon Blvd.	4 Protected LT Signals; MTA Bus Stop @ NNW Corner; TT Bus Stop @ **WSW** Corner					1		$78,500
Intersection	Sepulveda Blvd. @ Banning Blvd.	2-Phase Signal					1		$78,500
Intersection	Sepulveda Blvd. @ Wilmington Ave.	4 Protected LT Signals					1		$78,500
Intersection	Sepulveda Blvd. @ Tesoro/Phillips 66	2-Phase Signal					1		$78,500
Intersection	Sepulveda Blvd. @ Alameda Connector	2 Protected LT Signals on Sepulveda; Split phasing on Alameda St. connector					1		$78,500
Intersection	Sepulveda Blvd. @ Intermodal Wy.	2 Protected LT Signals					1		$78,500
Intersection	Sepulveda Blvd. @ R/R Xing	R/R Signal					1		$78,500
Intersection	Sepulveda Blvd. @ ICTF	4 Protected LT Signals						1	$12,500
Intersection	Sepulveda Blvd. @ Middle Rd.	2 Protected LT Signals					1		$78,500
Intersection	Sepulveda Blvd. @ CA-103 terminus	Freeway On/Off-Ramp; 3 Protected LT Signals and RT Overlaps					1		$78,500
Intersection	Sepulveda Blvd. @ Regway Ave.	2-Phase Signal					1		$78,500
Intersection	Sepulveda Blvd. @ Santa Fe Ave.	4 Protected LT Signals; LBT Bus Stops @ SSW & NNE Corners					1		$78,500
Intersection	Sepulveda Blvd. @ Easy Ave.	2-Phase Signal; LBT Bus Stops @ NNE, **WNW**, **ESE** & SSW Corners					1		$78,500
						TOTALS:	**16**	**1**	**$1,268,500**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)	
5	**11,010**	**2.09**	**Willow Street**	W	E. side L.A. River	E	Cherry Ave.	Long Beach	Signal Hill

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Prop. Constr. Method: Tunnel	Probable TTC Cost
Rdwy Seg	Willow - L.A. River to Cherry Ave.	76-80' (32-36'/dir) Boulevard	4-6 lanes/direction + raised median	No	No	CMP-No Truck-Yes			
Intersection	Willow @ Golden Ave.	2-Phase Signal; LBT Bus Stop east of **ENE** Corner					1		$78,500
Intersection	Willow @ Magnolia Ave.	1 Protected LT Signal; LBT Bus Stop @ NNE Corner					1		$78,500
Intersection	Willow @ Pacific Ave.	2 Protected LT Signals; LBT Bus Stop @ NNE & **ESE** Corners					1		$78,500
Intersection	Willow @ Earl Ave.	2 Protected LT Signals					1		$78,500
Intersection	Willow @ Long Beach Blvd.	4 Protected LT Signals; MTA Blue Line runs N/S through the intersection; LBT Bus Stop @ NNE, **WNW** & WSW Corners						1	$12,500
Intersection	Willow @ Atlantic Ave.	4 Protected LT Signals; LBT Bus Stops @ **WNW**, SSW & NNE Corners					1		$78,500
Intersection	Willow @ California Ave.	2-Phase Signal; LBT Bus Stops @ **WNW** & **ESE** Corners					1		$78,500
Intersection	Willow @ Orange Ave.	4 Protected LT Signals; LBT Bus Stops @ **WNW** & **WSW** Corners					1		$78,500
Intersection	Willow @ Walnut Ave.	2 Protected LT Signals; LBT Bus Stops @ **WNW** Corner					1		$78,500
Intersection	Willow @ Town Center	2 Protected LT Signals; LBT Bus Stop @ **WSW** Corner					1		$78,500
Intersection	Willow @ Cherry Ave. (alignment turn)	4 Protected LT Signals; LBT Bus Stops @ **WNW**, NNE and ESE Corners						1	$12,500
						TOTALS:	**9**	**2**	**$731,500**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)		
5A	**26,728**	**5.06**	**E. Willow Street**	W	Cherry Ave.	E	Los Coyotes Diagonal	Signal Hill	Long Beach	Lakewood
			Los Coyotes Diagonal	S	E. Willow St.	N	Carson St.			

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Prop. Constr. Method: Tunnel	Probable TTC Cost
Rdwy Seg	E. Willow - Cherry Ave. to Los Coyotes Diagonal	98' (36'/dir)	3/direction + raised median	No	No				
Intersection	E. Willow @ Cherry Ave. — ***continued from 5***	4 Protected LT Signals; LBT Bus Stops @ WNW, **NNE** and **ESE** Corners					1		$78,500
Intersection	E. Willow @ Dawson Ave. / Town Center E.	2 Protected LT Signals on Willow					1		$78,500
Intersection	E. Willow @ Junipero Avenue	2 Protected LT Signals on Willow; LBT Bus Stops @ **WNW** and **ESE** Corners					1		$78,500
Intersection	E. Willow @ Temple Avenue	2-phase Signal; LBT Bus Stops @ **WNW** and **ESE** Corners					1		$78,500
Intersection	E. Willow @ Redondo Avenue	4 Protected LT Signals; LBT Bus Stops @ NNE, **ENE** and **ESE** Corners					1		$78,500
Intersection	E. Willow @ Grand Avenue	2 Protected LT Signals on Willow; LBT Bus Stop @ **WNW** Corner					1		$78,500
Intersection	E. Willow @ Lakewood Boulevard	4 Protected LT Signals; LBT Bus Stops @ NNE, **WNW**, **ESE** and SSW Corners					1		$78,500
Intersection	E. Willow @ Clark Avenue	4 Protected LT Signals; LBT Bus Stop @ NNE Corner					1		$78,500
Intersection	E. Willow @ Bellflower Boulevard	4 Protected LT Signals					1		$78,500
Intersection	E. Willow @ N. Los Coyotes Diagonal (alignment turn)	2 Protected LT Signals on Willow; LBT Bus Stop @ ENE Corner					1		$78,500
Rdwy Seg	Los Coyotes Dia. - E. Willow to Carson	74-88' (32-36'/dir.)	2 lanes/dir + TWLTL	Spring-P.Verde	Yes				
Intersection	Los Coyotes Dia. @ Spring St.	2 Protected LT Signals on Los Coyotes; LBT Bus Stop @ ENE Corner					1		$78,500
Intersection	Los Coyotes Dia. @ Woodruff Ave.	2 Protected LT Signals on Los Coyotes; LBT bus stop @ WNW Corner					1		$78,500

ATTACHMENT 2B. Traffic Control Cost Estimation at Signalized Intersections Along Preferred Alignment - as of 8/10/18

Intersection	Los Coyotes Dia. @ Wardlow Rd.	2-phase Signal	1		$78,500
Intersection	Los Coyotes Dia. @ Palo Verde Ave.	2-phase Signal; LBT Bus Stops @ NNE and SSW Corners (on Palo Verde)	1		$78,500
Intersection	Los Coyotes Dia. @ Studebaker Rd. / Parkcrest St.	Combined signal at "Y" Junction; LBT Bus Stop @ **NE** Corner	1		$78,500
Intersection	Los Coyotes Dia. @ Carson St. — ***continues to 10A.1(a)***	2 Protected LT Signals on Carson; LBT Bus Stops @ ESE Corner	1		$78,500
		TOTALS:	**16**	**0**	**$1,256,000**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)	
10A	13,111	2.48	**10A.1(a) - Los Coyotes Dia.**	S	Carson St.	N	E. of San Gabriel River	Lakewood	Cerritos
			10A.1(b) - Studebaker Rd.	S	E. of San Gabriel River	N	SCE easement		
			10A.2 - Studebaker *(off-street)*	S	SCE easement	N	Del Amo Blvd.		
			10A.3 - Del Amo Blvd.	W	Studebaker Rd.	E	350' w/o State Rd.		
			10A.4 - State Rd. *(off-street)*	S	150' n/o Del Amo Blvd.	N	150' n/o cul-de-sac		
			10A.5 - State Rd. *(off-street)*	S	150' n/o cul-de-sac	N	350' n/o cul-de-sac		

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	CMP or Truck Rte?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Seg 10A.1(a)	Los Coyotes - Carson to E. side of SG River	116' (36'/dir.)	2 lanes/direction + striped median	Yes	No				
Intersection	Los Coyotes Diagonal @ Carson — ***continued from 5A***	2 Protected LT Signals; LBT Bus Stops @ ESE Corner					1		$78,500
Seg 10A.1(b)	Studebaker Rd. - Centralia St. to 350' s/o Del Amo Blvd.	80' (32'/dir.)	2 lanes/direction + striped median	No	No				
Seg 10A.2	Studebaker Rd. (off-street) - Del Amo Blvd. from 350' s'ly	80' (32'/dir.)	2 lanes/direction + raised median	No	Yes				
Intersection	Studebaker @ Del Amo — ***continued from 10A.1(b)***	4 Protected LT Signals					1		$78,500
Seg 10A.3	Del Amo - Studebaker to 350' w/o State Rd.	80' (32'/dir.)	2 lanes/direction + striped median	No	No				
Seg 10A.4	State Road (off-street) - 150' n/o Del Amo to 150' n/o cul-de-sac	-	-	-	-	-			
Seg 10A.5	150' n/o State Rd. cul-de-sac to 350' n/o cul-de-sac	-	-	-	-	-			
						TOTALS:	**2**	**0**	**$157,000**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)	
11	17,497	3.31	**Pub. Utility Easement - 11.1(a), 11.1(b), 11.2, 11.3(a), 11.3(b)**	W	I-605 Freeway	E	Valley View St.	La Palma	Buena Park

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Tunnel	Probable Cost
Not located on public roadway.							n/a	n/a	
						TOTALS:	**n/a**	**n/a**	**$0**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)	
16	13,375	2.53	**Pub. Utility Easement**	W	Walker St.	E	Stanton Ave.	La Palma	Buena Park

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Tunnel	Probable Cost
Not located on public roadway. 1,150' segment through Movieland/Raddison Hotel Parking Lots west and east of Beach Boulevard							n/a	n/a	
						TOTALS:	**n/a**	**n/a**	**$0**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)	
17	3,149	0.60	**Stanton Avenue**	S	Pub. Utility Easement	N	Orangethorpe Ave.	Buena Park	

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Rdwy Seg	Orangethorpe - 1,400' n/o La Palma Ave. to Orangethorpe Ave.	64' (26'/dir) Secondary Highway	2 lanes/direction + TWLTL	No	No	CMP- No			
Intersection	Orangethorpe @ Page St.	4 Protected-Permissive/Shared-Protected Only LT Signals					1		$78,500
						TOTALS:	**1**	**0**	**$78,500**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)			
18	47,453	8.99	**Orangethorpe Avenue**	W	Stanton Ave.	E	Kraemer Blvd.	Buena Park	Fullerton	Anaheim	Placentia
			Kraemer Boulevard	N	Orangethorpe Ave.	S	Miraloma Ave.				
			Miraloma Avenue	W	Kraemer Blvd.	E	4,000' e/o Kraemer				

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Rdwy Seg	Orangethorpe - Stanton Ave. to Kraemer Ave.	64-80' (26-34'/dir) Sec. Hwy. (BP), Maj. Arterial (F,P)	2-3 lanes/direction + TWLTL	No	Yes	CMP Route			
Intersection	Orangethorpe @ Auto Center Dr.	2 Shared Protected-Only LT Signals (side street); OCTA Bus Stops @ **ENE** & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Magnolia Ave.	4 Protected LT Signals; OCTA Bus Stops @ NNW & **ESE** Corner; OCTA/Metro Bus Stop @ **WSW** Corner					1		$78,500
Intersection	Orangethorpe @ Gilbert Street	2-Phase Signal; OCTA Bus Stops @ **ESE** & **ENE** Corners					1		$78,500
Intersection	Orangethorpe @ Brookhurst St.	4 Protected/Protected-Permissive LT Signals; OCTA Bus Stops @ NNW, **WNW** & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Pacific Dr.	2-Phase Signal					1		$78,500

ATTACHMENT 2B. Traffic Control Cost Estimation at Signalized Intersections Along Preferred Alignment - as of 8/10/18

Intersection	Orangethorpe @ Basque Ave.	2 Protected-Permissive LT Signals; OCTA Bus Stops @ **WNW** & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Euclid St.	4 Protected/Protected-Permissive LT Signals; OCTA Bus Stops @ **WNW**, SSE, SSE & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Woods Ave.	2-Phase Signal; OCTA Bus Stops @ **WNW** & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Richman Ave.	2-Phase Signal; OCTA Bus Stops @ **WNW** & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Highland Ave.	2 Protected-Permissive LT Signals; OCTA Bus Stops @ **WNW** & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Harbor Blvd.	CMP Intersection— 4 Protected LT Signals; OCTA Bus Stops @ NNE, SSW, **ESE** & **ENE** Corners					1		$78,500
Intersection	Orangethorpe @ Orangefaire Marketplace	2-Phase Signal					1		$78,500
Intersection	Orangethorpe @ Lemon St.	4 Protected/Protected-Permissive LT Signals; OCTA Bus Stops @ **WNW** & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Cypress Via	2-Phase Signal					1		$78,500
Intersection	Orangethorpe @ R/R Xing	R/R Signal					1		$78,500
Intersection	Orangethorpe @ Raymond Ave.	4 Protected/Protected-Permissive LT Signals; OCTA Bus Stops @ **WNW** & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Acacia Ave.	2-Phase Signal; OCTA Bus Stops @ **WNW** & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ State College Blvd.	CMP Intersection— 4 Protected-Permissive LT Signals; OCTA Bus Stops @ **WNW**, SSW, SSE & **ESE** Corners					1		$78,500
Intersection	Orangethorpe @ Placentia Ave.	4 Protected LT Signals; OCTA Bus Stops @ **WNW**, **ESE** & NNE Corners					1		$78,500
Intersection	Orangethorpe @ SR-57 SB On-Off/Iowa Pl.	2 Protected LT Signals; N/S split phase; OCTA Bus Stop @ **WNW** Corner						1	$12,500
Intersection	Orangethorpe @ SR-57 NB On/Off-Ramps	3-Phase Signal; 1 Protected LT Signal; N/S legs one-way NB						1	$12,500
Intersection	Orangethorpe @ Melrose St.	4 Protected LT Signals; OCTA Bus Stops @ SSW, **ESE** & **ENE** Corners					1		$78,500
Intersection	Orangethorpe @ Kraemer Blvd. (alignment turn)	4 Protected LT Signals; OCTA Bus Stops @ **WNW**, SSW & NNE Corners					1		$78,500
Rdwy Seg	Kraemer - Orangethorpe Ave. to Miraloma Ave.	86' (36'/dir) Primary Arterial	2 lanes/direction + TWLTL	Yes	No	CMP- No			
Intersection	Kraemer @ La Jolla St.	2 Protected-Permissive LT Signals; OCTA Bus Stops @ **NNE** & **SSW** Corners					1		$12,500
Intersection	Kraemer @ Miraloma Ave.	4 Protected/Protected-Permissive LT Signals; OCTA Bus Stops @ **NNE** & SSW Corners					1		$12,500
Rdwy Seg	Mira Loma - Kraemer St. to MWD	86' (36'/dir) Primary Arterial	2 lanes/direction + TWLTL	Yes	No	CMP- No			
Intersection	Mira Loma @ Miller St.	2-Phase Signal; OCTA Bus Stops @ **WSW** & **ESE** Corners					1		$78,500
						TOTALS:	**24**	**2**	**$1,777,000**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)			
20	36,466	6.91	**20.1(a) - Studebaker Rd.**	S	200' n/o Del Amo Blvd.	N	195th St.	Cerritos	Bellflower	Downey	Norwalk
			20.1(b) - Studebaker Rd.	S	195th St.	N	1,100' n'ly				
			San Gabriel River	S	Pub. Utility Easement	N	Firestone Blvd. OC				

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Seg 20.1(a)	Studebaker - 200' n/o Del Amo to 195th Street								
Intersection	Studebaker @ 195th Street	2 Protected-Permissive LT Signals on Studebaker; CoW Bus Stop @ NNE Corner					1		$78,500
Seg 20.1(b)	Studebaker - 200' n/o Del Amo to 195th Street								
Segments 20.2 through 20.15 located off-street; Tunneling w/o traffic control required across South Street (20.2), 183rd Street (20.5), Artesia Blvd. and SR-91 Fwy. (20.7), Alondra Blvd. (20.9), I-105 (20.12), Imperial Hwy. and Firestone Blvd. (20.14) and Rosecrans Ave. (20.15). 5,000' segment north and south of Rosecrans Avenue located along alleyways through Riverview Parking residential community and an industrial park in the City of Bellflower. 2,600' segment traverses the Cerritos Auto Square between South Street and Allington Street.							n/a	n/a	
						TOTALS:	**1**	**0**	**$78,500**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)	
22	19,969	3.78	**22.1 - San Gabriel River**	S	Firestone Blvd. OC	N	1,200' n'ly	Downey	Pico Rivera
			22.2 - San Gabriel River	S	1,200' n/o Firestone Blvd.OC	N	Washington Blvd. OC		

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Seg 22.1	SG River - Firestone OC to 1,200' n'ly	No signalized intersection crossings.							
Seg 22.2	SG River - 1,200' n/o Firestone OC to Washington OC	No signalized intersection crossings.							
						TOTALS:	**0**	**0**	**$0**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)
36	4,265	0.81	**W. side of San Gabriel River**	S	65' north of Washington Blvd.	N	Mines Ave.	Pico Rivera

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Rdwy Seg	W. side of SG River - 65' north of Washington to Mines	No signalized intersection crossings.							
						TOTALS:	**0**	**0**	**$0**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)
			38.1 - W. side of SG River	S	Mines Ave.	N	Whittier Blvd.	
			38.2(a) - Whittier Blvd.	E	E. side of San Gabriel River	W	Durfee Ave.	

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Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)				
38 (modified)	**27,870**	**5.28**	**- Durfee Ave.**	S	Whittier Blvd.	N	Beverly Blvd.	Pico Rivera	Industry	L.A. County	Baldwin Park	
			- Beverly Blvd.	W	Durfee Ave.	E	SG River Pkwy. / Manning Rd.					
			38.2(b) - Beverly Blvd.	W	SG River Pkwy. / Manning Rd.	E	E. side of San Gabriel River					
			38.3 - E. side of SG River	S	Beverly Blvd.	N	San Gabriel River Pkwy.					
			38.4(a) - SG River Pkwy	S	E. side of San Gabriel River	N	300' south of I-605 SB On-Ramp					
			38.5 - Sheperd St.	S	300' south of I-605 NB Off-Ramp	N	Rose Hills Rd.					
			38.6 - Rose Hills Rd.	W	Sheperd St.	E	Workman Mill Rd.					
			38.7 - Workman Mill Rd./Peck Rd.	S	Rose Hills Rd.	N	Pellissier Pl					
			38.8 - Pellissier Pl.	W	Peck Rd.	E	SR-60 UC / Workman Mill Rd.					
			38.9 - Workman Mill Rd.	W	SR-60 UC / Pellissier Pl.	E	Future UC/Grade Sep. @ Valley					
			38.10 - Puente Ave.	W	Future UC/Grade Sep. @ Valley	E	Merced Ave.					
			38.11 - Merced Ave.	S	Puente Ave.	N	Palm Ave.					

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	CMP or Truck Rte?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Seg 38.1	W. side of SG River - Mines to Whittier	No signalized intersection crossings. Tunneling w/o TTC potentially required at N. end of segment under Whittier Blvd.							
Seg 38.3	E. side of SG River - Beverly Blvd. to San Gabriel River	No signalized intersection crossings.							
Seg 38.4	SG River Pkwy - E. side of SG River to 300' south of I-605 SB On-Ramp	No signalized intersection crossings.							
						TOTALS:	**0**	**0**	**$0**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)
38A	**4,545**	**0.86**	**E. side of San Gabriel River**	S	Whittier Blvd.	N	Beverly Blvd.	Pico Rivera

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Rdwy Seg	E. side of SG River - Whittier to Beverly	No signalized intersection crossings. Tunneling w/o TTC potentially required under Beverly Blvd., Whittier Blvd. and UPRR Railway							
						TOTALS:	**0**	**0**	**$0**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)				
44	**28,891**	**5.47**	**44.1 - San Gabriel River Trl.**	S	Peck Rd.	N	N. side of SR-60 Fwy.	L.A. County	South El Monte	Industry	Baldwin Park	Irwindale
			44.2(a) - W/E of SG River	S	N. side of SR-60 Fwy.	N	1,500' n/o SG River-SJ Crk Jct.					
			44.2(b) - E. side of SG River	S	1,500' n/o SG River-SJ Crk Jct.	N	Ramona Blvd.					
			44.3(a) - E. side of SG River	S	Ramona Blvd.	N	Lower Azusa Rd.					
			44.3(b) - E. side of SG River	S	Lower Azusa Rd.	N	Rivergrade Rd.					

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	CMP or Truck Rte?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Seg 44.1	SG River Trl. - Peck to N. side of SR-60 Fwy.	No signalized intersection crossings. Tunneling w/o TTC potentially required under Peck Rd. and SR-60 Fwy.							
Seg 44.2(a)	W/E of SG River - N. of 60 Fwy. to 1,500' n/o SG River-SJ Crk Jct.	No signalized intersection crossings.							
Seg 44.2(b)	E. side of SG River - 1,500' n/o SGR-SJ Crk Jct. to Ramona	No signalized intersection crossings. Tunneling w/o TTC potentially required under Valley Blvd., Ramona Blvd. and I-10 Fwy.							
Seg 44.3(a)	E. side of SG River - Ramona to Lower Azusa	No signalized intersection crossings.							
Seg 44.3(b)	E. side of SG River - Lower Azusa to Rivergrade	No signalized intersection crossings. Tunneling w/o TTC potentially required under Los Angeles St.							
						TOTALS:	**0**	**0**	**$0**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)	
52	**2,604**	**0.49**	**52.1(a) - Rivergrade Rd.**	S	0.25 mi. n/o Lower Azusa Rd.	N	125' s/o Brooks Dr.	Irwindale	Baldwin Park

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	CMP or Truck Rte?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Seg 52.1(a)	Rivergrade - 0.25 mi. n/o Lower Azusa to 125' s/o Brooks Dr.	No signalized intersection crossings. Tunneling w/o TTC potentially required under I-605							
						TOTALS:	**0**	**0**	**$0**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)
56	**1,080**	**0.20**	**Live Oak Ave.**	E	W. side of San Gabriel River	W	Graham Rd.	Irwindale

Facility	Location	Roadway or Intersection Description: Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Prop. Constr. Method: Open Trench	Tunnel	Probable TTC Cost
Rdwy Seg	Live Oak - W. side of SG River to Graham								
Intersection	Live Oak @ Graham	T-intersection; 2-Phase Signal					1		$78,500
						TOTALS:	**1**	**0**	**$78,500**

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)
58	**3,350**	**0.63**	**58.1 - (off st) n/o Live Oak Ave.**	S	Graham Rd.	N	E. Side of I-605 (1,700' n'ly)	Irwindale
			58.2(a) - (off street)	S	Live Oak @ 220' s/o Arrow Hwy.	N	650' n/o I-605/Arrow IC	
			58.2(b) - (off street)	W	700' SW of Live Oak Ln.	E	Live Oak Ln.	

ATTACHMENT 2B. Traffic Control Cost Estimation at Signalized Intersections Along Preferred Alignment - as of 8/10/18

Facility	Location	Roadway or Intersection Description					Prop. Constr. Method		Probable TTC Cost
		Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Open Trench	Tunnel	
Seg 58.1	(off st) n/o Live Oak - Graham to E. Side of I-605 (1,700' n'ly)	No signalized intersection crossings. Tunneling w/o TTC potentially required at the south end of segment under Live Oak Ave.							
Seg 58.2(a)	(off street) - Live Oak @ 220' s/o Arrow to 650' n/o I-605/Arrow IC	No signalized intersection crossings. Tunneling w/o TTC potentially required under Arrow Hwy., Live Oak Ln. and I-605 n/o Arrow.							
Seg 58.2(b)	(off street) - 700' SW of Live Oak to Live Oak	No signalized intersection crossings.							
						TOTALS:	0	0	

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)
59	**9,246**	**1.75**	**59 - W. side of I-605**	S	650' n/o I-605/Arrow IC		1,450' SW of I-605/I-210 IC	Irwindale

Facility	Location	Roadway or Intersection Description					Prop. Constr. Method		Probable TTC Cost
		Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	Special Route?	Open Trench	Tunnel	
Rdwy Seg	W. side of I-605 - 650' n/o I-605/Arrow IC to 1,450' SW of I-605/I-210 IC	No signalized intersection crossings. Tunneling w/o TTC potentially required at north end of segment under I-605 s/o I-210							
						TOTALS:	0	0	$0

Alignment ID No.	Length LF	Length mi.	Roadway/Route	Limits end/from		Limits end/to		Jurisdiction(s)
60	**4,875**	**0.92**	**52.1(a) - Rivergrade Rd.**	S	150' s/o Brooks Dr.	N	150' n/o Live Oak Ave.	Irwindale

Facility	Location	Roadway or Intersection Description					Prop. Constr. Method		Probable TTC Cost
		Street Classification and Width	Travel Lanes, Center Division	On-Street Pkg.?	Bike lanes?	CMP or Truck Rte?	Open Trench	Tunnel	
Seg 60	Rivergrade - 150' s/o Brooks Dr. to 150' n/o Live Oak Ave.								
Intersection	Rivergrade @ Brooks Dr.	T-intersection; 2-Phase Signal					1		$78,500
Seg 52.4(b)	Rivergrade - 400' n/o Brooks to Live Oak Ave.								
Intersection	Rivergrade @ Live Oak Ave.	4 Protected LT Signal					1		$78,500
Seg 52.2	Across SG River - Rivergrade to SG River Trail								
						TOTALS:	2	0	$157,000

Notes:

Bus stop locations shown in **bold** indicate bus stop is located on the street of the project route.

APPENDIX H – AWP FACILITY DATA NEEDS

Phase 1 AWT Implementation
115 MGD Capacity

	DATA NEEDS MATRIX		DATA SOURCE/ CITATION (document/ page)	NEEDED BY
	GENERAL PROJECT INFORMATION			
1.	Site Location-FORCO or alternate site?	The full-scale AWT facility would be sited within the LACSD's Warren Water Resource Facility (Warren Facility) located at 24501 South Figueroa Street in Carson, California. Specifically, the new AWT facility would be situated within the confines of the area that was the former location of the Fletcher Oil and Refinery Company (FORCO). This 36 acres of property is immediate east of the Warren Facility's existing secondary treatment facilities. If the entire area east of the clarifier is made available the total area available is 54 acres. It is bounded to the east by S. Main St., to the south by E. Lomita Blvd., to the north by a railroad easement and the west by the existing treatment works. There are residential neighborhoods to the south with commercial properties to the east and north. An additional two acres is required for the workforce training center, bringing the total impacted area to 56 acres.	Description Summary in CPSR Sct 1.3, pages 1-15, 16, and Section 4 Presentation October 28, 2020 – "A New Source of Water", Southern California Water Dialogue.	12/6/2021
2.	Summary of major operating components	The proposed AWT would provide additional treatment to the HPOAS effluent resulting in a highly treated water compliant with established water quality standards consistent with indirect potable reuse. The new AWT facility would include, but not be limited to the following components: fine screening, micro/ultrafiltration, membrane bioreactor (MBR), reverse osmosis (RO) and ultraviolet irradiation with advanced oxidation processes to provide IPR level treatment. For DPR level treatment, ozone, BAC and/or MF would be added to the process train. RO brine would be discharged to the Warren Facility's ocean outfall directly. See **Appendix A** for the process flow diagram.	CPSR page 1-16, Figure 1.8	12/6/2021
3.	Site configuration - acres/dimensions (site plan for major operating components, including heights/depths)	• The "Joint Plant Site" (aka the Fletcher Oil and Refining Company - FORCO site) is located at 24721-24327 Main Street, Carson California. It is a 36 acre parcel. In 2000, the property was purchased by the County Sanitation Districts of Los Angeles County expanding their Warren Facility. The site has remained basically unused since purchase. Current plans are to locate the proposed AWT and ancillary facilities for IPR and DPR levels of treatment within the confines of this property. See **Appendix B** for Site Plan and **Appendix C** for AWTP Construction Phasing Site Plan. • Structures Dimensions Table (**Appendix D**)	From Stantec's BIM model	1/3/2022
4.	Improvements needed at Warren Facility (flow equalization, centrate treatment, source control, brine handling, etc.)	There may be modifications to the HPOAS reactors to provide nitrogen reduction (NDN) within the secondary treatment system. Portions of existing secondary clarifiers may be used for flow equalization. Centrate treatment is under consideration as well to provide nitrogen reduction in return sidestreams. The soil excavation amount for centrate treatment is included and is currently assumed to be at the solids processing facilities site (outside the FORCO site) at the Warren Facility. RO brine would be discharged directly to the Warren Facility's ocean outfall.	Conversation with LACSD staff	1/3/2022
5.	Treatment train description	Primary + Secondary effluent + Fine Screening + NdN Secondary MBR + RO + UV/AOP + Stabilization (See **Appendix A** – Process Flow Diagram). RO brine will be discharged directly to the ocean outfall of the Warren Facility. Ozone followed by BAC may be incorporated into this treatment train immediately following the MBR to achieve DPR levels of treatment. MF may follow the BAC as well to reduce the potential for solids carryover. Current assumption is that ozone will be generated using the oxygen supplied from the Warren Facility's existing infrastructure.		7/1/2022
6.	Boron management approach (CPSR p. 4-5); treatment at Warren Facility site or satellite treatment facility (CPSR p. 9-5)	Boron concentrations in the Warren Facility effluent are 0.88 and 1.1 mg/L, median and maximum, respectively. The largest contribution of boron to the Warren Facility has been attributed to industrial discharges in the collection system, specifically waste discharges from oilfields.	CPSR Appendix E Section 1.0	1/3/2022

		Inasmuch as that boron is naturally occurring, source control via product substitution is not an option for boron reduction. The basin plan objective for the Main San Gabriel basin is 0.5 mg/L for boron. The presence of boron in the secondary effluent from the Warren Facility at levels exceeding the Main San Gabriel groundwater basin plan limit of 0.5 mg/L may require either source control or treatment for boron removal at the AWT Facility. Treatment can be accomplished using ion-exchange processes. Options exist relative to the resin employed. The current approach is to assess the basin's assimilative capacity compared to boron levels in the recycled water. The preliminary findings are that no separate treatment is required.	Communications with G.L. Bluml – weekly status meeting – November 16, 2021	
7.	Phasing of improvements (for delivery quantities, meeting OC Basin nitrate requirements, meeting DPR requirements, etc.) (Metropolitan to review and update)	There will be 2 phases for the planned improvements. • Phase 1: 115 mgd of IPR AWT capacity and associated conveyance systems (pumping stations and pipelines) from the Warren Facility (Joint Plant Site - FORCO) to the Santa Fe spreading basins with diversion feeders to transport product water to the Rio Hondo spreading basins. 25 MGD of IPR treated water will be further treated to DPR level at either Weymouth WTP or a satellite facility. • Phase 2: Additional 35 mgd of IPR and 150 MGD of DPR-level treatment at the Joint Plant Site. See **Appendix C** for AWTP construction phasing site plan and **Appendix H** for AWPF Construction Schedule.		12/01/2023
8.	Variation in plant operations to accommodate varying basin capacity (rain events, maintenance?)	Spreading basin routine maintenance is not expected to impact AWT operations. The basins will be on a rotation such that the capacity for infiltration is kept at a nearly constant rate. During rain events, if the spreading basins are unavailable, product water flow will be diverted to a gravel pit for storage and groundwater recharge via spreading or injection. Excess flow will be pumped back into the system when spreading capacity becomes available.		1/3/2022
9.	New/modified upstream treatment facilities?	LACSD is considering modifying a portion of their bioreactor modules at the Warren Facility to nitrifying-denitrifying process modules and adding sidestream centrate treatment in future. (see #4)		12/6/2021
10.	Project Operational Year(s)	Phase 1 – 2032 (115 MGD) Phase 2 – 2036 (150 MGD-total)		1/3/2022
	CONSTRUCTION PHASE			
11.	Will there be pile driving? If so, where and for what duration?	There is no pile driving planned.	Available LACSD geotech reports reviewed	1/3/2022
12.	Depth/quantities of excavation/fill Hazardous waste topsoil removal **FORCO Update**: Metropolitan met with LACSD to get an update on FORCO site activities. Psomas completed a survey. Additional geotechnical and surveying services may not be needed. Assuming 110,000 cubic yard of earth volume may need to be disposed to landfill; disposal cost estimated at $17M. Contour map is also available. Weekly status meeting notes – 12/14/21	There is pumping to and from the AWT allowing for flexibility in the establishment of the hydraulic grade line through the processes. This also permits the siting of facilities to balance the cut and fill to an extent and thereby minimize import or export of soils. There would be the importation of aggregate base materials for all structures. Quantities of excavation and aggregate importation are: Excavation for structures (estimate from Stantec's BIM model) • 552,000 cubic yards; (includes construction quantities related to oil well abandonments at the Joint Plant Site; see Appendix J) • Aggregate base materials – 72,000 tons (72,000 cubic yards x 1 ton/cubic yard) *[The depth of excavation is generally assumed to be one (1) foot below the depth of structures as shown on structural dimensions, with greatest depth at approximately 30 feet below grade surface(bgs). The approximate quantity of mass excavation is 552,000 cy., of which an estimated 20%* (110,000 cy.) *is assumed to be contaminated and is to be disposed of at a Class II landfill such as Kettleman Hills Hazardous Waste Facility. Of the soil remaining after this disposal, 35% (155,000cy.) is to be used as structural backfill.*	Quantity take-offs from Stantec's Environmental Planning BIM model and LACSD's input for contaminated soil volume	12/01/2023
13.	Hazardous materials remediation plan	This will be part of the design process whether by Metropolitan or by LACSD.		7/1/2022
14.	Utility relocation needs, if any (CPSR p. 4-7)	An 8" gas line will be abandoned.	From Stantec's BIM	12/01/2023

			model	
15.	Estimated number of construction workers per day	Average estimated workers per day including Contractor mgmt. staff, trade craftsman, CM staff, Designer & Owner staff – 250 to 300 /day. Peak will be 560 – 620 / day. The construction activities are expected to continue for the remaining 85 MGD of capacity while the first 30 MGD worth of infrastructure is being commissioned (see **Attachment H** - Construction Schedule)	Carollo CM SME	1/3/2022
16.	Estimated number of construction worker vehicle trips per day	590 - 680 trips / day* - Typical worker ride share Will depend on greater carpooling needs due to timing of 2028 Olympics.	Carollo CM SME	1/3/2022
17.	Will there be weekend or nighttime construction? If nighttime or weekend requirements, type of expected construction.	Yes, the typical weekend work limited to concrete sandblasting to prepare for adjacent pours, materials movements to prepare for Monday work tasks. Nighttime work limited to “tie-ins” only.	Carollo CM SME	1/3/2022
18.	Construction staging area and storage location(s)	**Staging area** should include areas for Field Offices – all parties, immediate Contractor mgmt. staff parking, CM staff parking, Designer & Owner staff parking. **Storage area** for “ConEx” boxes for every trade, “heavy machinery”, major materials deliveries (wood, steel, electrical cable, piping, valves, misc. metals, process equipment, electrical gear, etc.), tools & supplies storage **Plus – Day Staging areas** immediately adjacent to structures for materials & tools storage for each trade. **Location:** There are approximately 5 acres available for staging and storage at the southwest corner of the site where future DPR facilities will be located; see **Appendix B** for the site layout.	Carollo CM SME	12/01/2023
19.	Construction worker vehicle parking	Additional area for worker parking - rental of off-site parking areas such as local church parking lots or other interim use facilities. There is an area immediate north of the proposed site just beyond the railroad tracks owned by LACSD that may be a candidate site.	Carollo CM SME	1/3/2022
20.	Power Supply (generators?)	Power supply from existing adjacent plant switchyard could provide power for the Field Office complex provided by Owner. Separate power supply / distribution systems will be required for the Construction Temporary Power. A Contractor distribution system will be required for construction through-out project site by Contractor.	Carollo CM SME	1/3/2022
21.	Temporary Lighting (main-powered or generator-powered)	Temporary lighting provided by Contractor from Construction Temporary Power distribution system required for construction throughout project site.	Carollo CM SME	1/3/2022
22.	Water Supply (hydrants? water trucks?)	Water Supply systems – potential separate potable and recycle water systems. Potable water distribution systems for the Field Office complex provided by Owner initially - Construction Temp. For environmental assessment assume a new, separate connection to the nearest potable supply for AWT. Non-potable water distribution system required for construction through-out project site by Contractor in purple pipe for dust control during excavations, grading, trenching and backfill operations. Non-potable water provided by Owner, free or at cost.	Carollo CM SME	1/3/2022
23.	Maximum number of daily one-way haul truck trips due to material transportation (e.g., off-haul/disposal, supplies, material); type of trucks; estimated distance, clear delineation of daily maximum trips separated by demolition waste and clean excavation disposal materials types.	25 one-way haul trips minimum, up to 50 trips on concrete pour days. Does not include demolition or excavation trips. Type of trucks – commercial, 20 ‘ long bed, flat bed Type of trucks – concrete delivery trucks Distance – TBD nearest concrete plant	Carollo CM SME	1/3/2022
24.	Volume of any material imported/exported, including demolition waste (asphalt/concrete, soils, hazardous soils, slurry, steel/metals) and clean construction materials (concrete, pipeline segments, rebar, base material/sand/gravel, etc.).	Per Stantec’s BIM model, • Volume of mass excavation is 552,000 cy. • Volume of structural excavation is 99,000 cy.	Carollo CM SME	12/01/2023
25.	Plans for recycling of materials as applicable (need % diverted), otherwise we use state default	Soil volume to be used in structural backfill is approx. 155,000 cy, as explained in row 12.	Carollo CM SME	12/01/2023

26.	Locations for ingress to/egress from construction site. If any temporary changes to the local street striping/traffic flow will be implemented, describe those (description can be general for program-level analysis).	Total of six entry/exit points to the site: five on Main St. and one on Lomita Blvd.; see **Appendix C**.					7/1/2022
27.	Disposal location for construction debris	Scholl Canyon Landfill or others of contractor's choice					1/3/2022
	Construction Phase	**Start and End Dates (or number of days/ weeks/months)**	**Equipment Used (Types and Quantities, incl. hp and hours/day) ***	**Haul or Material Truck Loads (in cy or truckloads)**	**Truck Travel Distance (in miles)**		
28.	Demolition/removal of existing site features? Paving: The general site area is 56 acres (max) Asphalt paving = 460,000 sf (10.5 acres) of asphaltic paving at 6" depth = 8,520 cy Demolition of Existing LACSD Warehouse Bldg. with Storm Detention Basin and Pilot Testing facility. Existing adjacent research area to remain and subject to enhancements	21 working days 21 working days	Model CAT 320 Excavator @ 160 hp x 21 days Model CAT 980G Loader @ 300 hp x 21 days 10 CY End Dump Materials Truck x 21 days x 8 hrs. Model CAT 320 Excavator @ 160 hp x 21 days Model CAT 980G Loader @ 300 hp x 21 days 10 CY End Dump Materials Truck x 21 days x 8 hrs. day	Materials: 4 trips /day x 10 cy / trip x 25 trucks = 1,000 cy / day Haul off Demo Materials: 4 trips /day x 10 cy / trip x 4 trucks = 160 cy / day	30 miles / 1-way or 60 miles / trip assume Scholl Canyon landfill 20 miles / 1-way or 40 miles / trip assume Scholl Canyon landfill	Carollo CM SME	12/01/2023
29.	Utility relocation: Assume potential unidentified subsurface structures or utilities are found requiring removal and/relocation. Removal & capping back to POC @ property line of any such subsurface interferences. (21 days)	36 working days for tie-in	Model CAT 320 Skid Loader w/ bucket @ 75 hp 8 hrs. / day	No Haul – dig & backfill same trench	None	Carollo CM SME	12/01/2023
30.	Clear and grub of entire remaining site - The general site area is 56 acres Half of site requires clear & grub of 1 foot depth = 1,220,000 sf of area = 45,185 cy	42 working days Note: activities for demolition, utility relocation, site prep & clear and grub to occur concurrently / overlapping time frames.	Model CAT 933 Track Loader @ 70 hp x 42 days Model CAT 320 Excavator @ 160 hp x 42 days Model CAT 980G Loader @ 300 hp x 42 days 10 CY End Dump Materials Truck x 42 days x 8 hrs.	Materials: 4 trips /day x 10 cy / trip x 25 trucks = 1,000 cy / day	30 miles / 1-way or 60 miles / trip assume Scholl Canyon landfill	Carollo CM SME	12/01/2023

31.	Foundation and below grade infrastructure for Phase 1 Mass Excavation & Haul Off: Assume 552,000 cy of excavation / haul off @ rate of 1880 cy / day for Phase 1. (Amount remaining onsite is 552,000 – 110,000 = 442,000 cy). Stantec performed soil cut-fill balance to eliminate the need to haul off any excess non-contaminated soil (442,000 cy) from the site. This soil will still need to be moved within the site i.e. to fill some areas with the soil excavated from the other area. Assume 20% requires Class II landfill disposal Kettleman Hills Hazardous Waste Facility 200 miles/1 way (110,000 cy.) 400 miles/round trip (rt)	154 working days @ 8hrs / day 154-50+128 = 232 workings days @ 8 hrs/day	(3) Model CAT 420 Excavators @ 128 hp x 154 days (2) Model CAT 631E Scrappers @ 490hp x 154days (2) Model 980G Loader @ 300 hp x 154 days (4) 4,000-Gal Water Truck @ 300 hp x 8 hrs / day 10 CY End Dump Materials Truck x 154 days x 8 hrs. Model CAT CS-323C Compactor @ 80hp x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 154 days Model CAT 135 Motor Grader @ 155 hp @ 102 days 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day	Materials: 40 trips /day x 10 cy / trip x 8 trucks = 3,200 cy / day Landfill disposal 1 trip/day x 10 cy / trip x 47 trucks = 470 cy / day	Assuming longest drive on site is 0.5 miles, at a speed of 5 mph to keep dust down, should take 12 minutes per round trip of 1 mile. This allows 40 trips per day. Assuming that with the 400 mile round trip, only one trip can be made per day.	Carollo CM SME	12/01/2023
32.	Structural Excavation and Foundation Preparation after mass excavation for Phase 1.	Assume 210 days @ 8 hrs./ day	Model CAT CS-323C Compactor @ 80hp x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 140 days Model CAT 135 Motor Grader @ 155 hp @ 140 days 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day				12/01/2023
33.	Yard Piping (Dig/Lay/Backfill) for Phase 1	Assume 195 days @ 8 hrs./ day	Model CAT 320 Excavator @ 160 hp x 8 hrs. Model CAT 980G Loader @ 300 hp x 8 hrs. (2) 10 CY End Dump Materials Truck x 8 hrs. day				12/01/2023

34.	Process Equipment Set and Above-grade AWT facilities/equipment and site improvements for Phase 1 (rough grading - north to south)	Assume 1,120 days @ 8 hrs./ day Note: duration is split in several activities in schedule such as foundation prep, concrete structures, process equipment & electrical gear	Model CAT 320 Excavator @ 160 hp x 8 hrs. (2) Model CAT 980G Loader @ 300 hp x 8 hrs. (4) 10 CY End Dump Materials Truck x 8 hrs. day (2) Model CAT CS-323C Compactor @ 80hp x 200 days x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 300 days (3) Model CAT TH63 Telescopic Handlers @ 101 hp X 400 days x 8 hrs / day Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225hp x 400 days x 8 hrs / day Model Manitowoc MLC650 400Ton Crawler Crane @ 600hp x 300 days x 8 hrs /day (4) 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day				12/01/2023
35.	Paving – 420,000 sf for 30 MGD	Assume 500 lf / day = 120 days @ 8 hrs. / day	Model CAT 135H Motor Grader@ 155 hp x 120 days Model CAT AP1000B Asphalt Paver @ 225 hp @ 120 days (2) Model CAT CS-323C compactors @ 80 hp x 120 days 10 CY End Dump Materials Truck x 120 days x 8 hrs. / day. 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day	Asphalt delivery to site Materials delivery 4 trips/day x 10 cy/trip x 10 trucks		From Stantec's BIM model	12/01/2023
36.	Paving – 40,000 sf for 85 MGD	Assume 500 lf / day = 40 days @ 8 hrs. / day	Model CAT 135H Motor Grader@155 hp x 40 days Model CAT AP1000B Asphalt Paver @ 225 hp @ 40 days (2) Model CS-323C compactors @ 80 hp x 40 days 10 CY End Dump Materials Truck x 40 days x 8 hrs. / day. 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day	Asphalt delivery to site Materials delivery: 4 trips/day x 10 cy/trip x 10 trucks		From Stantec's BIM model	12/01/2023
37.	Architectural coatings (Roofing and Exterior Cladding) for Phase 1	Assume 400 days @ 8 hrs./ day	Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225hp x 400 days x 8 hrs / day Model CAT TH63 Telescopic Handlers @ 101 hp x 400 days x 8 hrs / day				12/01/2023
38.	Power substation	Assume 356 days @ 8 hrs./ day	Model CAT 320 Excavator @ 160 hp x 356 days x 8 hrs. Model CAT 426 Backhoe @ 84 hp x 356 days Model CAT TH63 Telescopic Handlers @ 101 hp X 200 days X 8 hrs / day Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225hp x 200 days x 8 hrs / day 4,000 Gal Water Tuck @ 300 hp x 8 hrs / day				12/01/2023
	OPERATIONS PHASE						
39.	Height and materials of structures	Dimensions provided in **Appendix D**.					7/1/2022

40.	General design characteristics (architecture/coatings, lighting, landscaping/screening)	Typical of industrial design, neutral coatings, controlled lighting and fully landscaped at perimeter.		7/1/2022
41.	Preferred site access- employee parking and emergency vehicle access	AWTP will have six entrances/exits (see **Appendix C**). The preferred employee site access will be from Main St and the emergency exit is on Lomita Blvd. Parking Spaces P1 and P3 are for Metropolitan staff and P2 will be shared by Metropolitan staff and visitors.		12/01/2023
42.	Total footprint/acreage of new paved/impervious areas	30.2 acres	From Stantec's BIM model	1/3/2022
43.	Measures for detention/treatment of stormwater runoff	Stormwater runoff will be captured and recycled to the Warren Facility for treatment. BMPs for capture and initial storage to be employed. See **Appendix I** – Stormwater Runoff Quantities TM		1/3/2022
44.	AWT equipment types with typical operating data/characteristics	See **Appendix E**	From Stantec's BIM model	1/27/2023
45.	Estimated number of operations employees	See **Appendix G** for the basis of staffing estimates.	Reference Plant with adjustment (OC GWRS) – Pro-rated *Lab per MWD	1/27/2023
46.	Employee shifts per day when plant is in operation	See **Appendix G.**	Reference Plant with adjustment (OC GWRS)	1/27/2023
47.	Number of employees per shift	See **Appendix G**.		1/27/2023
48.	Estimated number of vehicle trips per day/week/month (project operation)	Worst case – each employee (127 staff - work commute) + 10 visitors= 137 round-trips/day (x's 5 per week / x's 20 per month)		1/27/2023
49.	Average trip distance (miles) for employees (project operation)	Employee work commute: 9.1 miles time 2 (each way) = 18.2 miles/per employee	SCAG LA County 2012 - 2016	1/3/2022
50.	Deliveries of materials, supplies or equipment (quantities, frequency)	Summary of chemical deliveries attached (**Appendix F**).		1/27/2023
51.	Will chemicals delivery occur on a 24/7 basis or weekday daytime only?	Assume 24/7 – worst case for noise relative to neighbors Assume 8 am to 5 pm – worst case for travel disruption	Worst case	1/3/2022
52.	Standby Generator(s) (expected sizing, fuel types, and locations) - Please provide frequency of testing and how often it will be used on a yearly basis.	Seven 4-MW diesel engine generators Operate - 1 hr/wk		1/3/2022
53.	Methane CoGen systems (size, number, location)?	There is no methane generated by these facilities.		1/3/2022
54.	Grid intertie power substation requirements and location(s)	To be determined during design.		1/3/2022

55.	Other operating equipment that generates emissions	No equipment with combustion emissions are planned. The biological processes will emit carbon and nitrogen compounds.		1/27/2023
56.	HVAC equipment requirements and locations	See **Appendix K**.	Footprints based on input from Metropolitan/LACSD and as incorporated in the Stantec's BIM model	12/01/2023
57.	Air handling systems size and location for treatment	See **Appendix K**.	Based on building volumes and occupancy	12/01/2023
58.	Treatment systems for odor emissions (if applicable)	If the FORCO site is used for secondary treatment (e.g., sMBR) plus AWT, the primary effluent pump station and aeration tanks are to be covered and off-gas treated • PE pump station – 430,000 scfm – bio trickling filter + activated carbon adsorption • Bioreactors – 262,000 scfm – activated carbon adsorption The potential for release and treatment of other gaseous emissions including toxics and GHGs to be assessed.	LACSD's JTAP Reports	1/3/2022
59.	Please provide annual electricity for pumps and facility.	See **Appendix E**		1/27/2023
60.	Any alternative energy generation (e.g., solar)?	1.5 MW of onsite solar power generation using approximately 11 acres of PV panels (buildings, parking, etc.).		12/01/2023
61.	Flares for excess methane emission disposal and estimates for usage of flares (if applicable)	Not applicable.		1/3/2022
62.	Annual natural gas use	Not applicable		1/3/2022
63.	Maintenance/replacement activities and frequency	Major system replacement items and interval • PROCESS – INTERVAL - NUMBER • MBR membranes – 10 yrs – 40,250 elements • MF modules – 10 years – 3,530 modules • RO cartridge filter – 0.5 years – 589 cartridges • RO elements (Stage 1 & 2) – 5 years – 16,490 elements • RO elements (Stage 3) – 1 year – 5,370 elements • UV lamps – 1.6 years – 3,140 lamps • UV ballasts – 5 years – 1,610 ballasts	Based on Stantec's updated estimates	1/27/2023
64.	List of chemicals to be used, quantities to be stored, delivery methods, and BMPs for transportation/storage/handling/disposal	See **Appendix D** – Chemical Quantities and Deliveries		1/27/2023
65.	Disposal of waste materials (rough quantities of hazardous/non-hazardous, disposal location)	Two 30-gallon drums of laboratory waste per month to be disposed per regulations.		1/3/2022
66.	Please indicate what SCAQMD air pollutant permits are required for project components.	Pending report from LACSD.		1/3/2022

67.	Overall throughput, amount of water to be injected into the ground and available for direct potable reuse.	115 MGD of IPR	Input from Metropolitan staff	1/27/2023
68.	SCAQMD Rule 402 prohibits public nuisances related to odors. Please describe if the emergency storage basin would result in a public nuisance related to odors.	Emergency storage would be for product water. The quality of this water is equivalent to fresh potable supplies. No odor related issues envisioned.		1/3/2022
	TECHNICAL INFORMATION			
69.	Geology/Soils Report	Existing reports available from LACSD; new geotechnical report currently under development and will be available by mid-August.		7/1/2022
70.	Hazardous Materials (Phase 1 ESA, Phase 2, Remedial Action Plan, etc.)	To be developed during design.		7/1/2022
71.	Conceptual grading/site plan/water quality BMPs	The site grading will provide for the capture of all site runoff associated with rainfall. Collected runoff from the process area will be pumped to the Warren Facility for treatment and rest can be infiltrated/reused, if desired. See **Appendix I** for stormwater runoff quantities.		1/27/2023
72.	Municipal Water Demand and Supply	Potable water to be provided for consumption, safety showers, sprinklers, and fire hydrants. Lab, warehouse, and maintenance shop will also require potable water service.		1/3/2022
73.	Wastewater Generation	Waste sidestream generated will be returned to the Warren Facility. These include: • Waste activated sludge • RO concentrate • Waste chemicals (associated with biological treatment, membrane cleaning and product water conditioning)		1/3/2022
74.	Solid Waste Generation and Disposal	1,100 lbs./day	CalRecyle – Industrial 8.93 lbs./day/employee	1/3/2022
75.	Data Network/Communication Backbone	Communication infrastructure to be constructed connecting plant and conveyance to Metropolitan's network and SCADA system. Also, separate communication system to be installed for coordination with LACFCD to provide the means for monitoring/reporting related to groundwater recharge status.		7/1/2022

* Typical construction equipment may include backhoe, dozers, scrapers, compactors, track hoe, trencher, loader, roller, cranes, heavy trucks

Appendices

- A: Process Flow Diagram
- B: Site Plan
- C: AWTP Construction Phasing Site Plan
- D: Structures Dimensions
- E: AWTP Equipment Electrical Load List
- F: Chemical Quantities and Delivery
- G: Basis for O&M Staffing Estimates
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Phase 2 AWT Implementation
35 MGD Additional IPR + 150 MGD DPR Capacity

	DATA NEEDS MATRIX		DATA SOURCE/ CITATION (document/ page)	NEEDED BY
N/C	**GENERAL PROJECT INFORMATION**			
	Site Location-FORCO or alternate site?	N/C		12/6/2021
2.	Summary of major operating components	N/C		12/6/2021
3.	Site configuration - acres/dimensions (site plan for major operating components, including heights/depths)	See **Appendices B, C and D**	From Stantec's BIM model	1/3/2022
4.	Improvements needed at Warren Facility (flow equalization, centrate treatment, source control, brine handling, etc.)	N/C		1/3/2022
5.	Treatment train description	N/C		7/1/2022
6.	Boron management approach (CPSR p. 4-5); treatment at Warren Facility site or satellite treatment facility (CPSR p. 9-5)	N/C		1/3/2022
7.	Phasing of improvements (for delivery quantities, meeting OC Basin nitrate requirements, meeting DPR requirements, etc.)	N/C		1/3/2022
8.	Variation in plant operations to accommodate varying basin capacity (rain events, maintenance?)	N/C		1/3/2022
9.	New/modified upstream treatment facilities?	N/C		12/6/2021
10.	Project Operational Year(s)	N/C		1/3/2022
	CONSTRUCTION PHASE			
11.	Will there be pile driving? If so, where and for what duration?	N/C	Available LACSD geotech reports reviewed	1/3/2022

12.	Depth/quantities of excavation/fill Hazardous waste topsoil removal **FORCO Update**: Metropolitan met with LACSD to get an update on FORCO site activities. Psomas completed a survey. Additional geotechnical and surveying services may not be needed. Assuming 31,000 cubic yard of earth volume may need to be disposed to landfill; disposal cost estimated at $3.0M. Contour map is also available. Weekly status meeting notes – 12/14/21	There is pumping to and from the AWT allowing for flexibility in the establishment of the hydraulic grade line through the processes. This also permits the siting of facilities to balance the cut and fill to an extent and thereby minimize import or export of soils. There would be the importation of aggregate base materials for all structures. Quantities of excavation and aggregate importation are: • Excavation for structures (estimate from Stantec's BIM model) ○ 154,000 cubic yards • Aggregate base materials – 7,000 tons (7,000 cubic yards x 1 ton/cubic yard) *[The depth of excavation is generally assumed to be one (1) foot below the depth of structures as shown on structural dimensions, with greatest depth at approximately 30 feet below grade surface(bgs). The approximate quantity of mass excavation is 149,000 cy., of which an estimated 20%* (31,000 cy.) *is assumed to be contaminated and is to be disposed of at a Class II landfill such as Kettleman Hills Hazardous Waste Facility. Of the soil remaining after this disposal, 35% (43,000cy.) is to be used as structural backfill.*	Quantity take-offs from Stantec's Environmental Planning BIM model and LACSD's input for contaminated soil volume	12/01/2023
13.	Hazardous materials remediation plan	N/C		7/1/2022
14.	Utility relocation needs, if any (CPSR p. 4-7)	One major utility will require relocation prior to development of the FORCO site: The 10' x 12' concrete box stormwater drain will be relocated to the south end of the site (see layout) paralleling the property boundary thereby avoid bisecting of the proposed site.	From Stantec's BIM model	12/01/2023
15.	Estimated number of construction workers per day	Average estimated workers per day including Contractor mgmt. staff, trade craftsman, CM staff, Designer & Owner staff – 150 to 200 /day. Peak will be 220 – 260 / day.	Carollo CM SME	1/3/2022
16.	Estimated number of construction worker vehicle trips per day	320 - 390 trips / day* - Typical worker ride share Dependent if greater carpooling is required due to timing of 2028 Olympics.	Carollo CM SME	1/3/2022
17.	Will there be weekend or nighttime construction? If nighttime or weekend requirements, type of expected construction.	N/C	Carollo CM SME	1/3/2022
18.	Construction staging area and storage location(s)	N/C	Carollo CM SME	1/3/2022
19.	Construction worker vehicle parking	N/C	Carollo CM SME	1/3/2022
20.	Power Supply (generators?)	N/C	Carollo CM SME	1/3/2022
21.	Temporary Lighting (main-powered or generator-powered)	N/C	Carollo CM SME	1/3/2022
22.	Water Supply (hydrants? water trucks?)	N/C	Carollo CM SME	1/3/2022
23.	Maximum number of daily one-way haul truck trips due to material transportation (e.g., off-haul/disposal, supplies, material); type of trucks; estimated distance, clear delineation of daily maximum trips separated by demolition waste and clean excavation disposal materials types.	N/C	Carollo CM SME	1/3/2022
24.	Volume of any material imported/exported, including demolition waste (asphalt/concrete, soils, hazardous soils, slurry, steel/metals) and clean construction materials (concrete, pipeline segments, rebar, base material/sand/gravel, etc.).	Per Stantec's BIM model, • Volume of mass excavation is 154,000 cy • Volume of structural excavation is 28,000 cy.	Carollo CM SME	12/01/2023
25.	Plans for recycling of materials as applicable (need % diverted), otherwise we use state default	Volume of structural backfill is approx. 43,000 cy, 35% of total exported materials	Carollo CM SME	12/01/2023

26.	Locations for ingress to/egress from construction site. If any temporary changes to the local street striping/traffic flow will be implemented, describe those (description can be general for program-level analysis).	N/C					7/1/2022
27.	Disposal location for construction debris	Scholl Canyon Landfill or others of contractor's choice					1/3/2022
	Construction Phase	**Start and End Dates (or number of days/ weeks/months)**	**Equipment Used (Types and Quantities, incl. hp and hours/day) ***	**Haul or Material Truck Loads (in cy or truckloads)**	**Truck Travel Distance (in miles)**		
28.	<u>Work Items are not applicable in the Phase 2</u> **Demolition** / Removal of existing site features? **Paving**: The general site area is 56 acres (max)					Carollo CM SME	02/17/2023
29.	**Utility relocation** Storm Drain diversion and connection (15 days)					Carollo CM SME	02/17/2023
30.	<u>Work Items are not applicable in Phase 2</u> **Remediation/site preparation** – **Clear and grub of entire remaining site**					Carollo CM SME	02/17/2023
31.	**Structural Ex. & Haul Off & Foundation Prep** Mass Excavation & Haul Off: Amount needing to be moved within site 154,000 – 31,000 = 123,000 cy over 165 days. Assume 20% requires Class II landfill disposal Kettleman Hills Hazardous Waste Facility 200 miles/1 way (31,000 cy.) 400 miles/round trip (rt)	Assume 165 working days @ 8 hrs. / day Assume 32 + 60 = 92 working days @ 8 hrs / day	Model CAT CS-323C Compactor @ 80hp x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 165 days Model CAT 135 Motor Grader @ 155 hp @ 165 days 4,000-Gal Water Tuck @ 300 hp x 8 hrs. / day	Materials: 40 trips /day x 10 cy / truckload x 2 trucks = 800 cy / day Landfill disposal 1 trip/day x 10 cy / trip x 34 trucks = 340 cy / day	Assuming longest drive on site is 0.5 miles, at a speed of 5 mph to keep dust down, should take 12 minutes per round trip of 1 mile. This allows 40 trips per day. Assuming that with the 400 mile round trip, only one trip can be made per day.	Carollo CM SME	12/01/2023
32.	Yard Piping	Assume 140 days @ 8 hrs./ day	Model CAT 320 Excavator @ 160 hp x 140 days x 8 hrs. Model CAT 980G Loader @ 300 hp x 140 days x 8 hrs. 10 CY End Dump Materials Truck x 140 days x 8 hrs. day				12/01/2023

33.	Process Equipment Set & Above-grade Process Piping Installation	Assume 300 days @ 8 hrs./ day	Model CAT 320 Excavator @ 160 hp x 8 hrs. (1) Model CAT 980G Loader @ 300 hp x 8 hrs. (2) 10 CY End Dump Materials Truck x 8 hrs. day (1) Model CAT CS-323C Compactor @ 80hp x 240 days x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 300 days (1) Model CAT TH63 Telescopic Handlers @ 101 hp X 240 days x 8 hrs. / day Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225 hp x 240 days x 8 hrs. / day (1) 4,000-Gal Water Tuck @ 300 hp x 8 hrs. / day				12/01/2023
34.	Paving – 58,000 sf	Assume 500 lf / day = 20 days @ 8 hrs. / day	Model CAT 135H Motor Grader@155 hp x 20 days Model CAT AP1000B Asphalt Paver @ 225 hp @ 20 days (2) Model CAT CS-323C compactors @ 80 hp x 20 days 10 CY End Dump Materials Truck x 20 days x 8 hrs. / day. 4,000-Gal Water Tuck @ 300 hp x 8 hrs. / day	Asphalt delivery to site Materials delivery 4 trips/day x 10 cy/trip x 10 trucks		From Stantec's BIM model	12/01/2023
35.	Architectural coatings (Roofing and Exterior Cladding)	Assume 60 days @ 8 hrs./ day	Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225 hp x 60 days x 8 hrs. / day Model CAT TH63 Telescopic Handlers @ 101 hp X 8 hrs. / day				12/01/2023
36.	Power substation - Constructed in Phase 1 (during the first 30 MGD construction)						02/17/2023
	OPERATIONS PHASE						
37.	Height and materials of structures	See **Appendix D**					7/1/2022
38.	General design characteristics (architecture/coatings, lighting, landscaping/screening)	N/C					7/1/2022
39.	Preferred site access- employee parking and emergency vehicle access	N/C					1/3/2022
40.	Total footprint/acreage of new paved/impervious areas	N/C				From Stantec's BIM model	1/3/2022
41.	Measures for detention/treatment of stormwater runoff	N/C					1/3/2022
42.	AWT equipment types with typical operating data/characteristics	See **Appendix E**				From Stantec's BIM model	1/3/2022

43.	Estimated number of operations employees (additional employees for Phase 2 on top of Phase 1)	See **Appendix G** for the basis of staffing estimates.	Reference Plant with adjustment (OC GWRS) – Pro-rated *Lab per MWD	1/3/2022
44.	Employee shifts per day when plant is in operation	See **Appendix G.**	Reference Plant with adjustment (OCWD's GWRS)	1/3/2022
45.	Number of employees per shift (additional employees on top of Phase 1)	See **Appendix G**.		1/27/2023
46.	Estimated number of vehicle trips per day/week/month (project operation) – Additional trips on top of Phase 1	Worst case – each employee (67 staff - work commute) = 67 round-trips/day (x's 5 per week / x's 20 per month)		1/3/2022
47.	Average trip distance (miles) for employees (project operation)	N/C	SCAG LA County 2012 - 2016	1/3/2022
48.	Deliveries of materials, supplies or equipment (quantities, frequency)	Summary of deliveries attached (**Appendix F**).		1/3/2022
49.	Will chemicals delivery occur on a 24/7 basis or weekday daytime only?	Assume 24/7 – worst case for noise relative to neighbors Assume 8 am to 5 pm – worst case for travel disruption	Worst case	1/3/2022
50.	Standby Generator(s) (expected sizing, fuel types, and locations) - Please provide frequency of testing and how often it will be used on a yearly basis.	One additional 4-MW generator for Phase 2.		1/3/2022
51.	Methane Cogen systems (size, number, location)?	N/C		1/3/2022
52.	Grid intertie power substation requirements and location(s)	N/C		1/3/2022
53.	Other operating equipment that generates emissions	N/C		1/3/2022
54.	HVAC equipment requirements and locations	N/C		1/3/2022
55.	Air handling systems size and location for treatment	N/C	Based on building volumes and occupancy	1/3/2022
56.	Treatment systems for odor emissions (if applicable)	N/C	LACSD's JTAP Reports	1/3/2022
57.	Please provide annual electricity for pumps and facility.	See appendix for equipment and loads (**Appendix E**)		1/3/2022
58.	Any alternative energy generation (e.g., solar)?	N/C		1/3/2022

59.	Flares for excess methane emission disposal and estimates for usage of flares (if applicable)	Not applicable.		1/3/2022
60.	Annual natural gas use	Not applicable		1/3/2022
61.	Maintenance/replacement activities and frequency	Major system replacement items and interval • PROCESS – INTERVAL - NUMBER • MBR membranes – 10 yrs – 12,250 elements • MF modules – 10 years – 1,071 modules • RO cartridge filter – 0.5 years – 179 cartridges • RO elements (Stage 1 & 2) – 5 years – 5,019 elements • RO elements (Stage 3) – 1 year – 1,630 elements • UV lamps – 1.6 years – 959 lamps • UV ballasts – 5 years – 490 ballasts	Based on Stantec's updated estimates	1/27/2023
62.	List of chemicals to be used, quantities to be stored, delivery methods, and BMPs for transportation/storage/handling/disposal	See **Appendix D – Chemical Quantities and Delivery**		1/27/2023
63.	Disposal of waste materials (rough quantities of hazardous/non-hazardous, disposal location)	No additional waste expected on top of Phase 1.		1/3/2022
64.	Please indicate what SCAQMD air pollutant permits are required for project components.	Pending report from LACSD		1/3/2022
65.	Overall throughput, amount of water to be injected into the ground and available for direct potable reuse.	Additional 35 MGD of IPR and 150 MGD of DPR	Input from Metropolitan staff	1/26/2023
66.	SCAQMD Rule 402 prohibits public nuisances related to odors. Please describe if the emergency storage basin would result in a public nuisance related to odors.	Emergency storage would be for product water. The quality of this water is equivalent to fresh potable supplies. No odor related issues envisioned.		1/3/2022
	TECHNICAL INFORMATION			
67.	Geology/Soils Report			7/1/2022
68.	Hazardous Materials (Phase 1 ESA, Phase 2, Remedial Action Plan, etc.)			7/1/2022
69.	Conceptual grading/site plan/water quality BMPs	N/C		1/3/2022
70.	Municipal Water Demand and Supply	N/C		1/3/2022
71.	Wastewater Generation	N/C		1/3/2022
72.	Solid Waste Generation and Disposal	1,150 lbs./day	CalRecyle – Industrial 8.93 lbs./day/employee	1/3/2022

73.	Data Network/Communication Backbone	Communication infrastructure to be constructed connecting plant and conveyance to Metropolitan's network and SCADA system. Also, separate communication system to be installed for coordination with LACFCD to provide the means for monitoring/reporting related to groundwater recharge status.		7/1/2022

* Typical construction equipment may include backhoe, dozers, scrapers, compactors, track hoe, trencher, loader, roller, cranes, heavy trucks

Appendices

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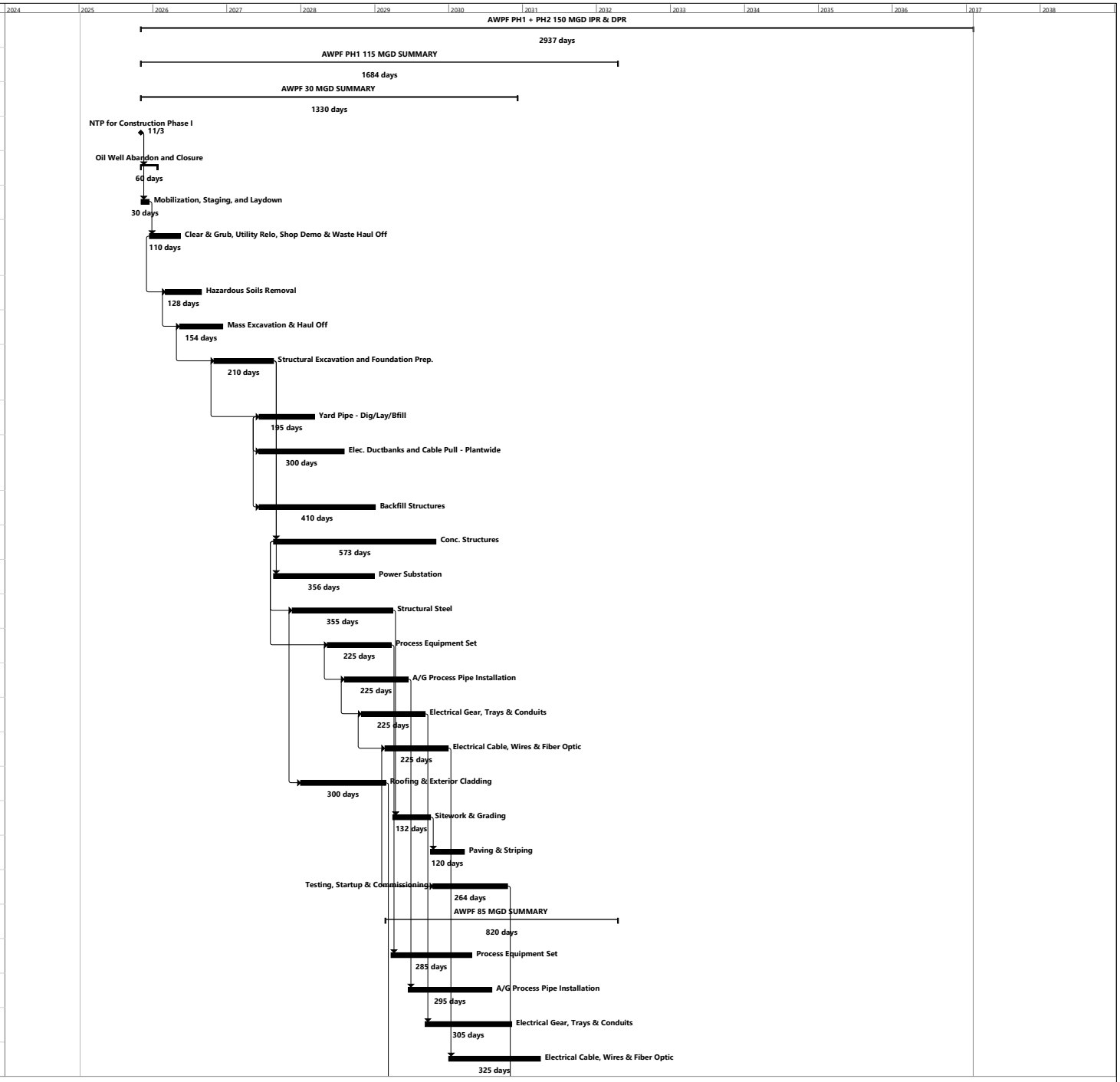
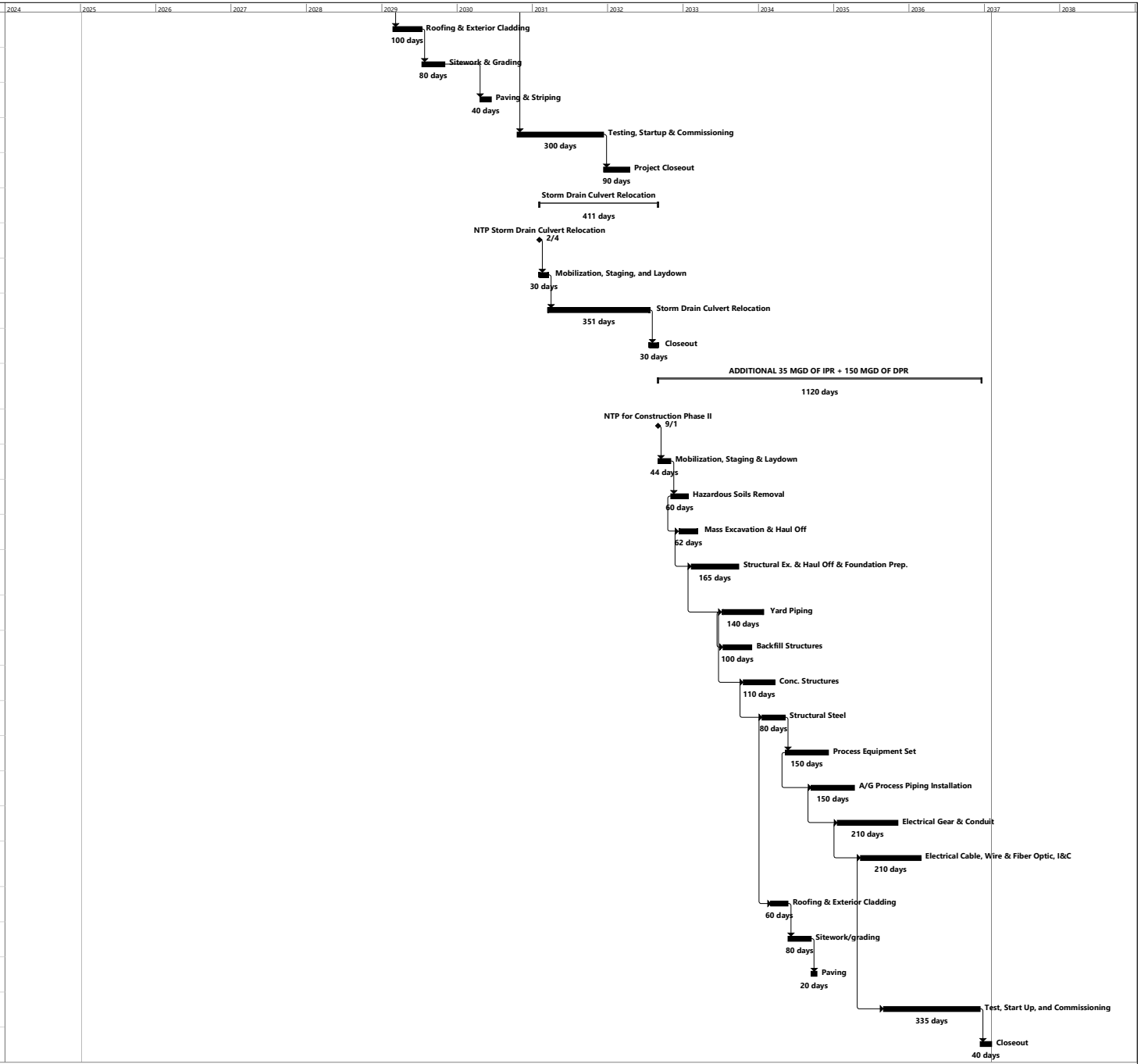
APPENDIX I – AWP FACILITY CONSTRUCTION SCHEDULE

ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	**AWPF PH1 + PH2 150 MGD IPR & DPR**	**2937 days**	**Mon 11/3/25**	**Tue 2/3/37**		
2	**AWPF PH1 115 MGD SUMMARY**	**1684 days**	**Mon 11/3/25**	**Thu 4/15/32**		
3	**AWPF 30 MGD SUMMARY**	**1330 days**	**Mon 11/3/25**	**Fri 12/6/30**		
4	NTP for Construction Phase I	0 days	**Mon 11/3/25**	Mon 11/3/25		
5	**Oil Well Abandon and Closure**	**60 days**	**Mon 11/3/25**	**Fri 1/23/26**	4	
6	Mobilization, Staging, and Laydown	30 days	**Mon 11/3/25**	Fri 12/12/25	4	
7	Clear & Grub, Utility Relo, Shop Demo & Waste Haul Off	110 days	Mon 12/15/25	Fri 5/15/26	6	
8	Hazardous Soils Removal	128 days	Tue 3/3/26	Thu 8/27/26	7SS+56 days	
9	Mass Excavation & Haul Off	154 days	Tue 5/12/26	Fri 12/11/26	8SS+50 days	
10	Structural Excavation and Foundation Prep.	210 days	Thu 10/29/26	Wed 8/18/27	9SS+122 days	
11	Yard Pipe - Dig/Lay/Bfill	195 days	Wed 6/9/27	Tue 3/7/28	10SS+42 days	
12	Elec. Ductbanks and Cable Pull - Plantwide	300 days	Wed 6/9/27	Tue 8/1/28	11SS	
13	Backfill Structures	410 days	Wed 6/9/27	Tue 1/2/29	11SS	
14	Conc. Structures	573 days	Thu 8/19/27	Mon 10/29/29	10	
15	Power Substation	356 days	Thu 8/19/27	Thu 12/28/28	10	
16	Structural Steel	355 days	Fri 11/19/27	Thu 3/29/29	14SS+66 days	
17	Process Equipment Set	225 days	Thu 5/11/28	Wed 3/21/29	14SS+190 days	
18	A/G Process Pipe Installation	225 days	Thu 8/3/28	Wed 6/13/29	17SS+60 days	
19	Electrical Gear, Trays & Conduits	225 days	Thu 10/26/28	Wed 9/5/29	18SS+60 days	
20	Electrical Cable, Wires & Fiber Optic	225 days	Mon 2/19/29	Fri 12/28/29	19SS+82 days	
21	Roofing & Exterior Cladding	300 days	Fri 12/31/27	Thu 2/22/29	16SS+30 days	
22	Sitework & Grading	132 days	Fri 3/30/29	Mon 10/1/29	16	
23	Paving & Striping	120 days	Tue 10/2/29	Mon 3/18/30	22	
24	Testing, Startup & Commissioning	264 days	Mon 10/15/29	Thu 10/17/30	20SS+170 days	
25	**AWPF 85 MGD SUMMARY**	**820 days**	**Fri 2/23/29**	**Thu 4/15/32**		
26	Process Equipment Set	285 days	Thu 3/22/29	Wed 4/24/30	17	
27	A/G Process Pipe Installation	295 days	Thu 6/14/29	Wed 7/31/30	18	
28	Electrical Gear, Trays & Conduits	305 days	Thu 9/6/29	Wed 11/6/30	19	
29	Electrical Cable, Wires & Fiber Optic	325 days	Mon 12/31/29	Fri 3/28/31	20	



ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names
30	Roofing & Exterior Cladding	100 days	Fri 2/23/29	Thu 7/12/29	21	
31	Sitework & Grading	80 days	Fri 7/13/29	Thu 11/1/29	30	
32	Paving & Striping	40 days	Mon 4/22/30	Fri 6/14/30	31	
33	Testing, Startup & Commissioning	300 days	Fri 10/18/30	Thu 12/11/31	24	
34	Project Closeout	90 days	Fri 12/12/31	Thu 4/15/32	33	
35	**Storm Drain Culvert Relocation**	**411 days**	**Tue 2/4/31**	**Tue 8/31/32**		
36	NTP Storm Drain Culvert Relocation	0 days	Tue 2/4/31	Tue 2/4/31		
37	Mobilization, Staging, and Laydown	30 days	Tue 2/4/31	Mon 3/17/31	36	
38	Storm Drain Culvert Relocation	351 days	Tue 3/18/31	Tue 7/20/32	37	
39	Closeout	30 days	Wed 7/21/32	Tue 8/31/32	38	
40	**ADDITIONAL 35 MGD OF IPR + 150 MGD OF DPR**	**1120 days**	**Wed 9/1/32**	**Tue 12/16/36**		
41	NTP for Construction Phase II	0 days	Wed 9/1/32	Wed 9/1/32		
42	Mobilization, Staging & Laydown	44 days	Wed 9/1/32	Mon 11/1/32	41	
43	Hazardous Soils Removal	60 days	Tue 11/2/32	Mon 1/24/33	42	
44	Mass Excavation & Haul Off	62 days	Tue 12/14/32	Wed 3/9/33	43SS+30 days	
45	Structural Ex. & Haul Off & Foundation Prep.	165 days	Tue 2/8/33	Mon 9/26/33	44SS+40 days	
46	Yard Piping	140 days	Tue 7/12/33	Mon 1/23/34	45SS+80 days	
47	Backfill Structures	100 days	Tue 7/12/33	Mon 11/28/33	46SS	
48	Conc. Structures	110 days	Tue 10/18/33	Mon 3/20/34	46SS+70 days	
49	Structural Steel	80 days	Wed 1/18/34	Tue 5/9/34	48SS+66 days	
50	Process Equipment Set	150 days	Wed 5/10/34	Tue 12/5/34	49	
51	A/G Process Piping Installation	150 days	Wed 9/13/34	Tue 4/10/35	50SS+90 days	
52	Electrical Gear & Conduit	210 days	Wed 1/17/35	Tue 11/6/35	51SS+90 days	
53	Electrical Cable, Wire & Fiber Optic, I&C	210 days	Wed 5/9/35	Tue 2/26/36	52SS+80 days	
54	Roofing & Exterior Cladding	60 days	Wed 3/1/34	Tue 5/23/34	49SS+30 days	
55	Sitework/grading	80 days	Wed 5/24/34	Tue 9/12/34	54	
56	Paving	20 days	Wed 9/13/34	Tue 10/10/34	55	
57	Test, Start Up, and Commissioning	335 days	Wed 8/29/35	Tue 12/9/36	53SS+80 days	
58	Closeout	40 days	Wed 12/10/36	Tue 2/3/37	57	



APPENDIX J – AWP FACILITY ADT AND VMT CALCULATIONS

Assumed Construction Duration

What is the entire construction duration for each phase? Is there overlap between construction phases?

Phase 1			
row #	**Construction Phase**	**days**	**years**
28	**Demolition/removal of existing site features**		
	Paving the general site area	21	
	Demolition of existing LACSD warehouse building	21	
29	**Utility relocation**	36	
30	**Clear and grub of entire remaining site**	42	
31	**Foundation and below grade infrastructure for phase 1**		
	Mass excavation & haul off	154	
	Class II landfill disposal hazardous waste facility	232	
32	**Structural excavation and foundation preparation**	210	
33	**Yard piping (dig/lay/backfill) for phase 1**	195	
34	**Process equipment set and above-grade AWT facilities**	1120	
35	**Paving 420 TSF for 30 MGD**	120	
36	**Paving 40 TSF for 85 MGD**	40	
37	**Architectural coatings**	400	
38	**Power substation**	356	
TOTAL	**Assumed Construction Duration (All Phases)**	**2947**	**8.1**

Phase 2			
row #	**Construction Phase**	**days**	**years**
29	**Utility relocation**	15	
31	**Structural excavation, haul off, foundation prep**		
	Mass excavation & haul off	165	
	Class II landfill disposal hazardous waste facility	92	
32	**Yard piping**	140	
33	**Process equipment set & above-grade piping installation**	300	
34	**Paving 58 TSF**	20	
35	**Architectural coatings**	60	
TOTAL	**Assumed Construction Duration (All Phases)**	**792**	**2.2**

Reference (Row)
10 Phase 1 (2032) 115 MGD

	Trip Distance Assumptions (one-way)		
SCAG	Avg. Worker Commute Distance	19.66	miles
31	To Class II landfill - Kettleman Hills Hazardous Waste Facility	200	miles
VMT V4	To regular landfill - Scholl Canyon Landfill	32	miles
survey of area Google Maps	To nearest concrete/asphalt plant (base materials)	10	miles
	Avg. trip for construction equipment traveling to work site	30	miles
	Chemical Deliveries (operations phase)	30	miles

Construction Phase

AWT Construction Schedule 12 ***Assumed Construction Duration (AWT Construction Schedule 12222*** ***1410*** ***days*** ***3.9*** ***years*** All phases except Testing, Startup & Commissioning and Project Close Out 4/15/2032 3/28/2031 274

Excavation and Base Materials

12	Mass Excavation	552,000	CY					To Landfill= Total-Backfill-Hazardous
12	To Regular Landfill	287,040	CY	57,408	# of 10CY truck trips	40.72	one-way trips/day	
12	Structural Backfill	35%	of remaining non haz excavation					
		154,560	CY					
12	Contaminated Soil (to Class II Haz Waste Landfill)	20%	of excavation					
		110,400	CY	22,080	# of 10CY truck trips	15.66	one-way trips/day	
24	Structural Excavation	99,000	CY	19,800	# of 10CY truck trips	14.05	one-way trips/day	
12	Aggregate Base Materials	72,000	CY x 1 ton/CY	14,400	# of 10CY truck trips	10.21	one-way trips/day	
	Excavation and Base Materials Subtotal	***568,440***	***CY***	***113,688***	***# of 10CY truck trips***	**80.65**	**one-way trips/day**	
					(to and from site)		(to and from site)	
23	Hual Truck Trips (Off-haul/disposal, supplies, material)							
	minimum	25	one-way trips					
	maximum	50	one-way trips	not including demo/excavation trips				

Construction Workers

15	Construction Workers per day			
	average	250-300		workers/day
	peak	560-620		workers/day
16	**Est. Num of Construction Wokers vehicle trips per day**			
	average	590-680		one-way trips/day (assuming carpooling)
		635		**avg. one-way trips/day (assuming carpooling)**
				(to and from site)

	Construction Phase and Duration		**Equipment**			**Haul & Delivery**		
28	**Demolition /Removal of Existing Site Features**							
	Paving the general an 21	1	320 Excavator	21	days	Materials Haul Off	4	trips/day
	days	1	980G Loader	21	days		10	CY/trip
		1	10CY Dump Truck	21	days		25	trucks
							1,000	CY/day
							8520	CY to haul off
	Demolition of Existing 21	1	320 Excavator	21	days	Materials Haul Off	4	trips/day
	days	1	980G Loader	21	days		10	CY/trip
		1	10CY Dump Truck	21	days		4	trucks
							160	CY/day
29	**Utility relocation**	1	320 Skid Loader	36	days			
	36							
	days							
30	**Clear and grub of entire remaining site**							
	42	1	933 Track Loader	42	days		4	trips/day
	days	1	320 Excavator	42	days		10	CY/trip
		1	980G Loader	42	days		25	trucks
		1	10CY Dump Truck	42	days		1,000	CY/day
							45,185	CY to haul off
31	**Foundation and below grade infrastructure**							
	Mass Excavation & Ha 154	3	420 Excavators	154	days	Materials Haul Off	40	trips/day
	days	2	631E Scrappers	154	days		10	CY/trip
		2	980G Loader	154	days		8	trucks
		4	4,000 Gal Water Truck	154	days		3,200	CY/day
		10	10CY Dump Truck	154	days			
	Class II landfill dispos 232	1	CS-323C Compactor	232	days		552,000	CY to haul off
	days	1	426 Backhoe	154	days		20%	hazardous waste
		1	135 Motor Grader	102	days			
		1	4,000 Gal Water Truck	232	days			
32	**Structural Excavation and Foundation Preparation**	1	CS-323C Compactor	210	days			
	210	1	426 Backhoe	140	days			
	days	1	135 Motor Grader	140	days			
		1	4,000 Gal Water Truck	210	days			
33	**Yard Piping**	1	320 Excavator	195	days			
	195	1	980G Loader	195	days			
	days	2	10CY Dump Truck	195	days			
34	Process Equipment Set and Above-grade AWT facilities/equipment	1	320 Excavator	1120	days			
	1120	2	980G Loader	1120	days			
	days	4	10CY Dump Truck	1120	days			
	split with: foundation prep, concrete structures, process equipment i	2	CS-323C Compactor	200	days			
		1	426 Backhoe	300	days			
		3	TH63 Telescopic Handlers	400	days			
		1	60 Ton RTC-8065 Crane	400	days			
		1	Manitowoc MLC650 Crane	300	days			
		4	4,000 Gal Water Truck	1120	days			
35	**Paving - 420,000 sf for 30 MGD**	1	135H Motor Graders	120	days	Asphalt Delivery	4	trips/day
	120	1	AP100B Asphalt Paver	120	days		10	CY/trip
	days	2	CS-323C Compactor	120	days		10	trucks
		1	10CY Dump Truck	120	days		400	CY/day
		1	4,000 Gal Water Truck	120	days			
36	**Paving - 40,000 sf for 85 MGD**	1	135H Motor Graders	40	days	Asphalt Delivery	4	trips/day
	40	1	AP100B Asphalt Paver	40	days		10	CY/trip
	days	2	CS-323C Compactor	40	days		10	trucks
		1	10CY Dump Truck	40	days		400	CY/day
		1	4,000 Gal Water Truck	40	days			
37	**Architectural coatings**	1	60 ton RTC Crane	400	days			
	400	1	TH63 Telescopic Handlers	400	days			
	days							
38	**Power substation**	1	320 Excavator	356	days			
	356	1	426 Backhoe	356	days			
	days	1	TH63 Telescopic Handlers	200	days			
		1	60 ton RTC Crane	200	days			
		1	4,000 Gal Water Truck	356	days			
	ALL CONSTRUCTION PHASES							
		29	unique equipment	each piece of equipment travels to and from the work site once				

CONSTRUCTION PHASE			
	One-Way Trips	Miles/Trip	VMT
Regular Landfill Haul Trips			
Entire Construction Period	77,208.00	31.50	2,432,052.00
Per Day	54.77	31.50	1,725.21
Hazardous Landfill Haul Trips			
Entire Construction Period	22,080.00	200.00	4,416,000.00
Per Day	15.66	200.00	3,132.55
Base Materials Haul Trips			
Entire Construction Period	14,400.00	10.00	144,000.00
Per Day	10.21	10.00	102.15
Construction Workers			
Entire Construction Period	895,168.57	19.66	17,598,072.71
Per Day	635.00	19.66	12,483.43
Construction Equipment Traveling To/From Work Site			
Entire Construction Period	58.00	30.00	1,740.00
Per Day	0.04	30.00	1.23
All Items			
Entire Construction Period	1,008,914.57		24,591,864.71
Per Day	715.69		17,444.57

CONSTRUCTION PHASE - By Trip Type and LV/HV		
	One-Way Trips	VMT
Construction Workers + Non-Haul Truck		
Entire Construction Period		
LV	895,168.57	17,598,072.71
HV	58.00	1,740.00
Per Day		
LV	635.00	12,483.43
HV	0.04	1.23
Haul Truck		
Entire Construction Period		
LV	-	-
HV	113,688.00	6,992,052.00
Per Day		
LV	-	-
HV	80.65	4,959.91
All Items		
Entire Construction Period		
LV	895,168.57	17,598,072.71
HV	113,746.00	6,993,792.00
Per Day		
LV	635.00	12,483.43
HV	80.69	4,961.14

CONSTRUCTION PHASE - By Roadway Type PER DAY ADT			
	Arterial	Collector	Local
Regular Landfill Haul Trips			
HV	54.77	-	-
Hazardous Landfill Haul Trips			
HV	15.66	-	-
Base Materials Haul Trips			
HV	9.30	0.92	-
Construction Workers			
LV	615.95	19.05	-
Construction Equipment Traveling To/From Work Site			
HV	0.04	0.00	-
All Items			
LV	615.95	19.05	-
HV	79.77	0.92	-
Total	695.72	19.97	-

Assumptions

100% to/from I-110 NB Ramp at Sepulveda Blvd.

100% to/from I-110 NB Ramp at Sepulveda Blvd.

45% travel on E/W arterials; 45% on N/S arterials, 10% to/from I-110

20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110

30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110

	ADT to/from freeway	ADT E/W arterials or N/S arterials
LV	431.17	203.84
HV	71.38	9.30
Total	502.55	213.14

CONSTRUCTION PHASE - By Land Use PER DAY ADT			
	Industrial	Commercial	Residential
Regular Landfill Haul Trips			
HV	43.81	8.22	2.74
Hazardous Landfill Haul Trips			
HV	12.53	2.35	0.78
Base Materials Haul Trips			
HV	2.66	1.53	6.03
Construction Workers			
LV	393.70	98.43	142.88
Construction Equipment Traveling To/From Work Site			
HV	0.02	0.01	0.01
All Items			
LV	393.70	98.43	142.88
HV	59.02	12.10	9.56
Total	452.72	110.53	152.43

Assumptions

100% to/from I-110 NB Ramp at Sepulveda Blvd.

100% to/from I-110 NB Ramp at Sepulveda Blvd.

45% travel on E/W arterials; 45% on N/S arterials, 10% to/from I-110

20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110

30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110

CONSTRUCTION PHASE - By Land Use PER DAY VMT			
	Industrial	Commercial	Residential
Regular Landfill Haul Trips			
HV	1,380.17	258.78	86.26
Hazardous Landfill Haul Trips			
HV	2,506.04	469.88	156.63
Base Materials Haul Trips			
HV	26.56	15.32	60.27
Construction Workers			
LV	7,739.73	1,934.93	2,808.77
Construction Equipment Traveling To/From Work Site			
HV	0.69	0.20	0.35
All Items			
LV	7,739.73	1,934.93	2,808.77
HV	3,913.46	744.18	303.50
Total	11,653.18	2,679.12	3,112.27

miles/trip	*Assumptions*
	100% to/from I-110 NB Ramp at Sepulveda Blvd.
31.50	
	100% to/from I-110 NB Ramp at Sepulveda Blvd.
200.00	
	45% travel on E/W arterials; 45% on N/S arterials, 10% to/from I-110
10.00	
	20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110
19.66	
	30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110
30.00	

Operations Phase

	Item	Quantity	Unit	
48	**Employees (Attachment G)**	127		
46	Operations Staff Operations (24 hour coverage, 12 hr/shift, 8+1 persons/shift)	36	based on ratio from previous version (32 ops staff out of 114 employees from old Attachment G)	
	Non-Operations Staff Non-Opeations (40 hrs/week, 5 weekdays)	91		
48	Est. # vehicle trips per day/week/month	127 10 137 **274**	employees visitors round-trips/day **one-way trips/day** (to and from site)	
50	**Chemical Deliveries (Attachment F)**			
	Total Chemical Deliveries	20 **39.1**	deliveries/day **one-way trips/day** (to and from site)	based on ratio of # of deliveries and MGD capacity from previous version previously 17 deliveries for 100 MGD capacity, now 115 MGD capacity

OPERATIONS PHASE			
	One-Way Trips	Miles/Trip	VMT
Employee + Visitor Trips (LV)			
Per Day	274.00	19.66	5,386.55
Chemical Deliveries Trips (HV)			
Per Day	39.10	30.00	1,173.00
All Items			
Per Day	313.10		6,559.55

CONSTRUCTION PHASE - By Roadway Type PER DAY ADT			
	Arterial	Collector	Local
Employee + Visitor Trips			
LV	265.78	8.22	-
Chemical Deliveries Trips			
HV	37.54	1.56	-
All Items			
Total	303.32	9.78	-

Assumptions
20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110

30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110

CONSTRUCTION PHASE - By Land Use PER DAY ADT			
	Industrial	Commercial	Residential
Employee + Visitor Trips			
LV	169.88	42.47	61.65
Chemical Deliveries Trips			
HV	21.90	6.26	10.95
All Items			
Total	191.78	48.73	72.60

Assumptions
20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110

30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110

CONSTRUCTION PHASE - By Land Use PER DAY VMT			
	Industrial	Commercial	Residential
Construction Workers			
LV	3,339.66	834.92	1,211.97
Chemical Deliveries Trips			
HV	656.88	187.68	328.44
All Items			
Total	3,996.54	1,022.60	1,540.41

miles/trip	***Assumptions***
	20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110
19.66	
	30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110
30.00	

Reference (Row)
10 Phase 2 (2036) 150 MGD Total [additional 35 MGD from Phase 1]

	Trip Distance Assumptions (one-way)		
SCAG	Avg. Worker Commute Distance	19.66	miles
31	To Class II landfill - Kettleman Hills Hazardous Waste Facility	200	miles
VMT V4	To regular landfill - Scholl Canyon Landfill	32	miles
survey of area Google Maps	To nearest concrete/asphalt plant (base materials)	10	miles
	Avg. trip for construction equipment traveling to work site	30	miles
	Chemical Deliveries (operations phase)	30	miles

Construction Phase

AWT Construction Schedule 12 ***Assumed Construction Duration (AWT Construction Schedule 1222*** ***875*** ***days*** ***2.4*** ***years*** All phases except Testing, Startup & Commissioning and Project Close Out
2/3/2037 2/26/2036 245

Excavation and Base Materials

12	Mass Excavation	154,000	CY				To Landfill= Total-Backfill-Hazardous
12	To Regular Landfill	80,080	CY	16,016	# of 10CY truck trips	18.30	one-way trips/day
12	Structural Backfill	35%	of remaining non haz excavation				
		43,120	CY				
12	Contaminated Soil (to Class II Haz Waste Landfill)	20%	of excavation				
		30,800	CY	6,160	# of 10CY truck trips	7.04	one-way trips/day
24	Structural Excavation	28,000	CY	5,600	# of 10CY truck trips	6.40	one-way trips/day
12	Aggregate Base Materials	7,000	CY x 1 ton/CY	1,400	# of 10CY truck trips	1.60	one-way trips/day
	Excavation and Base Materials Subtotal	***145,880***	***CY***	***29,176***	***# of 10CY truck trips*** (to and from site)	**33.34**	**one-way trips/day** (to and from site)

Construction Workers

15	Construction Workers per day		
	average	150-200	workers/day
	peak	220-260	workers/day

16	**Est. Num of Construction Wokers vehicle trips per day**		
	average	320-390	one-way trips/day (assuming carpooling)
		355	**avg. one-way trips/day (assuming carpooling)** (to and from site)

	Construction Phase and Duration	**Equipment**				**Haul & Delivery**	
29	**Utility relocation**						
	15						
	days						
31	**Structural Ex. & Haul Off & Foundation Prep**						
	Mass Excavation & H: 165	1	CS-323C Compactor	165	days	Materials 40	trips/day
	days	1	426 Backhoe	165	days	10	CY/trip
		1	135 Motor Grader	165	days	2	trucks
		1	4,000 Gal Water Truck	165	days	800	CY/day
	Class II landfill dispos 92					Landfill disposal 1	trip/day
	days					10	CY/trip
						34	trucks
						340	CY/day
32	**Yard piping**	1	320 Excavator	140	days		
	140	1	980G Loader	140	days		
	days	1	10CY Dump Truck	140	days		
33	**Process Equipment Set & Above-grade Process Piping Installation**	1	320 Excavator	300	days		
	300	1	980G Loader	300	days		
	days	2	10CY Dump Truck	300	days		
		1	CS-323C Compactor	240	days		
		1	426 Backhoe	300	days		
		1	TH63 Telescopic Handlers	240	days		
		1	60 Ton RTC-8065 Crane	240	days		
		1	4,000 Gal Water Truck	300	days		
34	**Paving - 58 TSF**	1	135H Motor Graders	20	days	Asphalt Delivery 4	trips/day
	20	1	AP1000B Asphalt Paver	20	days	10	CY/trip
	days	2	CS-323C Compactor	20	days	10	trucks
		1	10CY Dump Truck	20	days	400	CY/day
		1	4,000 Gal Water Truck	20	days		
35	**Architectural coatings**	1	60 Ton RTC-8065 Crane	60	days		
	60	1	TH63 Telescopic Handlers	60	days		
	days						
	ALL CONSTRUCTION PHASES	11	unique equipment	each piece of equipment travels to and from the work site once			

CONSTRUCTION PHASE	**One-Way Trips**	**Miles/Trip**	**VMT**
Regular Landfill Haul Trips			
Entire Construction Period	21,616.00	31.50	680,904.00
Per Day	24.70	31.50	778.18
Hazardous Landfill Haul Trips			
Entire Construction Period	6,160.00	200.00	1,232,000.00
Per Day	7.04	200.00	1,408.00
Base Materials Haul Trips			
Entire Construction Period	1,400.00	10.00	14,000.00
Per Day	1.60	10.00	16.00
Construction Workers			
Entire Construction Period	310,625.00	19.66	6,106,560.83
Per Day	355.00	19.66	6,978.93
Construction Equipment Traveling To/From Work Site			
Entire Construction Period	22.00	30.00	660.00
Per Day	0.03	30.00	0.75
All Items			
Entire Construction Period	339,823.00		8,034,124.83
Per Day	388.37		9,181.86

CONSTRUCTION PHASE - By Trip Type and LV/HV	**One-Way Trips**	**VMT**
Construction Workers + Non-Haul Truck		
Entire Construction Period		
LV	310,625.00	6,106,560.83
HV	22.00	660.00
Per Day		
LV	355.00	6,978.93
HV	0.03	0.75
Haul Truck		
Entire Construction Period		
LV	-	-
HV	29,176.00	1,926,904.00
Per Day		
LV	-	-
HV	33.34	2,202.18
All Items		
Entire Construction Period		
LV	310,625.00	6,106,560.83
HV	29,198.00	1,927,564.00
Per Day		
LV	355.00	6,978.93
HV	33.37	2,202.93

CONSTRUCTION PHASE - By Roadway Type PER DAY ADT			
	Arterial	Collector	Local
Regular Landfill Haul Trips			
HV	24.70	-	-
Hazardous Landfill Haul Trips			
HV	7.04	-	-
Base Materials Haul Trips			
HV	1.46	0.14	-
Construction Workers			
LV	344.35	10.65	-
Construction Equipment Traveling To/From Work Site			
HV	0.02	0.00	-
All Items			
LV	344.35	10.65	-
HV	33.22	0.15	-
Total	377.57	10.80	-

Assumptions

100% to/from I-110 NB Ramp at Sepulveda Blvd.

100% to/from I-110 NB Ramp at Sepulveda Blvd.

45% travel on E/W arterials; 45% on N/S arterials, 10% to/from I-110

20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110

30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110

	ADT to/from freeway	ADT E/W arterials or N/S arterials
LV	241.05	113.96
HV	31.90	1.47
Total	272.95	115.42

CONSTRUCTION PHASE - By Land Use PER DAY ADT			
	Industrial	Commercial	Residential
Regular Landfill Haul Trips			
HV	19.76	3.71	1.24
Hazardous Landfill Haul Trips			
HV	5.63	1.06	0.35
Base Materials Haul Trips			
HV	0.42	0.24	0.94
Construction Workers			
LV	220.10	55.03	79.88
Construction Equipment Traveling To/From Work Site			
HV	0.01	0.00	0.01
All Items			
LV	220.10	55.03	79.88
HV	25.83	5.01	2.54
Total	245.93	60.03	82.41

Assumptions

100% to/from I-110 NB Ramp at Sepulveda Blvd.

100% to/from I-110 NB Ramp at Sepulveda Blvd.

45% travel on E/W arterials; 45% on N/S arterials, 10% to/from I-110

20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110

30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110

CONSTRUCTION PHASE - By Land Use PER DAY VMT			
	Industrial	Commercial	Residential
Regular Landfill Haul Trips			
HV	622.54	116.73	38.91
Hazardous Landfill Haul Trips			
HV	1,126.40	211.20	70.40
Base Materials Haul Trips			
HV	4.16	2.40	9.44
Construction Workers			
LV	4,326.93	1,081.73	1,570.26
Construction Equipment Traveling To/From Work Site			
HV	0.42	0.12	0.21
All Items			
LV	4,326.93	1,081.73	1,570.26
HV	1,753.52	330.45	118.96
Total	6,080.46	1,412.18	1,689.22

miles/trip	***Assumptions***
	100% to/from I-110 NB Ramp at Sepulveda Blvd.
31.50	
	100% to/from I-110 NB Ramp at Sepulveda Blvd.
200.00	
	45% travel on E/W arterials; 45% on N/S arterials, 10% to/from I-110
10.00	
	20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110
19.66	
	30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110
30.00	

Operations Phase

	Item	Quantity	Unit	
46	**Employees (Attachment G)**	67		
44	Operations Staff	18	based on ratio from previous version (36 ops staff out of 129 employees from old Attachment G)	
	Operations (24 hour coverage, 12 hr/shift)		now Phase 1 and 2 combined 127+67=194 employees	
	Non-Operations Staff	49		
	Non-Opeations (40 hrs/week, 5 weekdays)			
46	Est. # vehicle trips per day/week/month	67	employees	
		0	visitors	
		67	round-trips/day	
		134	**one-way trips/day**	
48	**Chemical Deliveries (Attachment F)**			
	Total Chemical Deliveries	10	deliveries/day	based on ratio of # of deliveries and MGD capacity from previous version
		20	**one-way trips/day**	previously 14 deliveries for additonal 50 MGD capacity, now additional 35 MGD capacity

OPERATIONS PHASE			
	One-Way Trips	Miles/Trip	VMT
Employee + Visitor Trips			
Per Day	134.00	19.66	2,634.30
Chemical Deliveries Trips			
Per Day	19.60	30.00	588.00
All Iterms			
Per Day	153.60		3,222.30

CONSTRUCTION PHASE - By Roadway Type PER DAY ADT			
	Arterial	Collector	Local
Employee + Visitor Trips			
LV	129.98	4.02	-
Chemical Deliveries Trips			
HV	18.82	0.78	-
All Items			
Total	148.80	4.80	-

Assumptions

20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110

30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110

CONSTRUCTION PHASE - By Land Use PER DAY ADT			
	Industrial	Commercial	Residential
Employee + Visitor Trips			
LV	83.08	20.77	30.15
Chemical Deliveries Trips			
HV	10.98	3.14	5.49
All Items			
Total	94.06	23.91	35.64

Assumptions

20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110

30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110

CONSTRUCTION PHASE - By Land Use PER DAY VMT			
	Industrial	Commercial	Residential
Construction Workers			
LV	1,633.27	408.32	592.72
Chemical Deliveries Trips			
HV	329.28	94.08	164.64
All Items			
Total	1,962.55	502.40	757.36

miles/trip	***Assumptions***
	20% travel on E/W arterials; 10% on N/S arterials, 70% to/from I-110
19.66	
	30% travel on E/W arterials; 10% on N/S arterials, 60% to/from I-110
30.00	

Summary - Daily ADT (Average Daily Throughout the Construction Schedule)				
		Phase 1	Phase 2	Total
Construction Worker and Non-Haul Truck ADT Per Day	Light Vehicle	635	355	990
	Heavy Vehicle	0	0	0
	Total	635	355	990
Haul Truck Trips ADT Per Day	Light Vehicle	-	-	-
	Heavy Vehicle	81	33	114
	Total	81	33	114
Total ADT Per Day	Light Vehicle	635	355	990
	Heavy Vehicle	81	33	114
	Total	716	388	1,104

Summary - Daily VMT (Average Daily Throughout the Construction Schedule)				
		Phase 1	Phase 2	Total
Construction Worker and Non-Haul Truck VMT	Light Vehicle	12,483	6,979	19,462
	Heavy Vehicle	1	1	2
	Total	12,485	6,980	19,464
Haul Truck Trips VMT	Light Vehicle	-	-	-
	Heavy Vehicle	4,960	2,202	7,162
	Total	4,960	2,202	7,162
Total VMT	Light Vehicle	12,483	6,979	19,462
	Heavy Vehicle	4,961	2,203	7,164
	Total	17,445	9,182	26,626

Summary - Construction Schedule # of Days		
	Phase 1	Phase 2
Number of Construction Days	1,410	875

Summary - ADT (Throughout the Construction Schedule)				
		Phase 1	Phase 2	Total
Construction Worker and Non-Haul Truck ADT Per Day	Light Vehicle	895,169	310,625	1,205,794
	Heavy Vehicle	58	22	80
	Total	895,227	310,647	1,205,874
Haul Truck Trips ADT Per Day	Light Vehicle	-	-	-
	Heavy Vehicle	113,688	29,176	142,864
	Total	113,688	29,176	142,864
Total ADT Per Day	Light Vehicle	895,169	310,625	1,205,794
	Heavy Vehicle	113,746	29,198	142,944
	Total	1,008,915	339,823	1,348,738

Summary - VMT (Throughout the Construction Schedule)				
		Phase 1	Phase 2	Total
Construction Worker and Non-Haul Truck VMT	Light Vehicle	17,598,073	6,106,561	23,704,634
	Heavy Vehicle	1,740	660	2,400
	Total	17,599,813	6,107,221	23,707,034
Haul Truck Trips VMT	Light Vehicle	-	-	-
	Heavy Vehicle	6,992,052	1,926,904	8,918,956
	Total	6,992,052	1,926,904	8,918,956
Total VMT	Light Vehicle	17,598,073	6,106,561	23,704,634
	Heavy Vehicle	6,993,792	1,927,564	8,921,356
	Total	24,591,865	8,034,125	32,625,990

Distribution of Daily Project Trips ADT by Roadway Classification				
Vehicle Type	Roadway Class	Phase 1	Phase 2	Total
Light Vehicle	Arterial	603	337	941
	Collector	12	7	19
	Local	20	11	30
Heavy Vehicle	Arterial	78	33	111
	Collector	2	0	2
	Local	1	0	1
Total	Arterial	681	370	1051
	Collector	14	7	21
	Local	20	11	31

Daily Project Trips ADT on Route to Freeway			
Vehicle Type	Roadway Class	Phase 1	Phase 2
Light Vehicle	Arterial	431	241
Heavy Vehicle	Arterial	71	32
Total	Arterial	503	273

Daily ADT per Link by Roadway Classification - Within 5 miles buffer of contract					
Scenario	Vehicle Type	Roadway Class	Phase 1	Phase 2	Total
NP	TruckADT	Arterial	1,329	1,329	2,658
		Collector	424	424	849
		Local	177	177	354
	All ADT	Arterial	19,877	19,877	39,754
		Collector	1,741	1,741	3,481
		Local	2,279	2,279	4,557
Project Trips	TruckADT	Arterial	78	33	111
		Collector	2	0	2
		Local	1	0	1
	All ADT	Arterial	681	370	1,051
		Collector	14	7	21
		Local	20	11	31
NP + Project Trips	TruckADT	Arterial	1,407	1,362	2,769
		Collector	426	425	851
		Local	178	177	355
	All ADT	Arterial	20,558	20,247	40,805
		Collector	1,755	1,748	3,503
		Local	2,299	2,290	4,589
% Change (NP + Project Trips) - (NP)	TruckADT	Arterial	6%	2%	4%
		Collector	0%	0%	0%
		Local	0%	0%	0%
	All ADT	Arterial	3%	2%	3%
		Collector	1%	0%	1%
		Local	1%	0%	1%

Daily ADT per link on Route to Freeway				
Scenario	Vehicle Type	Roadway Class	Phase 1	Phase 2
NP	TruckADT	Arterial	1,710	1,710
	All ADT	Arterial	39,257	39,257
Project Trips	TruckADT	Arterial	71	32
	All ADT	Arterial	503	273
NP + Project Trips	TruckADT	Arterial	1,781	1,742
	All ADT	Arterial	39,760	39,530
% Change (NP + Project Trips) - (NP)	TruckADT	Arterial	4%	2%
	All ADT	Arterial	1%	1%

APPENDIX K – AWP FACILITY EMPLOYEE REQUIREMENTS

Appendix G – Operations & Maintenance (O&M) Staffing Estimates

BASIS: Orange County (OC) Groundwater Replenishment System (GWRS)
Adjustments Staffing Levels: pro-rate per flow

- OC GWRS – 100 mgd
- MWD –
    - Phase 1: 100 mgd
    - Phase 2: additional 50 mgd – 150 mgd total
- Consider Phase flow (150 mgd) and adjust for Phase 1 (100 mgd)
- Adjustment: Phase 2 Total = 150 mgd / GWRS Staff x 1.5 = MWD staff
- Complexity: RRWP will have more processes and greater capacity – 1.5 factor should compensate for both capacity and complexity.

OC GWRS Total Staff:

- Reference: *Water Production/Groundwater Replenishment System org chart dated April 2021*
- Staff Positions and Numbers
    - Exec Director + Sr Admin = 2
    - Process Controls = 17
    - Maintenance = 19
    - Operations = 23
    - Chemist = 1*
    - TOTAL = 62

Staffing for Ultimate Capacity (150 MGD)
Estimated MWD RRWP Staff (rounded)

- Exec Director + Sr Admins = 3
- Process Controls = 25
- Maintenance = 25
- Operations = 36
- Chemist = 40
- TOTAL = 129

Work Schedule:

- All except Operations
    - Monday to Friday
    - 40 hrs/week
- Operations
    - 4 operating shifts
    - 8 persons per shift + 1 floater
    - Shifts
        - First Half of Week
            - Shift 1 - 7 AM to 7 PM
            - Shift 2 - 7 PM to 7 AM

- Second Half of Week
    - Shift 3 - 7 AM to 7 PM
    - Shift 4 - 7 PM to 7 AM

*** Note:** MWD indicated 40 staff for sampling and analysis – lab

Staffing for Phase 1 (100 MGD)

	Phase 2 – 150 mgd Staffing	**Phase 1 – 100 mgd Staffing**	**Adjustment Basis**
Exec Director + Sr Admins	3	3	Same staff
Process Controls	25	21	Some reduction
Maintenance	25	22	Some reduction
Operations	36	32	Some reduction
Chemist	40	36	Some reduction
TOTAL	129	114	

Work Schedule:

- All except Operations
    - Monday to Friday
    - 40 hrs/week
- Operations
    - 4 operating shifts
    - 7 persons per shift + 1 floater
    - Shifts
        - First Half of Week
            - Shift 1 - 7 AM to 7 PM
            - Shift 2 - 7 PM to 7 AM
        - Second Half of Week
            - Shift 3 - 7 AM to 7 PM
            - Shift 4 - 7 PM to 7 AM

Phase 1 AWT Implementation
115 MGD Capacity

	DATA NEEDS MATRIX		DATA SOURCE/ CITATION (document/ page)	NEEDED BY
	GENERAL PROJECT INFORMATION			
1.	Site Location-FORCO or alternate site?	The full-scale AWT facility would be sited within the LACSD's Warren Water Resource Facility (Warren Facility) located at 24501 South Figueroa Street in Carson, California. Specifically, the new AWT facility would be situated within the confines of the area that was the former location of the Fletcher Oil and Refinery Company (FORCO). This 36 acres of property is immediate east of the Warren Facility's existing secondary treatment facilities. If the entire area east of the clarifier is made available the total area available is 54 acres. It is bounded to the east by S. Main St., to the south by E. Lomita Blvd., to the north by a railroad easement and the west by the existing treatment works. There are residential neighborhoods to the south with commercial properties to the east and north. An additional two acres is required for the workforce training center, bringing the total impacted area to 56 acres.	Description Summary in CPSR Sct 1.3, pages 1-15, 16, and Section 4 Presentation October 28, 2020 – "A New Source of Water", Southern California Water Dialogue.	12/6/2021
2.	Summary of major operating components	The proposed AWT would provide additional treatment to the HPOAS effluent resulting in a highly treated water compliant with established water quality standards consistent with indirect potable reuse. The new AWT facility would include, but not be limited to the following components: fine screening, micro/ultrafiltration, membrane bioreactor (MBR), reverse osmosis (RO) and ultraviolet irradiation with advanced oxidation processes to provide IPR level treatment. For DPR level treatment, ozone, BAC and/or MF would be added to the process train. RO brine would be discharged to the Warren Facility's ocean outfall directly. See **Appendix A** for the process flow diagram.	CPSR page 1-16, Figure 1.8	12/6/2021
3.	Site configuration - acres/dimensions (site plan for major operating components, including heights/depths)	• The "Joint Plant Site" (aka the Fletcher Oil and Refining Company - FORCO site) is located at 24721-24327 Main Street, Carson California. It is a 36 acre parcel. In 2000, the property was purchased by the County Sanitation Districts of Los Angeles County expanding their Warren Facility. The site has remained basically unused since purchase. Current plans are to locate the proposed AWT and ancillary facilities for IPR and DPR levels of treatment within the confines of this property. See **Appendix B** for Site Plan and **Appendix C** for AWTP Construction Phasing Site Plan. • Structures Dimensions Table (**Appendix D**)	From Stantec's BIM model	1/3/2022
4.	Improvements needed at Warren Facility (flow equalization, centrate treatment, source control, brine handling, etc.)	There may be modifications to the HPOAS reactors to provide nitrogen reduction (NDN) within the secondary treatment system. Portions of existing secondary clarifiers may be used for flow equalization. Centrate treatment is under consideration as well to provide nitrogen reduction in return sidestreams. The soil excavation amount for centrate treatment is included and is currently assumed to be at the solids processing facilities site (outside the FORCO site) at the Warren Facility. RO brine would be discharged directly to the Warren Facility's ocean outfall.	Conversation with LACSD staff	1/3/2022
5.	Treatment train description	Primary + Secondary effluent + Fine Screening + NdN Secondary MBR + RO + UV/AOP + Stabilization (See **Appendix A** – Process Flow Diagram). RO brine will be discharged directly to the ocean outfall of the Warren Facility. Ozone followed by BAC may be incorporated into this treatment train immediately following the MBR to achieve DPR levels of treatment. MF may follow the BAC as well to reduce the potential for solids carryover. Current assumption is that ozone will be generated using the oxygen supplied from the Warren Facility's existing infrastructure.		7/1/2022
6.	Boron management approach (CPSR p. 4-5); treatment at Warren Facility site or satellite treatment facility (CPSR p. 9-5)	Boron concentrations in the Warren Facility effluent are 0.88 and 1.1 mg/L, median and maximum, respectively. The largest contribution of boron to the Warren Facility has been attributed to industrial discharges in the collection system, specifically waste discharges from oilfields.	CPSR Appendix E Section 1.0	1/3/2022

		Inasmuch as that boron is naturally occurring, source control via product substitution is not an option for boron reduction. The basin plan objective for the Main San Gabriel basin is 0.5 mg/L for boron. The presence of boron in the secondary effluent from the Warren Facility at levels exceeding the Main San Gabriel groundwater basin plan limit of 0.5 mg/L may require either source control or treatment for boron removal at the AWT Facility. Treatment can be accomplished using ion-exchange processes. Options exist relative to the resin employed. The current approach is to assess the basin's assimilative capacity compared to boron levels in the recycled water. The preliminary findings are that no separate treatment is required.	Communications with G.L. Bluml – weekly status meeting – November 16, 2021	
7.	Phasing of improvements (for delivery quantities, meeting OC Basin nitrate requirements, meeting DPR requirements, etc.) (Metropolitan to review and update)	There will be 2 phases for the planned improvements. • Phase 1: 115 mgd of IPR AWT capacity and associated conveyance systems (pumping stations and pipelines) from the Warren Facility (Joint Plant Site - FORCO) to the Santa Fe spreading basins with diversion feeders to transport product water to the Rio Hondo spreading basins. 25 MGD of IPR treated water will be further treated to DPR level at either Weymouth WTP or a satellite facility. • Phase 2: Additional 35 mgd of IPR and 150 MGD of DPR-level treatment at the Joint Plant Site. See **Appendix C** for AWTP construction phasing site plan and **Appendix H** for AWPF Construction Schedule.		12/01/2023
8.	Variation in plant operations to accommodate varying basin capacity (rain events, maintenance?)	Spreading basin routine maintenance is not expected to impact AWT operations. The basins will be on a rotation such that the capacity for infiltration is kept at a nearly constant rate. During rain events, if the spreading basins are unavailable, product water flow will be diverted to a gravel pit for storage and groundwater recharge via spreading or injection. Excess flow will be pumped back into the system when spreading capacity becomes available.		1/3/2022
9.	New/modified upstream treatment facilities?	LACSD is considering modifying a portion of their bioreactor modules at the Warren Facility to nitrifying-denitrifying process modules and adding sidestream centrate treatment in future. (see #4)		12/6/2021
10.	Project Operational Year(s)	Phase 1 – 2032 (115 MGD) Phase 2 – 2036 (150 MGD-total)		1/3/2022
	CONSTRUCTION PHASE			
11.	Will there be pile driving? If so, where and for what duration?	There is no pile driving planned.	Available LACSD geotech reports reviewed	1/3/2022
12.	Depth/quantities of excavation/fill Hazardous waste topsoil removal **FORCO Update**: Metropolitan met with LACSD to get an update on FORCO site activities. Psomas completed a survey. Additional geotechnical and surveying services may not be needed. Assuming 110,000 cubic yard of earth volume may need to be disposed to landfill; disposal cost estimated at $17M. Contour map is also available. Weekly status meeting notes – 12/14/21	There is pumping to and from the AWT allowing for flexibility in the establishment of the hydraulic grade line through the processes. This also permits the siting of facilities to balance the cut and fill to an extent and thereby minimize import or export of soils. There would be the importation of aggregate base materials for all structures. Quantities of excavation and aggregate importation are: Excavation for structures (estimate from Stantec's BIM model) • 552,000 cubic yards; (includes construction quantities related to oil well abandonments at the Joint Plant Site; see Appendix J) • Aggregate base materials – 72,000 tons (72,000 cubic yards x 1 ton/cubic yard) *[The depth of excavation is generally assumed to be one (1) foot below the depth of structures as shown on structural dimensions, with greatest depth at approximately 30 feet below grade surface(bgs). The approximate quantity of mass excavation is 552,000 cy., of which an estimated 20%* (110,000 cy.) *is assumed to be contaminated and is to be disposed of at a Class II landfill such as Kettleman Hills Hazardous Waste Facility. Of the soil remaining after this disposal, 35% (155,000cy.) is to be used as structural backfill.*	Quantity take-offs from Stantec's Environmental Planning BIM model and LACSD's input for contaminated soil volume	12/01/2023
13.	Hazardous materials remediation plan	This will be part of the design process whether by Metropolitan or by LACSD.		7/1/2022
14.	Utility relocation needs, if any (CPSR p. 4-7)	An 8" gas line will be abandoned.	From Stantec's BIM	12/01/2023

			model	
15.	Estimated number of construction workers per day	Average estimated workers per day including Contractor mgmt. staff, trade craftsman, CM staff, Designer & Owner staff – 250 to 300 /day. Peak will be 560 – 620 / day. The construction activities are expected to continue for the remaining 85 MGD of capacity while the first 30 MGD worth of infrastructure is being commissioned (see **Attachment H** - Construction Schedule)	Carollo CM SME	1/3/2022
16.	Estimated number of construction worker vehicle trips per day	590 - 680 trips / day* - Typical worker ride share Will depend on greater carpooling needs due to timing of 2028 Olympics.	Carollo CM SME	1/3/2022
17.	Will there be weekend or nighttime construction? If nighttime or weekend requirements, type of expected construction.	Yes, the typical weekend work limited to concrete sandblasting to prepare for adjacent pours, materials movements to prepare for Monday work tasks. Nighttime work limited to “tie-ins” only.	Carollo CM SME	1/3/2022
18.	Construction staging area and storage location(s)	**Staging area** should include areas for Field Offices – all parties, immediate Contractor mgmt. staff parking, CM staff parking, Designer & Owner staff parking. **Storage area** for “ConEx” boxes for every trade, “heavy machinery”, major materials deliveries (wood, steel, electrical cable, piping, valves, misc. metals, process equipment, electrical gear, etc.), tools & supplies storage **Plus – Day Staging areas** immediately adjacent to structures for materials & tools storage for each trade. **Location:** There are approximately 5 acres available for staging and storage at the southwest corner of the site where future DPR facilities will be located; see **Appendix B** for the site layout.	Carollo CM SME	12/01/2023
19.	Construction worker vehicle parking	Additional area for worker parking - rental of off-site parking areas such as local church parking lots or other interim use facilities. There is an area immediate north of the proposed site just beyond the railroad tracks owned by LACSD that may be a candidate site.	Carollo CM SME	1/3/2022
20.	Power Supply (generators?)	Power supply from existing adjacent plant switchyard could provide power for the Field Office complex provided by Owner. Separate power supply / distribution systems will be required for the Construction Temporary Power. A Contractor distribution system will be required for construction through-out project site by Contractor.	Carollo CM SME	1/3/2022
21.	Temporary Lighting (main-powered or generator-powered)	Temporary lighting provided by Contractor from Construction Temporary Power distribution system required for construction throughout project site.	Carollo CM SME	1/3/2022
22.	Water Supply (hydrants? water trucks?)	Water Supply systems – potential separate potable and recycle water systems. Potable water distribution systems for the Field Office complex provided by Owner initially - Construction Temp. For environmental assessment assume a new, separate connection to the nearest potable supply for AWT. Non-potable water distribution system required for construction through-out project site by Contractor in purple pipe for dust control during excavations, grading, trenching and backfill operations. Non-potable water provided by Owner, free or at cost.	Carollo CM SME	1/3/2022
23.	Maximum number of daily one-way haul truck trips due to material transportation (e.g., off-haul/disposal, supplies, material); type of trucks; estimated distance, clear delineation of daily maximum trips separated by demolition waste and clean excavation disposal materials types.	25 one-way haul trips minimum, up to 50 trips on concrete pour days. Does not include demolition or excavation trips. Type of trucks – commercial, 20 ‘ long bed, flat bed Type of trucks – concrete delivery trucks Distance – TBD nearest concrete plant	Carollo CM SME	1/3/2022
24.	Volume of any material imported/exported, including demolition waste (asphalt/concrete, soils, hazardous soils, slurry, steel/metals) and clean construction materials (concrete, pipeline segments, rebar, base material/sand/gravel, etc.).	Per Stantec’s BIM model, • Volume of mass excavation is 552,000 cy. • Volume of structural excavation is 99,000 cy.	Carollo CM SME	12/01/2023
25.	Plans for recycling of materials as applicable (need % diverted), otherwise we use state default	Soil volume to be used in structural backfill is approx. 155,000 cy, as explained in row 12.	Carollo CM SME	12/01/2023

26.	Locations for ingress to/egress from construction site. If any temporary changes to the local street striping/traffic flow will be implemented, describe those (description can be general for program-level analysis).	Total of six entry/exit points to the site: five on Main St. and one on Lomita Blvd.; see **Appendix C**.					7/1/2022
27.	Disposal location for construction debris	Scholl Canyon Landfill or others of contractor's choice					1/3/2022
	Construction Phase	**Start and End Dates (or number of days/ weeks/months)**	**Equipment Used (Types and Quantities, incl. hp and hours/day) ***	**Haul or Material Truck Loads (in cy or truckloads)**	**Truck Travel Distance (in miles)**		
28.	Demolition/removal of existing site features? Paving: The general site area is 56 acres (max) Asphalt paving = 460,000 sf (10.5 acres) of asphaltic paving at 6" depth = 8,520 cy Demolition of Existing LACSD Warehouse Bldg. with Storm Detention Basin and Pilot Testing facility. Existing adjacent research area to remain and subject to enhancements	21 working days 21 working days	Model CAT 320 Excavator @ 160 hp x 21 days Model CAT 980G Loader @ 300 hp x 21 days 10 CY End Dump Materials Truck x 21 days x 8 hrs. Model CAT 320 Excavator @ 160 hp x 21 days Model CAT 980G Loader @ 300 hp x 21 days 10 CY End Dump Materials Truck x 21 days x 8 hrs. day	Materials: 4 trips /day x 10 cy / trip x 25 trucks = 1,000 cy / day Haul off Demo Materials: 4 trips /day x 10 cy / trip x 4 trucks = 160 cy / day	30 miles / 1-way or 60 miles / trip assume Scholl Canyon landfill 20 miles / 1-way or 40 miles / trip assume Scholl Canyon landfill	Carollo CM SME	12/01/2023
29.	Utility relocation: Assume potential unidentified subsurface structures or utilities are found requiring removal and/relocation. Removal & capping back to POC @ property line of any such subsurface interferences. (21 days)	36 working days for tie-in	Model CAT 320 Skid Loader w/ bucket @ 75 hp 8 hrs. / day	No Haul – dig & backfill same trench	None	Carollo CM SME	12/01/2023
30.	Clear and grub of entire remaining site - The general site area is 56 acres Half of site requires clear & grub of 1 foot depth = 1,220,000 sf of area = 45,185 cy	42 working days Note: activities for demolition, utility relocation, site prep & clear and grub to occur concurrently / overlapping time frames.	Model CAT 933 Track Loader @ 70 hp x 42 days Model CAT 320 Excavator @ 160 hp x 42 days Model CAT 980G Loader @ 300 hp x 42 days 10 CY End Dump Materials Truck x 42 days x 8 hrs.	Materials: 4 trips /day x 10 cy / trip x 25 trucks = 1,000 cy / day	30 miles / 1-way or 60 miles / trip assume Scholl Canyon landfill	Carollo CM SME	12/01/2023

31.	Foundation and below grade infrastructure for Phase 1 Mass Excavation & Haul Off: Assume 552,000 cy of excavation / haul off @ rate of 1880 cy / day for Phase 1. (Amount remaining onsite is 552,000 – 110,000 = 442,000 cy). Stantec performed soil cut-fill balance to eliminate the need to haul off any excess non-contaminated soil (442,000 cy) from the site. This soil will still need to be moved within the site i.e. to fill some areas with the soil excavated from the other area. Assume 20% requires Class II landfill disposal Kettleman Hills Hazardous Waste Facility 200 miles/1 way (110,000 cy.) 400 miles/round trip (rt)	154 working days @ 8hrs / day 154-50+128 = 232 workings days @ 8 hrs/day	(3) Model CAT 420 Excavators @ 128 hp x 154 days (2) Model CAT 631E Scrappers @ 490hp x 154days (2) Model 980G Loader @ 300 hp x 154 days (4) 4,000-Gal Water Truck @ 300 hp x 8 hrs / day 10 CY End Dump Materials Truck x 154 days x 8 hrs. Model CAT CS-323C Compactor @ 80hp x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 154 days Model CAT 135 Motor Grader @ 155 hp @ 102 days 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day	Materials: 40 trips /day x 10 cy / trip x 8 trucks = 3,200 cy / day Landfill disposal 1 trip/day x 10 cy / trip x 47 trucks = 470 cy / day	Assuming longest drive on site is 0.5 miles, at a speed of 5 mph to keep dust down, should take 12 minutes per round trip of 1 mile. This allows 40 trips per day. Assuming that with the 400 mile round trip, only one trip can be made per day.	Carollo CM SME	12/01/2023
32.	Structural Excavation and Foundation Preparation after mass excavation for Phase 1.	Assume 210 days @ 8 hrs./ day	Model CAT CS-323C Compactor @ 80hp x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 140 days Model CAT 135 Motor Grader @ 155 hp @ 140 days 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day				12/01/2023
33.	Yard Piping (Dig/Lay/Backfill) for Phase 1	Assume 195 days @ 8 hrs./ day	Model CAT 320 Excavator @ 160 hp x 8 hrs. Model CAT 980G Loader @ 300 hp x 8 hrs. (2) 10 CY End Dump Materials Truck x 8 hrs. day				12/01/2023

34.	Process Equipment Set and Above-grade AWT facilities/equipment and site improvements for Phase 1 (rough grading - north to south)	Assume 1,120 days @ 8 hrs./ day Note: duration is split in several activities in schedule such as foundation prep, concrete structures, process equipment & electrical gear	Model CAT 320 Excavator @ 160 hp x 8 hrs. (2) Model CAT 980G Loader @ 300 hp x 8 hrs. (4) 10 CY End Dump Materials Truck x 8 hrs. day (2) Model CAT CS-323C Compactor @ 80hp x 200 days x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 300 days (3) Model CAT TH63 Telescopic Handlers @ 101 hp X 400 days x 8 hrs / day Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225hp x 400 days x 8 hrs / day Model Manitowoc MLC650 400Ton Crawler Crane @ 600hp x 300 days x 8 hrs /day (4) 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day				12/01/2023
35.	Paving – 420,000 sf for 30 MGD	Assume 500 lf / day = 120 days @ 8 hrs. / day	Model CAT 135H Motor Grader@ 155 hp x 120 days Model CAT AP1000B Asphalt Paver @ 225 hp @ 120 days (2) Model CAT CS-323C compactors @ 80 hp x 120 days 10 CY End Dump Materials Truck x 120 days x 8 hrs. / day. 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day	Asphalt delivery to site Materials delivery 4 trips/day x 10 cy/trip x 10 trucks		From Stantec's BIM model	12/01/2023
36.	Paving – 40,000 sf for 85 MGD	Assume 500 lf / day = 40 days @ 8 hrs. / day	Model CAT 135H Motor Grader@155 hp x 40 days Model CAT AP1000B Asphalt Paver @ 225 hp @ 40 days (2) Model CS-323C compactors @ 80 hp x 40 days 10 CY End Dump Materials Truck x 40 days x 8 hrs. / day. 4,000-Gal Water Tuck @ 300 hp x 8 hrs / day	Asphalt delivery to site Materials delivery: 4 trips/day x 10 cy/trip x 10 trucks		From Stantec's BIM model	12/01/2023
37.	Architectural coatings (Roofing and Exterior Cladding) for Phase 1	Assume 400 days @ 8 hrs./ day	Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225hp x 400 days x 8 hrs / day Model CAT TH63 Telescopic Handlers @ 101 hp x 400 days x 8 hrs / day				12/01/2023
38.	Power substation	Assume 356 days @ 8 hrs./ day	Model CAT 320 Excavator @ 160 hp x 356 days x 8 hrs. Model CAT 426 Backhoe @ 84 hp x 356 days Model CAT TH63 Telescopic Handlers @ 101 hp X 200 days X 8 hrs / day Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225hp x 200 days x 8 hrs / day 4,000 Gal Water Tuck @ 300 hp x 8 hrs / day				12/01/2023
	OPERATIONS PHASE						
39.	Height and materials of structures	Dimensions provided in **Appendix D**.					7/1/2022

40.	General design characteristics (architecture/coatings, lighting, landscaping/screening)	Typical of industrial design, neutral coatings, controlled lighting and fully landscaped at perimeter.		7/1/2022
41.	Preferred site access- employee parking and emergency vehicle access	AWTP will have six entrances/exits (see **Appendix C**). The preferred employee site access will be from Main St and the emergency exit is on Lomita Blvd. Parking Spaces P1 and P3 are for Metropolitan staff and P2 will be shared by Metropolitan staff and visitors.		12/01/2023
42.	Total footprint/acreage of new paved/impervious areas	30.2 acres	From Stantec's BIM model	1/3/2022
43.	Measures for detention/treatment of stormwater runoff	Stormwater runoff will be captured and recycled to the Warren Facility for treatment. BMPs for capture and initial storage to be employed. See **Appendix I** – Stormwater Runoff Quantities TM		1/3/2022
44.	AWT equipment types with typical operating data/characteristics	See **Appendix E**	From Stantec's BIM model	1/27/2023
45.	Estimated number of operations employees	See **Appendix G** for the basis of staffing estimates.	Reference Plant with adjustment (OC GWRS) – Pro-rated *Lab per MWD	1/27/2023
46.	Employee shifts per day when plant is in operation	See **Appendix G.**	Reference Plant with adjustment (OC GWRS)	1/27/2023
47.	Number of employees per shift	See **Appendix G**.		1/27/2023
48.	Estimated number of vehicle trips per day/week/month (project operation)	Worst case – each employee (127 staff - work commute) + 10 visitors= 137 round-trips/day (x's 5 per week / x's 20 per month)		1/27/2023
49.	Average trip distance (miles) for employees (project operation)	Employee work commute: 9.1 miles time 2 (each way) = 18.2 miles/per employee	SCAG LA County 2012 - 2016	1/3/2022
50.	Deliveries of materials, supplies or equipment (quantities, frequency)	Summary of chemical deliveries attached (**Appendix F**).		1/27/2023
51.	Will chemicals delivery occur on a 24/7 basis or weekday daytime only?	Assume 24/7 – worst case for noise relative to neighbors Assume 8 am to 5 pm – worst case for travel disruption	Worst case	1/3/2022
52.	Standby Generator(s) (expected sizing, fuel types, and locations) - Please provide frequency of testing and how often it will be used on a yearly basis.	Seven 4-MW diesel engine generators Operate - 1 hr/wk		1/3/2022
53.	Methane CoGen systems (size, number, location)?	There is no methane generated by these facilities.		1/3/2022
54.	Grid intertie power substation requirements and location(s)	To be determined during design.		1/3/2022

55.	Other operating equipment that generates emissions	No equipment with combustion emissions are planned. The biological processes will emit carbon and nitrogen compounds.		1/27/2023
56.	HVAC equipment requirements and locations	See **Appendix K**.	Footprints based on input from Metropolitan/LACSD and as incorporated in the Stantec's BIM model	12/01/2023
57.	Air handling systems size and location for treatment	See **Appendix K**.	Based on building volumes and occupancy	12/01/2023
58.	Treatment systems for odor emissions (if applicable)	If the FORCO site is used for secondary treatment (e.g., sMBR) plus AWT, the primary effluent pump station and aeration tanks are to be covered and off-gas treated • PE pump station – 430,000 scfm – bio trickling filter + activated carbon adsorption • Bioreactors – 262,000 scfm – activated carbon adsorption The potential for release and treatment of other gaseous emissions including toxics and GHGs to be assessed.	LACSD's JTAP Reports	1/3/2022
59.	Please provide annual electricity for pumps and facility.	See **Appendix E**		1/27/2023
60.	Any alternative energy generation (e.g., solar)?	1.5 MW of onsite solar power generation using approximately 11 acres of PV panels (buildings, parking, etc.).		12/01/2023
61.	Flares for excess methane emission disposal and estimates for usage of flares (if applicable)	Not applicable.		1/3/2022
62.	Annual natural gas use	Not applicable		1/3/2022
63.	Maintenance/replacement activities and frequency	Major system replacement items and interval • PROCESS – INTERVAL - NUMBER • MBR membranes – 10 yrs – 40,250 elements • MF modules – 10 years – 3,530 modules • RO cartridge filter – 0.5 years – 589 cartridges • RO elements (Stage 1 & 2) – 5 years – 16,490 elements • RO elements (Stage 3) – 1 year – 5,370 elements • UV lamps – 1.6 years – 3,140 lamps • UV ballasts – 5 years – 1,610 ballasts	Based on Stantec's updated estimates	1/27/2023
64.	List of chemicals to be used, quantities to be stored, delivery methods, and BMPs for transportation/storage/handling/disposal	See **Appendix D** – Chemical Quantities and Deliveries		1/27/2023
65.	Disposal of waste materials (rough quantities of hazardous/non-hazardous, disposal location)	Two 30-gallon drums of laboratory waste per month to be disposed per regulations.		1/3/2022
66.	Please indicate what SCAQMD air pollutant permits are required for project components.	Pending report from LACSD.		1/3/2022

67.	Overall throughput, amount of water to be injected into the ground and available for direct potable reuse.	115 MGD of IPR	Input from Metropolitan staff	1/27/2023
68.	SCAQMD Rule 402 prohibits public nuisances related to odors. Please describe if the emergency storage basin would result in a public nuisance related to odors.	Emergency storage would be for product water. The quality of this water is equivalent to fresh potable supplies. No odor related issues envisioned.		1/3/2022
	TECHNICAL INFORMATION			
69.	Geology/Soils Report	Existing reports available from LACSD; new geotechnical report currently under development and will be available by mid-August.		7/1/2022
70.	Hazardous Materials (Phase 1 ESA, Phase 2, Remedial Action Plan, etc.)	To be developed during design.		7/1/2022
71.	Conceptual grading/site plan/water quality BMPs	The site grading will provide for the capture of all site runoff associated with rainfall. Collected runoff from the process area will be pumped to the Warren Facility for treatment and rest can be infiltrated/reused, if desired. See **Appendix I** for stormwater runoff quantities.		1/27/2023
72.	Municipal Water Demand and Supply	Potable water to be provided for consumption, safety showers, sprinklers, and fire hydrants. Lab, warehouse, and maintenance shop will also require potable water service.		1/3/2022
73.	Wastewater Generation	Waste sidestream generated will be returned to the Warren Facility. These include: • Waste activated sludge • RO concentrate • Waste chemicals (associated with biological treatment, membrane cleaning and product water conditioning)		1/3/2022
74.	Solid Waste Generation and Disposal	1,100 lbs./day	CalRecyle – Industrial 8.93 lbs./day/employee	1/3/2022
75.	Data Network/Communication Backbone	Communication infrastructure to be constructed connecting plant and conveyance to Metropolitan's network and SCADA system. Also, separate communication system to be installed for coordination with LACFCD to provide the means for monitoring/reporting related to groundwater recharge status.		7/1/2022

* Typical construction equipment may include backhoe, dozers, scrapers, compactors, track hoe, trencher, loader, roller, cranes, heavy trucks

Appendices

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- C: AWTP Construction Phasing Site Plan
- D: Structures Dimensions
- E: AWTP Equipment Electrical Load List
- F: Chemical Quantities and Delivery
- G: Basis for O&M Staffing Estimates
- H: Construction Sequencing Schedule
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- K: HVAC Power Requirements for Different Structures at the AWPF

Phase 2 AWT Implementation
35 MGD Additional IPR + 150 MGD DPR Capacity

	DATA NEEDS MATRIX		DATA SOURCE/ CITATION (document/ page)	NEEDED BY
N/C	**GENERAL PROJECT INFORMATION**			
	Site Location-FORCO or alternate site?	N/C		12/6/2021
2.	Summary of major operating components	N/C		12/6/2021
3.	Site configuration - acres/dimensions (site plan for major operating components, including heights/depths)	See **Appendices B, C and D**	From Stantec's BIM model	1/3/2022
4.	Improvements needed at Warren Facility (flow equalization, centrate treatment, source control, brine handling, etc.)	N/C		1/3/2022
5.	Treatment train description	N/C		7/1/2022
6.	Boron management approach (CPSR p. 4-5); treatment at Warren Facility site or satellite treatment facility (CPSR p. 9-5)	N/C		1/3/2022
7.	Phasing of improvements (for delivery quantities, meeting OC Basin nitrate requirements, meeting DPR requirements, etc.)	N/C		1/3/2022
8.	Variation in plant operations to accommodate varying basin capacity (rain events, maintenance?)	N/C		1/3/2022
9.	New/modified upstream treatment facilities?	N/C		12/6/2021
10.	Project Operational Year(s)	N/C		1/3/2022
	CONSTRUCTION PHASE			
11.	Will there be pile driving? If so, where and for what duration?	N/C	Available LACSD geotech reports reviewed	1/3/2022

12.	Depth/quantities of excavation/fill Hazardous waste topsoil removal **FORCO Update**: Metropolitan met with LACSD to get an update on FORCO site activities. Psomas completed a survey. Additional geotechnical and surveying services may not be needed. Assuming 31,000 cubic yard of earth volume may need to be disposed to landfill; disposal cost estimated at $3.0M. Contour map is also available. Weekly status meeting notes – 12/14/21	There is pumping to and from the AWT allowing for flexibility in the establishment of the hydraulic grade line through the processes. This also permits the siting of facilities to balance the cut and fill to an extent and thereby minimize import or export of soils. There would be the importation of aggregate base materials for all structures. Quantities of excavation and aggregate importation are: • Excavation for structures (estimate from Stantec's BIM model) ○ 154,000 cubic yards • Aggregate base materials – 7,000 tons (7,000 cubic yards x 1 ton/cubic yard) *[The depth of excavation is generally assumed to be one (1) foot below the depth of structures as shown on structural dimensions, with greatest depth at approximately 30 feet below grade surface(bgs). The approximate quantity of mass excavation is 149,000 cy., of which an estimated 20%* (31,000 cy.) *is assumed to be contaminated and is to be disposed of at a Class II landfill such as Kettleman Hills Hazardous Waste Facility. Of the soil remaining after this disposal, 35% (43,000cy.) is to be used as structural backfill.*	Quantity take-offs from Stantec's Environmental Planning BIM model and LACSD's input for contaminated soil volume	12/01/2023
13.	Hazardous materials remediation plan	N/C		7/1/2022
14.	Utility relocation needs, if any (CPSR p. 4-7)	One major utility will require relocation prior to development of the FORCO site: The 10' x 12' concrete box stormwater drain will be relocated to the south end of the site (see layout) paralleling the property boundary thereby avoid bisecting of the proposed site.	From Stantec's BIM model	12/01/2023
15.	Estimated number of construction workers per day	Average estimated workers per day including Contractor mgmt. staff, trade craftsman, CM staff, Designer & Owner staff – 150 to 200 /day. Peak will be 220 – 260 / day.	Carollo CM SME	1/3/2022
16.	Estimated number of construction worker vehicle trips per day	320 - 390 trips / day* - Typical worker ride share Dependent if greater carpooling is required due to timing of 2028 Olympics.	Carollo CM SME	1/3/2022
17.	Will there be weekend or nighttime construction? If nighttime or weekend requirements, type of expected construction.	N/C	Carollo CM SME	1/3/2022
18.	Construction staging area and storage location(s)	N/C	Carollo CM SME	1/3/2022
19.	Construction worker vehicle parking	N/C	Carollo CM SME	1/3/2022
20.	Power Supply (generators?)	N/C	Carollo CM SME	1/3/2022
21.	Temporary Lighting (main-powered or generator-powered)	N/C	Carollo CM SME	1/3/2022
22.	Water Supply (hydrants? water trucks?)	N/C	Carollo CM SME	1/3/2022
23.	Maximum number of daily one-way haul truck trips due to material transportation (e.g., off-haul/disposal, supplies, material); type of trucks; estimated distance, clear delineation of daily maximum trips separated by demolition waste and clean excavation disposal materials types.	N/C	Carollo CM SME	1/3/2022
24.	Volume of any material imported/exported, including demolition waste (asphalt/concrete, soils, hazardous soils, slurry, steel/metals) and clean construction materials (concrete, pipeline segments, rebar, base material/sand/gravel, etc.).	Per Stantec's BIM model, • Volume of mass excavation is 154,000 cy • Volume of structural excavation is 28,000 cy.	Carollo CM SME	12/01/2023
25.	Plans for recycling of materials as applicable (need % diverted), otherwise we use state default	Volume of structural backfill is approx. 43,000 cy, 35% of total exported materials	Carollo CM SME	12/01/2023

26.	Locations for ingress to/egress from construction site. If any temporary changes to the local street striping/traffic flow will be implemented, describe those (description can be general for program-level analysis).	N/C					7/1/2022
27.	Disposal location for construction debris	Scholl Canyon Landfill or others of contractor's choice					1/3/2022
	Construction Phase	**Start and End Dates (or number of days/ weeks/months)**	**Equipment Used (Types and Quantities, incl. hp and hours/day) ***	**Haul or Material Truck Loads (in cy or truckloads)**	**Truck Travel Distance (in miles)**		
28.	<u>Work Items are not applicable in the Phase 2</u> **Demolition** / Removal of existing site features? **Paving**: The general site area is 56 acres (max)					Carollo CM SME	02/17/2023
29.	**Utility relocation** Storm Drain diversion and connection (15 days)					Carollo CM SME	02/17/2023
30.	<u>Work Items are not applicable in Phase 2</u> **Remediation/site preparation** – **Clear and grub of entire remaining site**					Carollo CM SME	02/17/2023
31.	**Structural Ex. & Haul Off & Foundation Prep** Mass Excavation & Haul Off: Amount needing to be moved within site 154,000 – 31,000 = 123,000 cy over 165 days. Assume 20% requires Class II landfill disposal Kettleman Hills Hazardous Waste Facility 200 miles/1 way (31,000 cy.) 400 miles/round trip (rt)	Assume 165 working days @ 8 hrs. / day Assume 32 + 60 = 92 working days @ 8 hrs / day	Model CAT CS-323C Compactor @ 80hp x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 165 days Model CAT 135 Motor Grader @ 155 hp @ 165 days 4,000-Gal Water Tuck @ 300 hp x 8 hrs. / day	Materials: 40 trips /day x 10 cy / truckload x 2 trucks = 800 cy / day Landfill disposal 1 trip/day x 10 cy / trip x 34 trucks = 340 cy / day	Assuming longest drive on site is 0.5 miles, at a speed of 5 mph to keep dust down, should take 12 minutes per round trip of 1 mile. This allows 40 trips per day. Assuming that with the 400 mile round trip, only one trip can be made per day.	Carollo CM SME	12/01/2023
32.	Yard Piping	Assume 140 days @ 8 hrs./ day	Model CAT 320 Excavator @ 160 hp x 140 days x 8 hrs. Model CAT 980G Loader @ 300 hp x 140 days x 8 hrs. 10 CY End Dump Materials Truck x 140 days x 8 hrs. day				12/01/2023

33.	Process Equipment Set & Above-grade Process Piping Installation	Assume 300 days @ 8 hrs./ day	Model CAT 320 Excavator @ 160 hp x 8 hrs. (1) Model CAT 980G Loader @ 300 hp x 8 hrs. (2) 10 CY End Dump Materials Truck x 8 hrs. day (1) Model CAT CS-323C Compactor @ 80hp x 240 days x 8hrs / day Model CAT 426 Backhoe @ 84 hp x 300 days (1) Model CAT TH63 Telescopic Handlers @ 101 hp X 240 days x 8 hrs. / day Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225 hp x 240 days x 8 hrs. / day (1) 4,000-Gal Water Tuck @ 300 hp x 8 hrs. / day				12/01/2023
34.	Paving – 58,000 sf	Assume 500 lf / day = 20 days @ 8 hrs. / day	Model CAT 135H Motor Grader@155 hp x 20 days Model CAT AP1000B Asphalt Paver @ 225 hp @ 20 days (2) Model CAT CS-323C compactors @ 80 hp x 20 days 10 CY End Dump Materials Truck x 20 days x 8 hrs. / day. 4,000-Gal Water Tuck @ 300 hp x 8 hrs. / day	Asphalt delivery to site Materials delivery 4 trips/day x 10 cy/trip x 10 trucks		From Stantec's BIM model	12/01/2023
35.	Architectural coatings (Roofing and Exterior Cladding)	Assume 60 days @ 8 hrs./ day	Model Link-Belt 60 Ton RTC-8065 Wheel Crane @ 225 hp x 60 days x 8 hrs. / day Model CAT TH63 Telescopic Handlers @ 101 hp X 8 hrs. / day				12/01/2023
36.	Power substation - Constructed in Phase 1 (during the first 30 MGD construction)						02/17/2023
	OPERATIONS PHASE						
37.	Height and materials of structures	See **Appendix D**					7/1/2022
38.	General design characteristics (architecture/coatings, lighting, landscaping/screening)	N/C					7/1/2022
39.	Preferred site access- employee parking and emergency vehicle access	N/C					1/3/2022
40.	Total footprint/acreage of new paved/impervious areas	N/C				From Stantec's BIM model	1/3/2022
41.	Measures for detention/treatment of stormwater runoff	N/C					1/3/2022
42.	AWT equipment types with typical operating data/characteristics	See **Appendix E**				From Stantec's BIM model	1/3/2022

43.	Estimated number of operations employees (additional employees for Phase 2 on top of Phase 1)	See **Appendix G** for the basis of staffing estimates.	Reference Plant with adjustment (OC GWRS) – Pro-rated *Lab per MWD	1/3/2022
44.	Employee shifts per day when plant is in operation	See **Appendix G.**	Reference Plant with adjustment (OCWD's GWRS)	1/3/2022
45.	Number of employees per shift (additional employees on top of Phase 1)	See **Appendix G**.		1/27/2023
46.	Estimated number of vehicle trips per day/week/month (project operation) – Additional trips on top of Phase 1	Worst case – each employee (67 staff - work commute) = 67 round-trips/day (x's 5 per week / x's 20 per month)		1/3/2022
47.	Average trip distance (miles) for employees (project operation)	N/C	SCAG LA County 2012 - 2016	1/3/2022
48.	Deliveries of materials, supplies or equipment (quantities, frequency)	Summary of deliveries attached (**Appendix F**).		1/3/2022
49.	Will chemicals delivery occur on a 24/7 basis or weekday daytime only?	Assume 24/7 – worst case for noise relative to neighbors Assume 8 am to 5 pm – worst case for travel disruption	Worst case	1/3/2022
50.	Standby Generator(s) (expected sizing, fuel types, and locations) - Please provide frequency of testing and how often it will be used on a yearly basis.	One additional 4-MW generator for Phase 2.		1/3/2022
51.	Methane Cogen systems (size, number, location)?	N/C		1/3/2022
52.	Grid intertie power substation requirements and location(s)	N/C		1/3/2022
53.	Other operating equipment that generates emissions	N/C		1/3/2022
54.	HVAC equipment requirements and locations	N/C		1/3/2022
55.	Air handling systems size and location for treatment	N/C	Based on building volumes and occupancy	1/3/2022
56.	Treatment systems for odor emissions (if applicable)	N/C	LACSD's JTAP Reports	1/3/2022
57.	Please provide annual electricity for pumps and facility.	See appendix for equipment and loads (**Appendix E**)		1/3/2022
58.	Any alternative energy generation (e.g., solar)?	N/C		1/3/2022

59.	Flares for excess methane emission disposal and estimates for usage of flares (if applicable)	Not applicable.		1/3/2022
60.	Annual natural gas use	Not applicable		1/3/2022
61.	Maintenance/replacement activities and frequency	Major system replacement items and interval • PROCESS – INTERVAL - NUMBER • MBR membranes – 10 yrs – 12,250 elements • MF modules – 10 years – 1,071 modules • RO cartridge filter – 0.5 years – 179 cartridges • RO elements (Stage 1 & 2) – 5 years – 5,019 elements • RO elements (Stage 3) – 1 year – 1,630 elements • UV lamps – 1.6 years – 959 lamps • UV ballasts – 5 years – 490 ballasts	Based on Stantec's updated estimates	1/27/2023
62.	List of chemicals to be used, quantities to be stored, delivery methods, and BMPs for transportation/storage/handling/disposal	See **Appendix D – Chemical Quantities and Delivery**		1/27/2023
63.	Disposal of waste materials (rough quantities of hazardous/non-hazardous, disposal location)	No additional waste expected on top of Phase 1.		1/3/2022
64.	Please indicate what SCAQMD air pollutant permits are required for project components.	Pending report from LACSD		1/3/2022
65.	Overall throughput, amount of water to be injected into the ground and available for direct potable reuse.	Additional 35 MGD of IPR and 150 MGD of DPR	Input from Metropolitan staff	1/26/2023
66.	SCAQMD Rule 402 prohibits public nuisances related to odors. Please describe if the emergency storage basin would result in a public nuisance related to odors.	Emergency storage would be for product water. The quality of this water is equivalent to fresh potable supplies. No odor related issues envisioned.		1/3/2022
	TECHNICAL INFORMATION			
67.	Geology/Soils Report			7/1/2022
68.	Hazardous Materials (Phase 1 ESA, Phase 2, Remedial Action Plan, etc.)			7/1/2022
69.	Conceptual grading/site plan/water quality BMPs	N/C		1/3/2022
70.	Municipal Water Demand and Supply	N/C		1/3/2022
71.	Wastewater Generation	N/C		1/3/2022
72.	Solid Waste Generation and Disposal	1,150 lbs./day	CalRecyle – Industrial 8.93 lbs./day/employee	1/3/2022

73.	Data Network/Communication Backbone	Communication infrastructure to be constructed connecting plant and conveyance to Metropolitan's network and SCADA system. Also, separate communication system to be installed for coordination with LACFCD to provide the means for monitoring/reporting related to groundwater recharge status.		7/1/2022

* Typical construction equipment may include backhoe, dozers, scrapers, compactors, track hoe, trencher, loader, roller, cranes, heavy trucks

Appendices

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APPENDIX L – CITY OF CARSON VMT THRESHOLD GUIDELINES

CITY OF CARSON

PLANNING COMMISSION

RESOLUTION NO. 22-XXXX

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF CARSON, CALIFORNIA, RECOMMENDING THE CITY COUNCIL ADOPT "VEHICLE MILES TRAVELED" THRESHOLDS OF SIGNIFICANCE FOR PURPOSES OF ANALYZING TRANSPORTATION IMPACTS UNDER THE CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) AND FIND THAT THE ACTION IS EXEMPT FROM CEQA

WHEREAS, the California Environmental Quality Act Guidelines ("CEQA Guidelines") encourage public agencies to develop and publish generally applicable "thresholds of significance" to be used in determining the significance of a project's environmental effects; and

WHEREAS, CEQA Guidelines section 15064.7(a) defines a threshold of significance as "an identifiable quantitative, qualitative or performance level of a particular environmental effect, noncompliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant"; and

WHEREAS, CEQA Guidelines section 15064.7(b) provides that thresholds of significance to be adopted for general use as part of the lead agency's environmental review process must be adopted by ordinance, resolution, rule, or regulations, developed through a public review process, and be supported by substantial evidence; and

WHEREAS, pursuant to CEQA Guidelines section 15064.7(c), when adopting thresholds of significance, a lead agency may consider thresholds of significance adopted or recommended by other public agencies provided that the decision of the lead agency to adopt such thresholds is supported by substantial evidence; and

WHEREAS, Senate Bill 743, enacted in 2013 and codified in Public Resources Code section 21099, required changes to the CEQA Guidelines regarding the criteria for determining the significance of transportation impacts of projects; and

WHEREAS, in 2018, the Governor's Office of Planning and Research ("OPR") proposed, and the California Natural Resources Agency certified and adopted, new CEQA Guidelines section 15064.3 that identifies vehicle miles traveled ("VMT") – meaning the amount and distance of automobile travel attributable to a project – as the most appropriate metric to evaluate a project's transportation impacts under CEQA. CEQA Guidelines section 15064.3 went into effect on July 1, 2020; and

WHEREAS, as a result, automobile delay, as measured by "level of service" and other similar metrics, generally no longer constitutes a significant environmental effect under CEQA; and

WHEREAS, on October 11, 2022, the Planning Commission conducted a duly noticed public hearing to consider the proposed VMT thresholds of significance attached hereto as Exhibit "A."

WHEREAS, having done so, the Planning Commission finds that proposed VMT thresholds of significance, are supported by substantial evidence. The proposed thresholds are consistent with OPR guidance. The process utilized the SCAG model, reflecting City baseline land use and transportation network to develop the VMT thresholds. This was largely completed through technical analysis using the model and spreadsheets and translated into transportation study guidelines; and

WHEREAS, the City's project review process will retain "level of service" analysis to ensure consistency with the General Plan.

NOW, THEREFORE, THE PLANNING COMMISSION OF THE CITY OF CARSON, CALIFORNIA, HEREBY RESOLVES AS FOLLOWS:

Section 1. The foregoing recitals are true and correct, and are incorporated herein as findings of fact.

Section 2. The adoption of new local CEQA VMT thresholds of significance for transportation impacts will not have a significant environmental impact and is exempt from the CEQA pursuant to Section 15308 of Title 14 of the California Code of Regulations because the action is undertaken by the City for the protection of the environment. The revised CEQA thresholds will be compliant with State law (SB 743) and will be used in a regulatory process (CEQA process) that involves procedures for the protection of the environment. Accordingly, the action is exempt from the environmental review requirements of CEQA pursuant to Section 15308 of Title 14 of the California Code of Regulations.

Section 3. The Planning Commission of the City of Carson hereby recommends that the City Council adopt the VMT thresholds of significance attached hereto as Exhibit "A."

Section 4. This decision of the Planning Commission shall become effective and final 15 days from the date of the action, in accordance with Section 9173.33 of the Zoning Ordinance, unless an appeal is filed within that time in accordance with Section 9173.4 of the Zoning Ordinance.

Section 5. The Secretary of the Planning Commission shall certify to the adoption of this Resolution.

APPROVED and **ADOPTED** this 11th day of October 2022.

_____
CHAIRPERSON

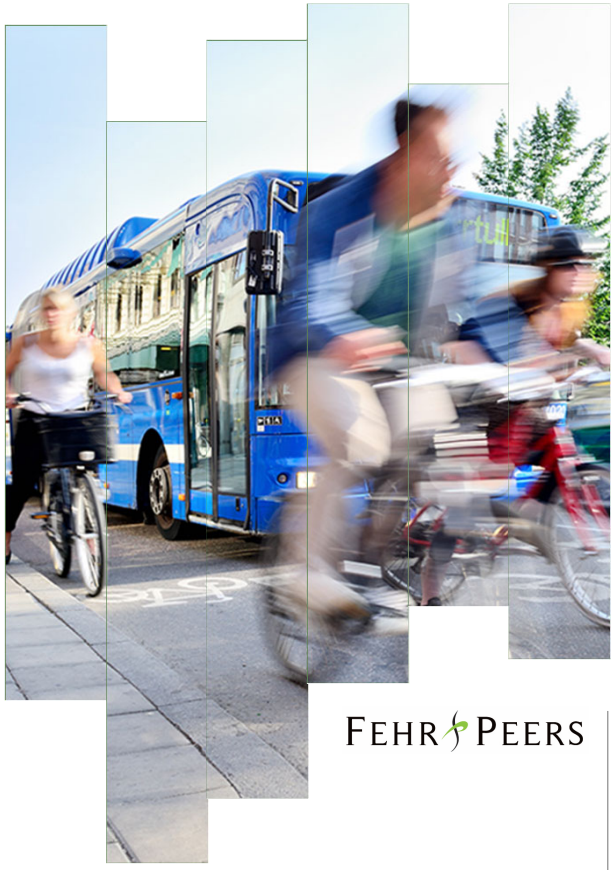
ATTEST:

_____
SECRETARY

EXHIBIT "A"

City of Carson VMT Baselines and Thresholds of Significance

[to be attached]



FEHR PEERS

City of Carson
SB 743 Implementation

EXHIBIT NO. 1A

Goals of SB 743

Shift in focus to better align with the following State goals:

- Reducing greenhouse gas (GHG) emissions
- Encouraging infill development
- Improving public health through increased active transportation

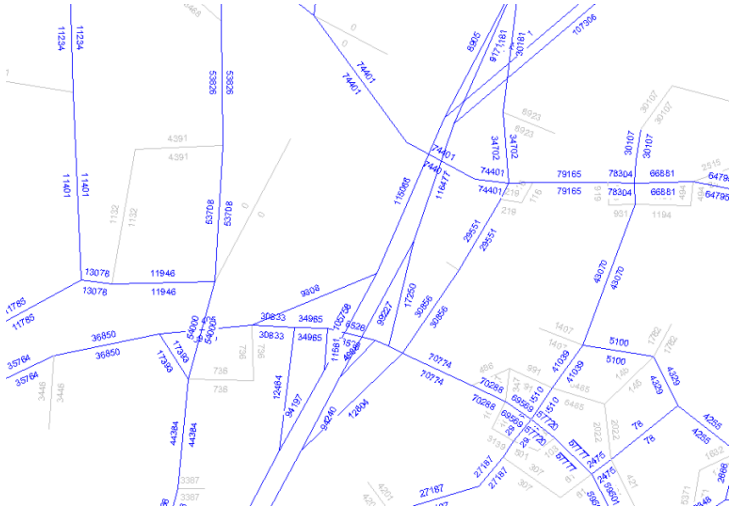
New criteria should promote:

- Development of multimodal transportation networks
- Diversity of land uses
- Ensure that the environmental impacts of traffic such as noise, air pollution, and safety concerns continue to be addressed and mitigated through CEQA

Implementation Decisions

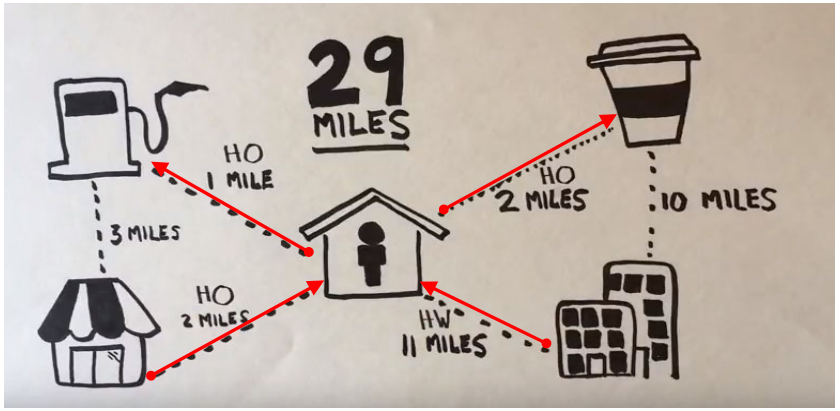
VMT Screening	• *OPR screening options* • *Project size, low VMT, TPA*
VMT Methodology	• *SCAG RTP/SCS Model* • *VMT per capita, or per employee*
VMT Impact Thresholds	• *OPR guidance is 15% below regional average*
VMT Mitigation	• *Land use mix and densities* • *TDM mitigation options*
Transportation Study Guidelines	• *Does the City still want to study LOS or other metrics?*

New VMT Methodology

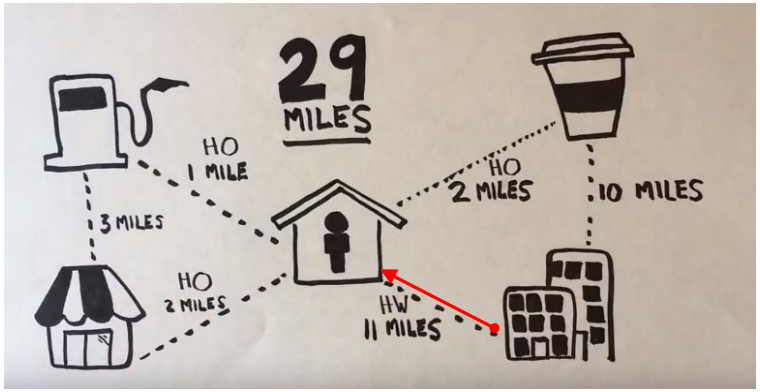


- VMT = Volume x Distance or Trips x Trip Length
- VMT data can be derived from the regional 2016 SCAG RTP/SCS Travel Demand Model

What is VMT?
What VMT counts?

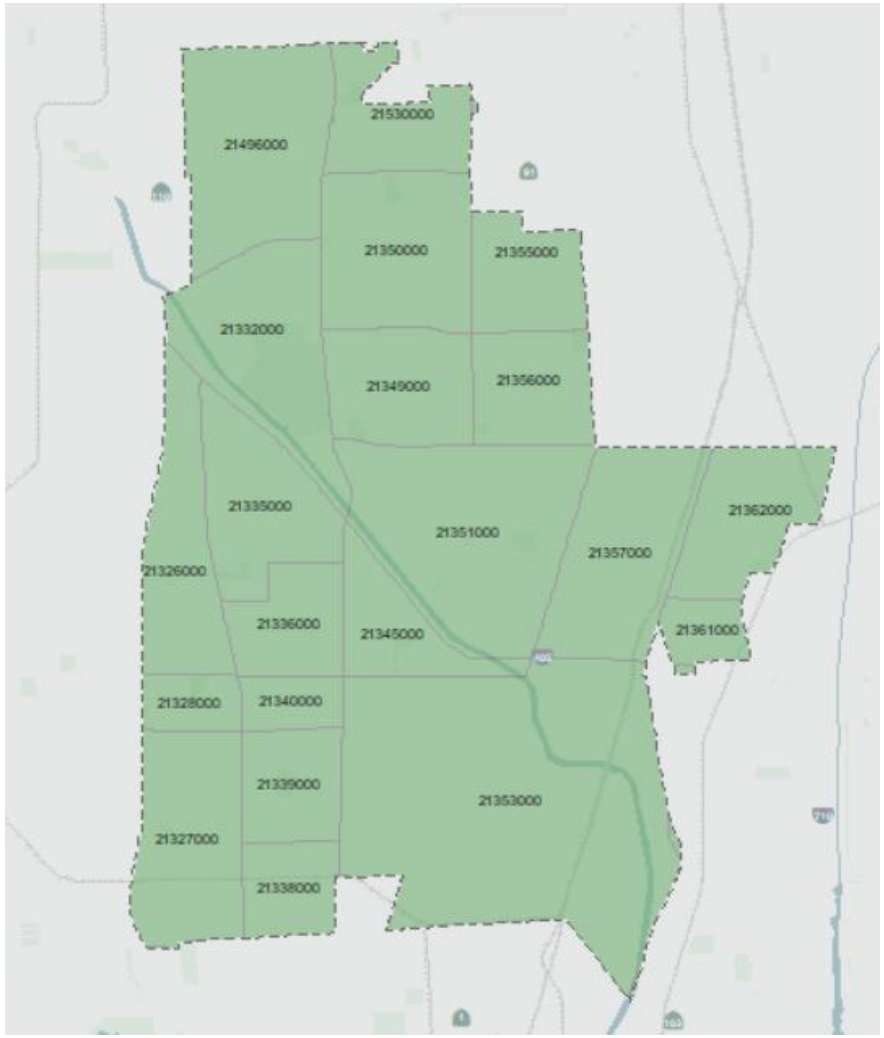


Residential
Home-Based Generated VMT

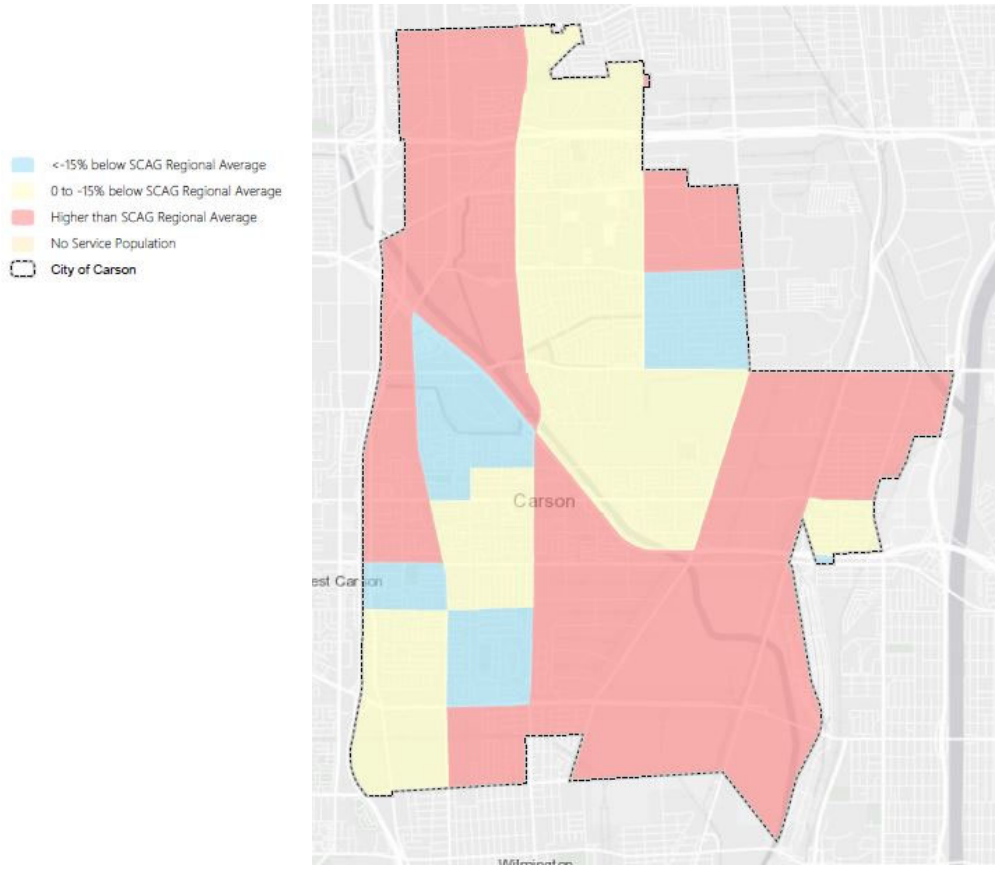


Office
Home-Based Work Generated VMT

SCAG Model: Transportation Analysis Zones

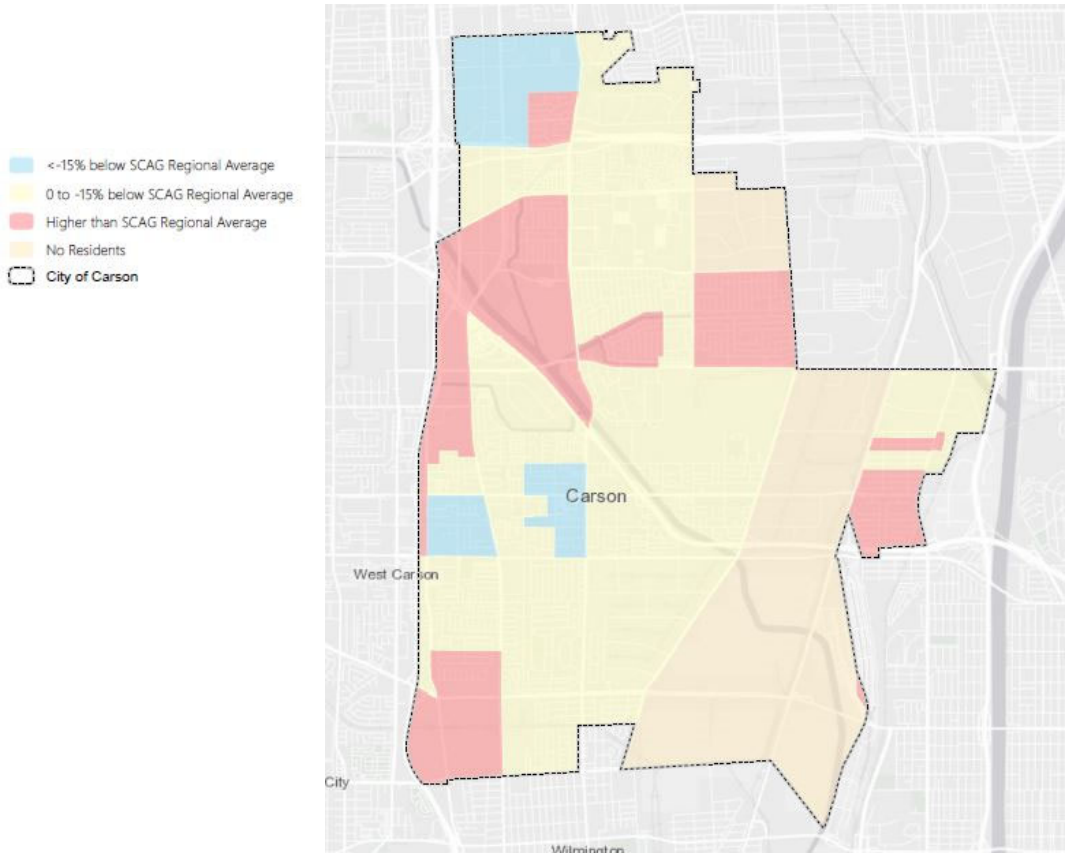


VMT Metrics Comparison to SCAG Average: Daily VMT per Service Population

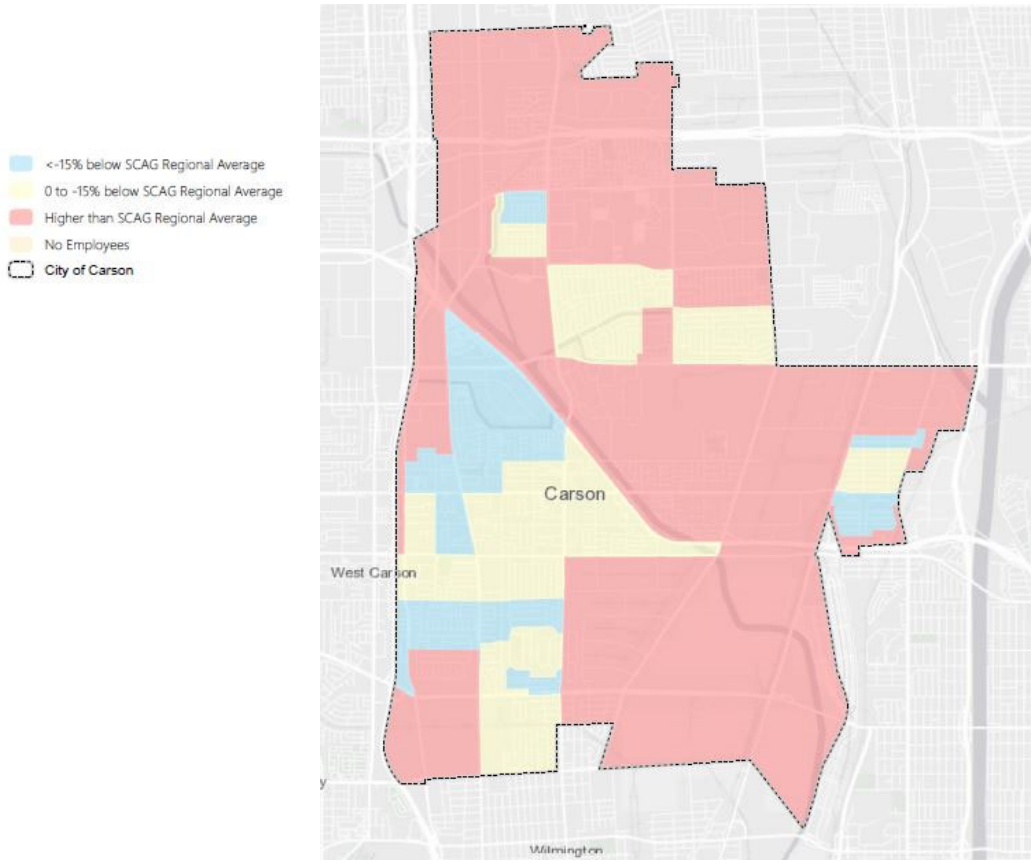


Includes Trucks

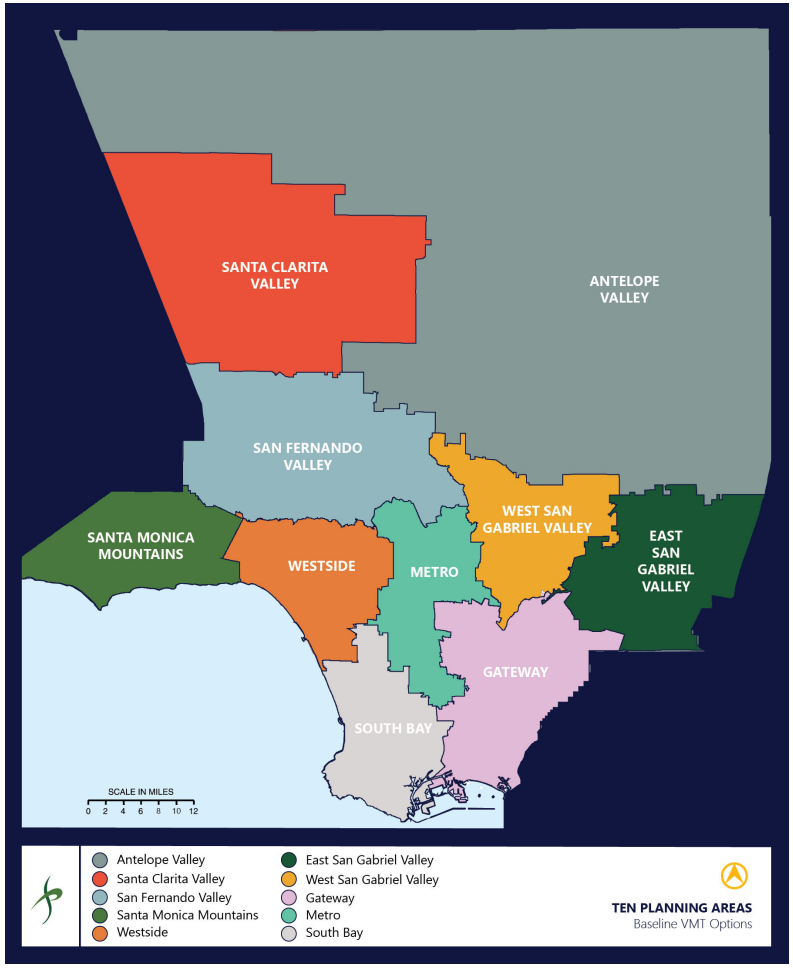
VMT Metrics Comparison to SCAG Average: Daily Home-Based VMT per Capita



VMT Metrics Comparison to SCAG Average: Daily Home-Based Work VMT per Employee



LA County Planning Areas



Baseline VMT Metrics – Comparison to SCAG

VMT Metrics			SCAG Region/ Carson VMT
Total VMT	SCAG	Avg Regional VMT per Service Pop	35.0
	Carson	**Avg City VMT per Service Pop**	**37.9**
	Change	% Difference	8%
Home-Based VMT	SCAG	Avg Regional Home-Based VMT per Capita	15.3
	Carson	**Avg City Home-Based VMT per Capita**	**14.4**
	Change	% Difference	-6%
Home-Based Work VMT	SCAG	Avg Regional Home-Based Work VMT per Worker	18.6
	Carson	**Avg City Home-Based Work VMT per Worker**	**19.6**
	Change	% Difference	5%

Baseline VMT Metrics – Comparison to South Bay Planning Area

VMT Metrics			South Bay/Carson VMT
Total VMT	South Bay	Avg Planning Area VMT per Service Pop	32.4
	Carson	**Avg City VMT per Service Pop**	**37.9**
	Change	% Difference	17%
Home-Based VMT	South Bay	Avg Planning Area Home-Based VMT per Capita	13.4
	Carson	**Avg City Home-Based VMT per Capita**	**14.4**
	Change	% Difference	8%
Home-Based Work VMT	South Bay	Avg Planning Area Home-Based Work VMT per Worker	18.2
	Carson	**Avg City Home-Based Work VMT per Worker**	**19.6**
	Change	% Difference	8%

Carson Context

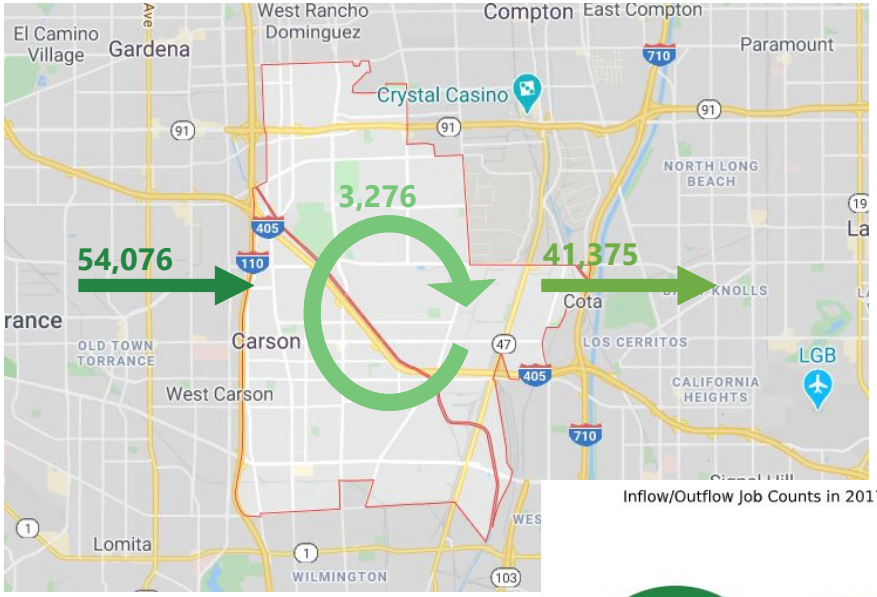
Commute distance for people who live in Carson

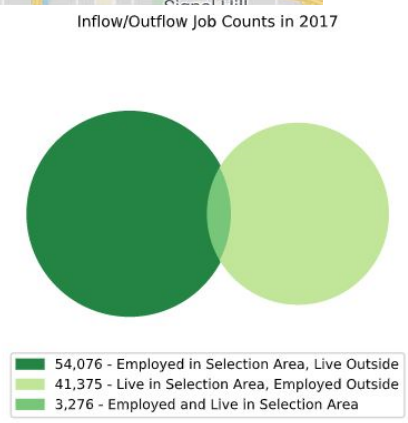
Jobs by Distance - Home Census Block to Work Census Block	2017 Count	2017 Share
Total All Jobs	44,651	100.0%
Less than 10 miles	21,635	48.5%
10 to 24 miles	15,110	33.8%
25 to 50 miles	3,969	8.9%
Greater than 50 miles	3,937	8.8%

Commute distance for people who work in Carson

Jobs by Distance - Work Census Block to Home Census Block	2017 Count	2017 Share
Total All Jobs	57,352	100.0%
Less than 10 miles	27,573	48.1%
10 to 24 miles	15,270	26.6%
25 to 50 miles	6,205	10.8%
Greater than 50 miles	8,304	14.5%

Daily commute inflow and outflow





Source: 2017 US Census Center for Economic Studies Longitudinal Employer-Household Dynamics, onthemap.ces.census.gov

Carson Context

Commuter Transportation

MOST COMMON METHOD OF TRAVEL

1. Drove Alone
   79.8%
2. Carpooled
   10.1%
3. Public Transit
   3.59%

In 2017, the most common method of travel for workers in Carson, CA was Drove Alone (79.8%), followed by those who Carpooled (10.1%) and those who Public Transit (3.59%).

Public Transit Options

Source: 2017 US Census 5-Year Estimates, https://datausa.io

1700 Carnegie Avenue, Suite 100
Santa Ana, CA 92705

iteris.com

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