

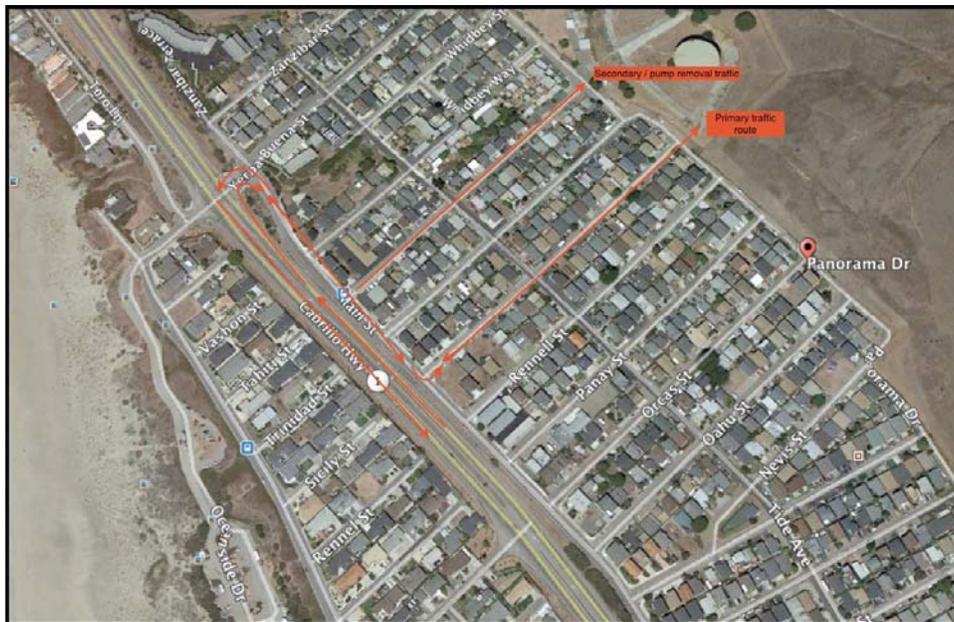
Truck Traffic Impact Analysis

FOR

Proposed Demolition Project

AT

**3300 Panorama Drive
Morro Bay, CA**



Prepared for
Rhine LP & CVI Group, LLC

Prepared by



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I. Report Objective

This report provides an analysis of impact of the truck routes for the proposed demolition project at 3300 Panorama Drive in Morro Bay, California on the existing roads. This report includes information from Bedford Demolition & Contracting, Inc. and the City of Morro Bay. For this analysis we met with City of Morro Bay employees Whitney McIlvaine and Jarrod Whelan. They provided information on the existing streets, Sewer, and Water mains. The actual construction of the road, sewer, and water mains are assumed to be per City of Morro Bay standards.

II. Demolition Project

Rhine LP and CVI Group, LLC propose the demolition and removal of two above ground storage tanks, water tank, associated piping and pumps, concrete within the containment area, and a concrete pad (30' x 30'). The demolition and removal will require metals, debris, and trash to be transported by truck from the site.

III. Truck Route and Loads

The proposed truck route will be from Highway 1 to East on Yerba Buena Street, then south on to Main Street. The primary traffic route will be on Sicily Street, where trucks will enter the site at the intersection of Sicily Street and Panorama Drive. The secondary traffic route designated for smaller vehicles used by workers will be on Tahiti Street, where traffic will enter the secondary parking area at the intersection of Tahiti Street and Panorama Drive. There will be no staging of trucks on City streets. See Exhibit A for a map of the truck route.

An anticipated forty truckloads (2 to 4 per day only during hauling of material) will be required for the tank, pump, and pipe removal. The trucks used for the tank, pump, and pipe removal will be semi-end dump trucks licensed for 80,000 pounds. A total of 1,050 yards of concrete is anticipated to be removed. An anticipated 70 truckloads (10 to 15 per day only during hauling of material) will be required for this portion of the removal. The trucks used for the concrete, sand, and dirt removal will be five-axle tractor trailer trucks and semi-end dump trucks licensed for 68,000 and 80,000 pounds. Additionally, 2 to 5 worker vehicles are anticipated per day that will be staged on site at the secondary parking area or the primary site location.

When analyzing the effect of a truck load on pavement is it important to look at the number of axles and tires. The load exerted on the pavement by each wheel of the truck is affected by the wheel arrangement. Decreasing the axle load and choosing dual instead of single wheels will lessen the wheel load by dividing the axle load over the number of wheels. The equivalent single axle load (ESAL) is a concept that relates the effects of axles carrying loads to the damaged caused to pavement overtime by truckloads. The reference axle load is an 18,000 pound single axle (dual tires), which has an ESAL equal to 1. For example, a standard passenger car would have an ESAL of 0.0007. Tandem axles also have a smaller ESAL than single axles.

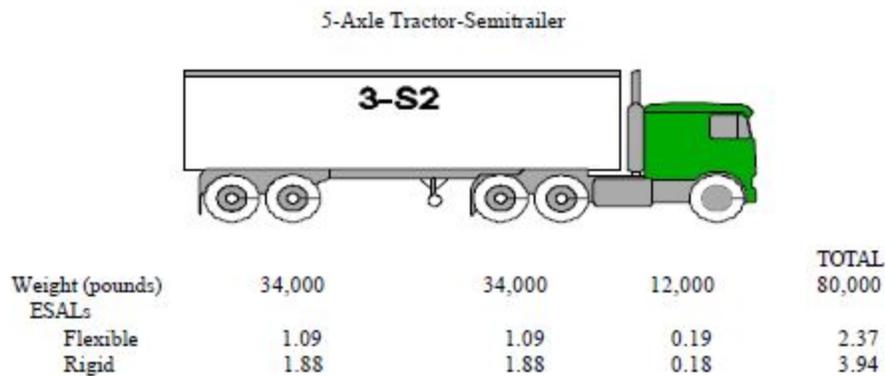


Figure 1. ESAL of 5-Axle Tractor-Semitrailer (Federal Highway Administration, 2000)

For a truck loaded with 80,000 pounds, the distribution of weight to the front axle will be 12,000 pounds and 17,000 pounds to each of the four rear axles. The pavement of the streets of interest would be considered “flexible” since it is asphalt concrete, cement concrete would be considered a “rigid” pavement. The approximate ESAL of the proposed five-axle trucks that will be used to remove the materials from this demolition is equal to 2.37, 0.19 for the front axle and 1.09 for each tandem rear axles. Compared to a typical 3-axle garbage truck with a total weight of 55,000 pounds, 20,000 pounds distributed to the front axle and 35,000 pounds to the rear axles, and an ESAL of 2.79. Compared to a typical garbage truck, one trip of a proposed five-axle truck would have less impact on a road than one trip of typical garbage truck.

IV. Street Conditions

Two aspects to consider when evaluating condition of the roads are fatigue and aging. Pavement fatigue is caused by the application of loads, which can lead to fatigue failure. The fatigue failure is usually expressed as the breaking up of the pavement. The City of Morro Bay's Pavement Management Plan notes that aging of pavement is characterized by the breakdown of aggregates leading to the pavement becoming brittle, which "results in additional cracking from loaded vehicles" (Pavement Management Plan, 2011).

The City of Morro Bay has rated the condition of streets in the city using the Pavement Condition Index (PCI). The PCI is a numerical rating of road segments with zero being the worst and one-hundred the best condition. The pavement fatigue and smoothness of the road are measured with the PCI. The City's Pavement Management Program aims to improve to and/or maintain an average PCI of 70 for all City streets from the current average of 66 (Streets Summit Update to Council, 2016).

The streets of interest for this proposed truck routing have been rated by the City of Morro Bay using the PCI, see Exhibit B for the map of roads and their PCI ratings. Main Street's PCI rating is divided with a PCI rating of 37 (Category IV - Poor) north of Vashon Street and a PCI rating of 88 (Category I - Very Good) south of Vashon Street, which about two-thirds of the route on Main Street. Sicily Street has a PCI rating of 84 and Tahiti Street has a PCI rating of 67, both in Category I - Very Good.

V. Sewer Main Location

Standard depth of a sanitary sewer system is designed to meet a minimum cover of 3 feet at the property line for individual house laterals (City of Morro Bay Specification 8.04). Most agencies require sewer to be installed at a minimum cover of 4'-6'. The depths of the sewer main along Main Street and Sicily Street range from 5.58 feet to 11 feet below surface. The deeper the pipe is the less effect the point load from the truck tires will have on the pipe since loading diminishes with depth. The depths of the sewer main along Main Street and Tahiti Street range from 6.5 feet to 9.61 feet. The loading on Main Street and Tahiti Street route is not as much of a concern since the vehicles on this road will be regular passenger vehicles (2 to 5 per day). See Exhibit C for the location and depths of the sewer manholes and cleanouts.

VI. Water Main Location

The water main lines are 6-inch asbestos-cement pipe. Standard depth of a water system is designed to meet a minimum cover of 2.5 feet above water mains (City of Morro Bay Specification 9.02.D). Information from the City Engineer and Whale Rock Plan and Profile plans shows that the water lines are at minimum Morro Bay City standard depth. See Exhibit D for the location and size of the water main.

VII. Summary

Loading fatigue of the pavement from truckloads should not be a concern along the proposed primary and secondary traffic routes. The primary and secondary traffic route (a majority Main, Tahiti, and Sicily Street) all have high PCI ratings (Category I – Very Good), indicating that road conditions are capable of handling the proposed traffic to and from the demolition project. The trucks that are proposed to be used are five-axle vehicles (tandem rear axles) with dual wheels, which will reduce the pavement fatigue damage by spreading out the loads. A typical garbage truck has a front axial weight of 20,000 pounds and 35,000 pounds distributed over the tandem rear axles. The proposed five-axle trucks that will be used for the demolition have a lighter 12,000 pounds distributed to the front axle and 34,000 pounds distributed over each tandem rear axle even though they are carrying a heavier load. Therefore, the point loading on the sewer and water mains from the proposed five-axle trucks would make the weight over each axle lighter than a typical garbage truck. Also for every trip over the pavement a standard garbage truck does more harm to the fatigue of the road than each trip from the 5 axle semi-truck trailer.

References

- City of Morro Bay (2011). *Pavement Management Plan (PMP) for the City of Morro Bay*. Retrieved from <http://ca-morrobay2.civicplus.com/DocumentCenter/View/1387>
- City of Morro Bay, Public Works Department (2016). *Street Summit Update to City Council*. Retrieved from <http://www.morrobayca.gov/DocumentCenter/View/10108>
- Federal Highway Administration (2000). *Comprehensive Truck Size and Weight (CTS&W) Study*. Retrieved from <https://www.fhwa.dot.gov/reports/tswstudy/Vol2-Chapter6.pdf>



EXHIBIT A

Truck Route

TRUCK ROUTE

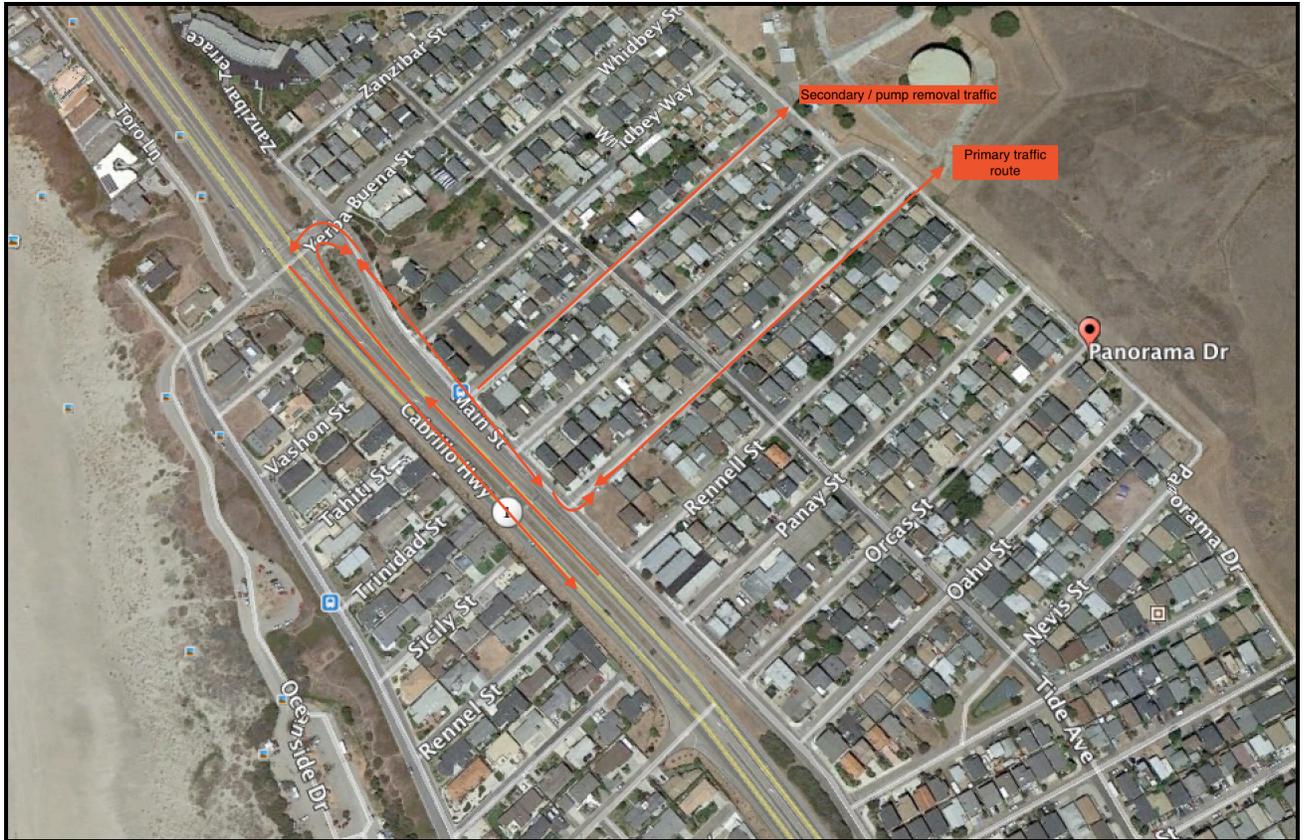




EXHIBIT B

PCI Ratings of Streets Proposed for Truck Route (City of Morro Bay)





EXHIBIT C

Sewer Manhole and Cleanout Map (City of Morro Bay)

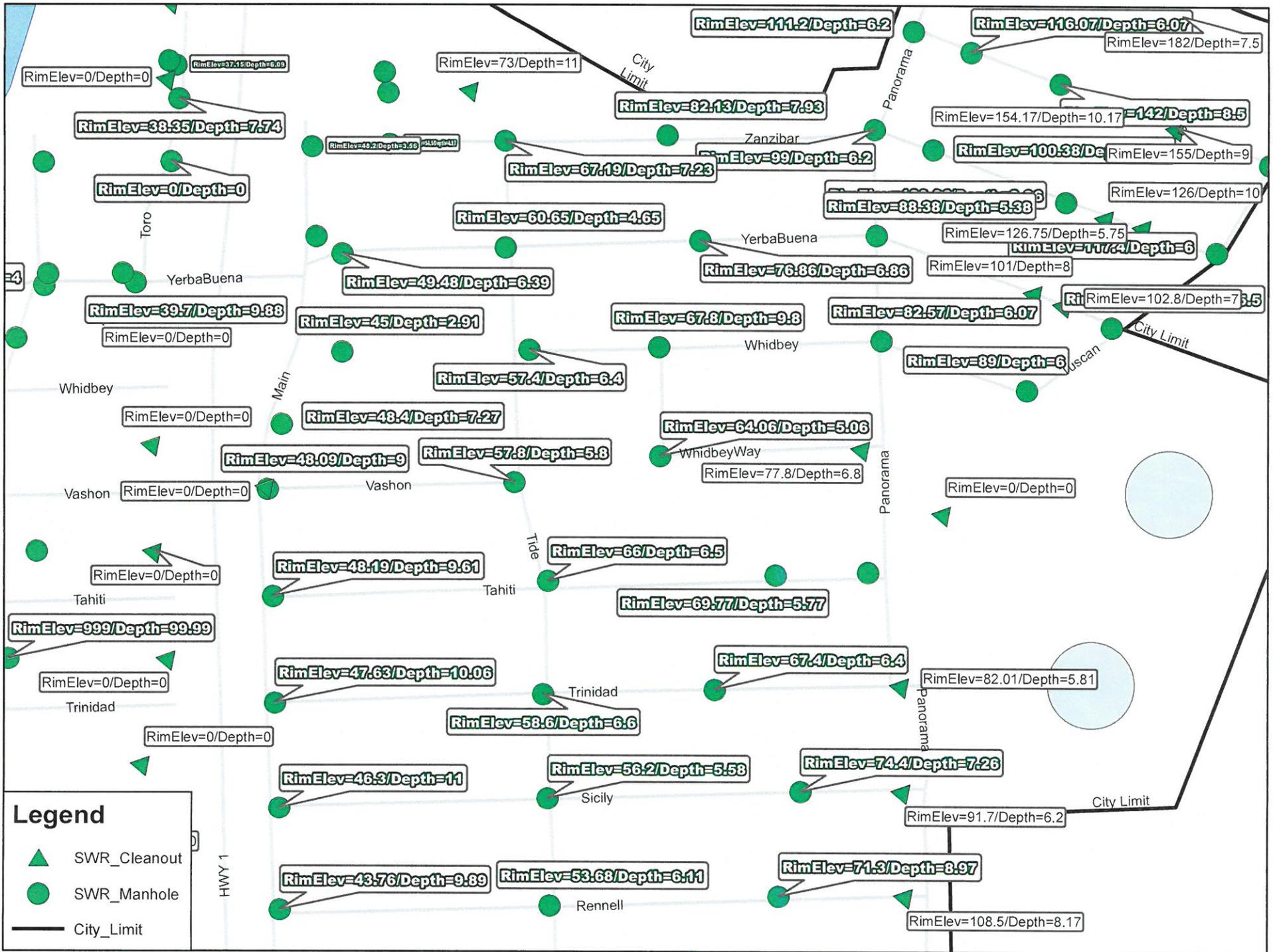




EXHIBIT D

Water Main Map (City of Morro Bay)

