ALAMEDA CORRIDOR TRENCH DESIGN-BUILD PROJECT

By

James K. Kessler, P.E.
HNTB / Thomas K. Dyer, Inc.
343 E. Six Forks Road, Suite 200
Raleigh, NC 27609
Telephone (919) 836-8152

Lawrence E. Meeker, P.E.
Parsons Transportation Group
Post Office Box 696
Reno, NV 89504
Telephone (775) 887-1801

Wayne J. Mauthe, P.E.
HNTB Corporation
611 West Sixth Street, Suite 1800
Los Angeles, CA 90017
Telephone (213) 622-4117

4945 Words + 3 Figures: 07/05/00

ABSTRACT

The Alameda Corridor is a 20 mile-long railroad corridor improvement project designed to enhance the movement of rail freight between the Ports of Los Angeles and Long Beach, and the rail yards east of downtown Los Angeles, California. The ports handle nearly 25% of the maritime freight traffic in the United States, and an efficient rail connection is vital to maintaining projected growth.

The Mid-Corridor Trench is a 10 mile-long section of the Corridor that will separate the rail line from the adjacent streets. It will be 30 feet deep and 51 feet wide. Initially it will have two tracks but will include room for a third. The Trench will replace 30 at-grade crossings with overhead bridges.

Project backers awarded the $712 million Mid-Corridor Trench design-build contract in October 1998; the job will be complete in April 2002. The design-build process enables the Designer and Contractor to work together and deliver the project on-time and for a set price. It is very advantageous in developing workable solutions for complex engineering and construction issues.

This paper describes the Alameda Corridor project with a focus on the Mid-Corridor Trench. Topics include a project description and scope, schedules, construction methods and sequences, and coordination aspects with railroads, public agencies,

utilities, and municipalities. The authors also outline the design-build process using examples of issues the parties have resolved in this manner.

INTRODUCTION

This paper presents an overview of the 20-mile long Alameda Corridor project in southern California, with a specific focus on the 10-mile long Mid-Corridor Trench. The Corridor will improve rail freight service from the Ports of Los Angeles and Long Beach through downtown Los Angeles rail yards and points east.

The Ports and the cities along the route formed the Alameda Corridor Transportation Authority (ACTA) to secure project financing and represent them during the project construction. ACTA awarded the $712 million Mid-Corridor design-build project to The Tutor-Saliba Team, a joint venture of the Tutor Saliba Corporation, O&G Industries, Parsons Transportation Group (PTG), and the HNTB Corporation. PTG and HNTB jointly are designing it. The Union Pacific Railroad (UPRR) and the Burlington Northern Santa Fe Railway (BNSF) are the major railroads that will move traffic through the completed Trench.

For continuity, the authors have also included a brief description of the Alameda Corridor *East* project. That project lies between Los Angeles and San Bernardino and has no contractual links to the original/main Alameda Corridor. It will, however, expedite train movements passing through the Corridor.

PROJECT DESCRIPTION

Alameda Corridor

The Alameda Corridor is a 20-mile long rail corridor that connects the Ports of Los Angeles and Long Beach to the rail yards east of downtown Los Angeles (Figure 1). This $2.4 billion project will provide improved rail access from the ports to the rail yards and to points east. The Ports combined move about 25% of the waterborne cargo in the United States and the quantity is growing significantly each year.

Recent rapid growth of rail traffic to the Ports has led to heavy use of the three existing rail access lines and significant vehicle delays at at-grade crossings (over 200 in total). The railroads now in place, built during the late 19^{th} and early 20^{th} Centuries, likewise will not accommodate future anticipated growth at the Ports. The new Corridor thus will alleviate existing traffic inadequacies and provide needed capacity to accept future growth.

The Alameda Corridor consists of three sections:

- The North End near downtown Los Angeles extends from Santa Fe Avenue east to Perrino Place near the Los Angeles River. This section, where the track is at grade, includes grade separations at Santa Fe Avenue and Washington Boulevard, the

Redondo Junction fly-over (rail over rail separation) and a new Los Angeles River bridge.

- The Mid-Corridor Trench extends from Santa Fe Avenue south to the Compton Creek Bridge (10 miles long).
- The South End is at grade from the Compton Creek Bridge south to the Henry Ford Avenue Bridge near the Ports. Key components include: bridges at Compton Creek, Dominguez Channel, and on the Long Beach Lead, grade separations at Alameda Street, Del Amo Boulevard, Sepulveda Boulevard, the Pacific Coast Highway, Anaheim Street, and Henry Ford Avenue, and various industrial and storage track improvements.

The Mid-Corridor Trench is the most expensive part of the new ‘rail-cargo expressway.’ Its main objective is to form a key link to the Ports by eliminating at-grade rail-roadway crossings and increasing train speeds. PTG and HNTB have formed an engineering team, as part of the construction joint venture, to provide major design and construction services throughout the life of this project.

The Trench is open topped, 30-feet deep, 51-feet wide, initially will have two main tracks. It is wide enough to fit three tracks in the future. Vehicular and rail traffic will cross via 30 new overhead bridges. The Contractor constructed a six-mile, at-grade

Bypass Track along the east edge to allow temporary detouring of UPRR trains during Trench construction. This line will also be a permanent means for accessing rail-served industries in the area and for re-routing rail traffic during any future Trench shutdown.

The narrowness of the Corridor along the north end of the Trench requires that existing city streets and another UPRR drill track cantilever over the top of the structure. A short section of the Bypass Track at Rosecrans Avenue, mid way along the Trench, will also cantilever over the Trench due to the location of overhead bridge piers and the alignment of the adjacent streets.

Alameda Corridor East

The Alameda Corridor *East* project extends from near downtown Los Angeles east to Ontario in San Bernardino County. The first phase of this project grade separates 11 existing crossings and improves 11 others. The goal is to enhance vehicle queuing, eliminate vehicle movements around lowered gates, correct excessive or faulty gate closures, improve pedestrian crossings, and widen selected crossings. The second phase will grade separate nine existing crossings and improve traffic signalization at 29 others. The total project cost estimate is $900 million, and it should be complete by the year 2007.

MID-CORRIDOR TRENCH DESIGN-BUILD PROJECT

Major design-build components of the Mid-Corridor Trench include constructing the structure itself, relocating existing tracks and utilities, building tracks within, north and south of the Trench, completing civil improvements (primarily roadways and site work), and installing railroad signal / communications systems.

The design-build project consists of 12 design segments (geographical and/or functional), including North End Track, seven Trench structure segments, Trench Track, South End Track, Signals, and Communications:

- North End Track is farthest north and is east of the Trench. Design-build work here is limited to track construction and signals installation. The Contractor coordinates this work with other related projects ongoing in this segment. These include the Los Angeles River bridge, the Redondo fly-over structure and the Washington Street and Santa Fe Street bridge structures. This is about one-mile long.
- Trench Segments 2, 2X, 3, 4, 5, 6 and 7 form the Trench, 10.2-miles long.
- Trench Track, including ACTA main line tracks 1 and 2
- South End Track is the south part of the Corridor. The design-build work here also is limited to constructing track and signals. The Contractor interfaces in these locations with other storage track contracts, grade separations of several streets, the Compton Creek and Dominguez Channel bridge projects, and the Henry Ford Bridge project. Also included are connections to several industries and local tracks.

- Signals (entire Corridor)
- Communications (entire Corridor)

General Configuration

The general configuration of the new Trench consists of a wall system of three-foot diameter cast-in-drilled hole (CIDH) piles placed four feet on center. Connecting components are the shotcrete facing, cast-in-place concrete invert slab, integral top wale, and precast concrete struts. Trench drain troughs collect storm water along each wall and send it to two in-trench pump stations. Strut spacing typically will be 25-feet, but will reduce to 15-feet (in order to provide more support) where the Bypass and UPRR Drill Tracks overhang the Trench.

Track Structure

The ACTA main tracks will have 136-lb., continuously-welded rail on concrete ties and crushed rock ballast. Tracks will rest on a concrete invert within the Trench and on prepared subgrade or concrete bridge decks outside Trench limits. The bridge over Compton Creek will have an open timber deck due to clearance constraints. All other ACTA tracks will have 136-lb. rail on timber ties. This includes the Bypass Track, Storage Track Area 1, and industrial tracks.

Crossovers between ACTA tracks will be No. 20 inside the Trench and either No.14 or 20 elsewhere. ACTA main track crossovers and turnouts will be on concrete switch ties; others are on timber.

The main track design speed generally is 40 miles per hour. ACTA standards, based on a combination of AREMA and railroad industry standards, will prevail on ACTA tracks. ACTA standards also provide uniformity of components for tracks already in service at the Ports. Connections to the UPRR and BNSF tracks, as well as tracks belonging to those lines, will meet the standards of those respective railroads.

Trench Structure

Figure 2 depicts the standard cross section of the new Trench. It has 51-feet of horizontal clearance and 24-feet, 3-inch minimum-vertical clearance above top of rail.

The Trench wall consists of three-foot diameter CIDH piles spaced at four-feet on center with six to eight-inch shotcrete facing. A cast-in-place concrete invert slab, from one to four feet thick, is at the bottom of the Trench. Drainage troughs along each wall convey storm water run-off to two separate pump stations in the Trench itself.

On the top of the wall is an integral top wale with a concrete barrier and a chain-link fence. Precast concrete struts, located near the top of the walls, span the width of the Trench between the top wales. Strut spacing will typically be a 25-feet. Where West

Alameda Street, the UPRR Drill Track and the Bypass Track overhang the Trench section, the strut spacing will be 15 feet in order to provide support for the overhead facility. At these locations a deck that supports either a track or roadway partially covers the Trench (Figure 3).

At Rosecrans Avenue an existing overhead roadway bridge spans above East and West Alameda Streets, the at-grade Bypass Track and the new Trench. The Trench and Bypass Track alignments therefore had to avoid the existing bridge piers. This required the Contractor to cantilever the Bypass Track over and parallel to the Trench for approximately 700 feet.

Between Randolph Street and 27th Street at the north end of the Trench, West Alameda Street overhangs the west wall of the Trench due to right-of-way constraints. The UPRR Drill Track, in addition, extends out over the east wall of the Trench in the same general area between 41st Street and 27th Street. Here that narrows the opening in the top of the Trench to about four feet.

Bridges

Thirty bridges will grade separate existing roadways (local and arterial streets) and BNSF/MTA and UPRR rail lines over the Trench. These crossing streets are (north to south): 25th, 27th, and 38th/41st Streets, Vernon Avenue, 55th Street, Slauson Avenue /

BNSF, Randolph Street / UPRR, Gage and Zoe Avenues, Florence Avenue, Metro Commercial Parkway, Nadeau Street, Engle and HON Driveways, Firestone Boulevard, 92nd Street / Southern Avenue, Tweedy, MLK, and Santa Ana Boulevards, Imperial Highway, Lynwood Road, 124th Street / Weber Avenue, El Segundo Boulevard, 134th Street / Pine Avenue, Elm Street, Palmer Avenue, Compton Boulevard, Myrrh Street, and Alondra and Greenleaf Boulevards.

Bridge Types

The Corridor will have three distinct types: double-tee girder bridges, I-beam girder bridges, and box-girder bridges. The double-tee and I-beam girder bridges will be precast, prestressed, and have cast-in place decks; the box girder bridges will have slurry-filled decks.

Double-Tee Girder Bridges

Most of the bridges will have double-tee girders with cast-in-place decks. They will form simple spans between Trench walls, and serve as a strut to brace the top of the Trench section. Bridge deck flares are frequently required for turning lanes at exterior girders. Several bridge decks, including Palmer Avenue, Compton Boulevard, Myrrh Street, and Alondra Boulevard are “highly enhanced” with the addition of planters, supporting trees, ground cover, and other ‘urban design’ features.

I-Beam Girder Bridges

Five structures will be I-beam girder bridges: those at 25th, 27th, and 38th/41st Streets, Vernon Avenue and 55th Street. All of these, with the exception of 25th Street, will have a greater depth than the double-tee girder bridges due to the need to support the overhanging UPRR Drill Track and/or West Alameda Street sections.

Box-Girder Bridges

Two bridges will be box-girders. Those at Slauson Avenue and Randolph Street will support rail (BNSF/MTA and UPRR, respectively) and roadway. Parallel box girder structures (nearly perpendicular to the Trench) with ballasted decks support the railroad, and similar girders with cast-in-place decks support the roads.

Utilities and Drainage

The drainage system for the Mid-Corridor Trench will be a dual, open-channel box trough with grating cover. The troughs, which run longitudinally for the length of the Trench, intercept runoff from the Trench cross-section. The trough section is of uniform width and varying depth that changes with run-off rate and longitudinal slope. The slope matches the proposed rail profile slope.

Two separate pump-station systems (at Nadeau Avenue and Greenleaf Boulevard) will discharge to existing storm drain facilities adjacent to the Trench. The pump stations are necessary because the Trench drains are located below the existing storm-water utility lines. Due to the capacity limitations of the receiving systems, and to meet requirement to provide 50-year drainage capacity within the Trench, the pump stations include detention basins under the track. They will provide storage of the volume difference between the allowable discharge and the 50-year run-off (the design requirement for the Trench). Los Angeles County Unit Hydrograph Methods determine volume requirements of the onsite detention basins.

Since the project will be in a dense urban area, the Contractor must complete extensive utility relocations and protections. The design team is working with public agencies and private companies in order to complete this work within the project construction schedule constraints. Affected utilities include sewer and water lines, oil and gas pipelines, fiber optic lines and electrical and communication facilities.

Roadway and Site Improvements

East and West Alameda Streets parallel the Trench on both side, and 30 cross streets pass over it. The project will rehabilitate street intersections by placing new traffic control devices, installing grade crossing warning devices for the Bypass Track, repaving roadway surfaces, and building new curbs and sidewalks. New Bypass Track grade crossings will have precast-concrete surfaces.

Schedule

This design-build project is on a fast-track schedule, going from award to in-service status in just over three years. Awarded in October 1998, the construction work commenced in January 1999. The project presently is on schedule. The Contractor completed the majority of the Storage Tracks by the fall of 1999 and the Bypass Track by January of 2000. Two simultaneous Trench headings are well underway. Track, signal, and communications design are all approaching completion. The Contractor faces significant liquidated damages for not having the Trench and three ACTA main tracks open and operating on time, currently scheduled for April 15, 2002.

Construction Sequence

Existing rail freight service operating through the Corridor must continue during construction. New storage yards to the south now replace storage capacity removed from the area of the Trench. A new six-mile Bypass Track maintains through UPRR freight service during construction, provides an alternate route after the Mid-Corridor Trench is complete, and gives industrial track access to rail customers.

Build Storage Track Yards

New railroad storage yards were the first major-construction component of the Alameda Corridor project. The Contractor built these tracks on both ACTA right of way (Storage Track Area 1) and UPRR rights-of-way (Storage Track Areas 2, 3, 4, and 5) south of the Trench. This included all the 'civil' work, that is the demolition, utility protection, clearing and grubbing, drainage installation, and grade balancing, subgrade and subballast (as well as the track itself). Because the tracks will eventually become parts of the ACTA main tracks, Storage Track Area 1 has concrete ties. The other Storage Tracks Areas have timber ties. UPRR forces completed 'live' cut ins to all UPRR tracks.

Build Bypass Track

The Bypass Track extends from the south end of the Trench north to Firestone Boulevard, a distance of about six miles. It parallels the Trench, which follows the former Southern Pacific (now UPRR) San Pedro Branch, and connects to UPRR's Santa Ana Branch. The new track has 136 lb. continuously-welded rail on timber ties. The Contractor needed to maintain rail traffic (up to 12 trains daily) along Corridor during the construction of the Bypass Track, building it and cutting it into service in three phases. Construction began at the south end and proceeded north. Several temporary cutovers between the new and old tracks were necessary as the work proceeded.

UPRR subsequently completed upgrades on its parallel Wilmington Subdivision line one mile to the west to take most trains away from the Trench and Bypass Track during construction.

The general sequence of work for the Bypass Track was similar to that of the Storage Track Areas: demolition, utility protection, clearing and grubbing, drainage installation, grade balancing, subgrade, subballast, and track installation. This work also included the identification and removal of contaminated and hazardous ballast and soils, and the construction of a special drainage line along the entire length of the track.

There are 16 public at-grade crossings along the new Bypass Track. The Contractor will replace the existing temporary asphalt surfaces with precast concrete panels prior to completion of the project. All of these public crossings will have CPUC-approved warning devices that include flashing lights and gates.

Remove Existing Tracks / Initial Grading and Excavation

As the Contractor opened segments of the Bypass Track he concurrently removed existing adjacent tracks, removed all contaminated ballast and soils, and began the initial grading and excavation of the Trench. The initial excavation is six feet across the 60' width of the right-of-way in order to permit the drilling of the piles for the Trench walls.

Utility Relocation

Relocating the utilities affected by the Trench construction has proved to be one of the most challenging and expensive elements of the project. Affected utilities include lines for storm water, sanitary sewer, oil, gas, telephone, electrical power, and fiber optics. The nature of the Trench itself by default forced utility companies to reroute their lines either under the Trench, across it, or around it. Those going under the Trench, an extremely expensive endeavor, included several large diameter water lines. Smaller lines go through cells in the roadway bridges, or through struts or casings, that span the Trench. Crossing over is somewhat less costly but just as challenging due to the need to immediately bend underneath ACTA's By-pass Track running parallel to the east side of the Trench.

Trench Construction

The placement of CIDH piles that form the Trench wall is progressing northward from two separate headings. The first started near Greenleaf Boulevard at the south end of the Trench. The second heading began (after completion of the Bypass Track) near the center of the Trench north of Firestone Boulevard.

As CIDH installation proceeds the Contractor excavates the top part of the Trench as deep as the piles' cantilever deflection will permit. He then sets in place precast concrete struts prior to reaching the full Trench excavation depth at the invert elevation. The Contractor next installs the top wale and wall, and caps this with temporary chain-link fencing (to retard potential climbers). The finished concrete invert sections are 76 feet long. The last processes are to face the CIDH walls with shotcrete and to build the drainage curbs.

Bridges

Bridge construction moves forward concurrently with Trench wall construction. The Contractor detours street traffic over to adjacent streets or to temporary roadways constructed across ACTA's right-of-way.

CIDH piles form the bridge abutments in a manner similar to those on the Trench walls. Precast girders support the roadway surfaces and vehicular traffic. The Contractor excavates beneath the bridges simultaneous with the excavation of the Trench itself.

Track and Systems Installation

As the Trench construction proceeds northward, ACTA main track construction on the invert slab will begin. The Contractor will deposit crushed-rock ballast on the concrete invert slab, and will soon follow with the delivery and installation of concrete ties and welded rail strings.

Where we are today

The overall design of the track, including the tracks in the Trench and the North and South End connecting tracks, is 75% complete. Signal and communication systems design has progressed to a similar level. The first (southern) heading now has more than one mile of completed Trench structure (without tracks), while the second (northern) heading has about one-half mile completed. Construction is on schedule to meet the year 2002 completion deadline, and the first train will run through the Trench on or before April 15.

COORDINATION WITH OUTSIDE ENTITIES

Railroad Coordination

Coordinating the design and construction of the Mid-Corridor Trench with outside entities has at times been challenging but has proceeded well to date. These entities include the local railroads, governing agencies, utility companies and the municipalities.

Railroad coordination involves working closely with the UPRR, the BNSF and the Pacific Harbor Lines. UPRR owns and operates main tracks and branch lines of the former Southern Pacific in the area as well as its own previously existing lines that generally paralleled those of the Southern Pacific.

BNSF operates on former Atchison, Topeka and Santa Fe Railway lines in the region and shares some line ownership with the Los Angeles County Metropolitan

Transportation Authority (MTA). Pacific Harbor Lines operates over Port-owned beltway trackage on which the Harbor Belt Line previously had operated. The UPRR and BNSF both have sold major parts of their tracks and rights-of-way to ACTA, the Port's representative. The tracks and train movements on nearly all of these railroads interact with those of ACTA.

To keep the project on schedule, help ensure railroad acceptance of design and construction plans, and to allow trains to keep moving through the project site, the Contractor maintains nearly daily communications with both UPRR and BNSF personnel. The two railroads or their representatives review and comment on all major design work for rail-related parts of the project. The Contractor also schedules a monthly railroad-coordination meeting that gives all parties a chance to review work, report any concerns, and consult on other issues.

The UPRR uses ACTA's new Bypass Track, adjacent to the Trench, for industry access and for three to six daily through train movements from downtown Los Angeles to the Ports. The Contractor constructed this line in three phases, working closely with the railroad to secure track time to coordinate live-track tie-ins. Although there is a contract clause that allows the Contractor to shut down this line daily for 12-hour work windows for Trench construction, he has elected to give the UPRR more flexibility for movements by only requesting limited track time.

In another arrangement worked out with the UPRR, the railroad has allowed the Contractor to eliminate a temporary shoofly track that would have temporarily carried the UPRR La Habra Branch along Randolph Street where it will cross over the Trench. In return the Contractor will construct for the railroad two new storage tracks at its J-Yard facility and will install a crossover and complete other non-funded UPRR track improvements near the south end of the Trench.

The Contractor works in a similar fashion with the BNSF and MTA on the Harbor Subdivision crossing (BNSF trains on MTA tracks) over the Trench at Slauson Avenue. This intersection is particularly challenging due to restricted railroad and roadway geometry, 12 BNSF daily train movements, and very high vehicular traffic levels crossing the Corridor parallel to the tracks. Contractor work at this location includes constructing an 800’ long shoofly track through the intersection, complex roadway traffic detours, and utility protection and relocation during the four-month period of bridge construction over the Trench.

The Contractor also is working with the BNSF, the UPRR, and a local rail-served customer near the south end of the Trench to accommodate complicated trackwork on very limited real estate. ACTA’s preliminary design had the BNSF’s new Watson Yard lead track crossing over industry tracks and a UPRR drill track via five unique, curved diamonds. The Contractor is negotiating with ACTA and the local industry in attempts to rearrange the industry yard tracks and reduce the crossings to two or three tangent diamonds.

Agency Coordination

ACTA and the Contractor have worked very closely with the California Public Utilities Commission (CPUC) since inception of the project. Major items of interest to the CPUC are at-grade crossing warning devices, intersection geometries, clearances, and walkways for trainmen. The Contractor communicates with the local CPUC office on a weekly or biweekly basis, meets on-site with CPUC staff regularly to review pending design and construction work, and together coordinate the submittal of plans for grade crossing modifications. In addition to the CPUC, the Federal Railroad Administration has made regular visits to the project to inspect track and signal work.

Utility Coordination

The Contractor coordinated the assignment of the bridge cells to the various utility entities via 'Bridge Cell Bingo' sessions as the design of each bridge advanced. Of the Contractor's total initial budget of $712M, about $50 went to utility relocations. ACTA, the project owner, also will spend a comparable amount above and beyond that figure along the entire length of the Alameda Corridor.

Municipal Coordination

Municipal coordination included extensive meetings and special arrangements with nine different cities, as well as Los Angeles County, that claim jurisdiction along the length of the project. ACTA previously had negotiated Memoranda of Understanding with each entity. The Contractor used these agreements as a starting point, but soon found that each city had its own ideas about the nature of the 'Understanding' part of the Memoranda. Some cities apparently felt that ACTA and the Contractor were fair game as deep pockets; accordingly they demanded special intersection designs with upgrades. Several intersections had three different municipalities each owning one or two corner quadrants.

Dust, noise, and temporary traffic controls have been very sensitive issues and naturally have demanded very special attention to detail. The Contractor regularly waters the worksite and adjacent roads to control dust, and even had to water ballast during track tamping and regulating. To control noise, he is constructing expensive soundwalls in selected locations and limits work hours near residential communities. Traffic control is probably the most delicate matter, and the Contractor spends much energy devising and revising detours and traffic control plans. The Contractor is building bridges in alternate locations so that, generally, no two adjacent existing roads remain closed at the same time.

DESIGN-BUILD PROCESS

The *design-build* process is a relatively new method in the USA to construct large, complex, urban construction projects. In contrast to the conventional *design-bid-build* process, where project design is complete before the bids for construction go out, design and construction take place simultaneously on design-build projects. Design-build is a fast-track method ideally suited for big transportation projects in crowded, polluted urban regions where changes in procedure may occur on a weekly or even daily basis. It gives the Contractor the flexibility to change the design to respond to immediate geotechnical, geometric or political constraints well before design is at the 90% or 100% level. The Contractor saves time on his schedule by beginning work on selected parts of the project while design is still underway, and the process allows him to adapt to changing project needs without having to backtrack extensively.

Design-build can also be tremendous benefit to the owner and his representatives. It requires the Contractor to accept a percentage of the risks involved in the project. Design-build can save the owner from many of the costly change orders required during the design-bid-build process whenever unforeseen obstacles appear that would impact costs and/or the schedule.

The Design-build process will allow the Mid-Corridor Trench to go from contract award to ‘in-service’ status in just 3 years. Other specific examples where the process has benefited the project include traffic routing, utility relocation methods, and the arrangement outlined above with both the UPRR and BNSF regarding the Randolph Street line and the Watson Lead.

CONCLUSIONS

Construction of the Alameda Corridor project is now one-third complete. After opened to service in 2002, its track enhancements will allow the UPRR and BNSF to speed trains to and from the Ports of Los Angeles and Long Beach on 20 miles of grade separated tracks. It will also bypass existing century-old track networks ringed with at-grade crossings, thereby improving traffic movements for vehicles and municipalities. This project is a win-win endeavor for the transportation industry in the Los Angeles basin.

ACRONYMS

ACTA: Alameda Corridor Transportation Authority

BNSF: Burlington Northern Santa Fe Railway

CIDH: Cast-in-Drill Hole (Pile)

CPUC: California Public Utilities Commission

MTA: Metropolitan Transportation Authority (County of Los Angeles)

PTG: Parsons Transportation Group

UPRR: Union Pacific Railroad

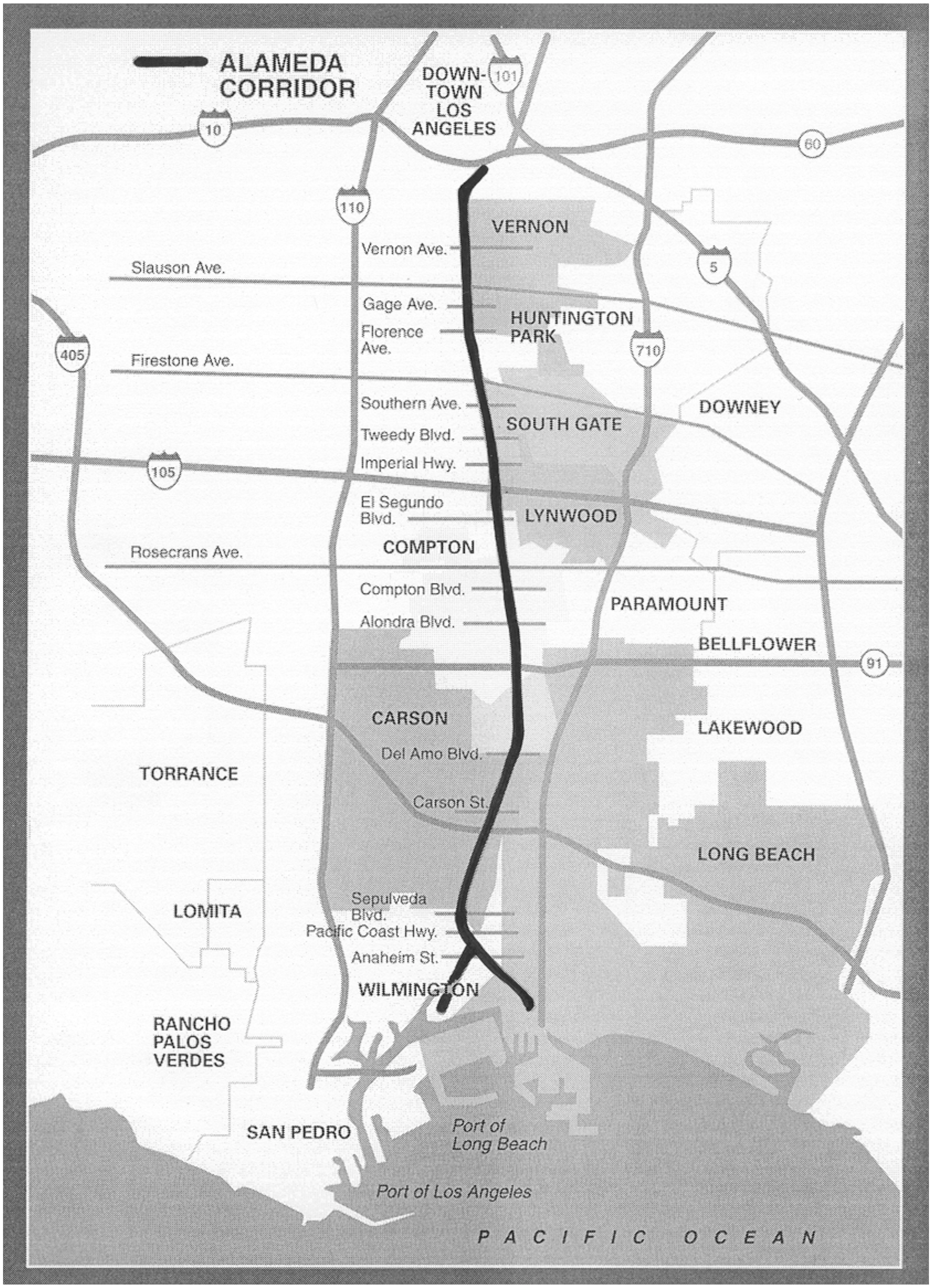

Figure 1: Map of Alameda Corridor

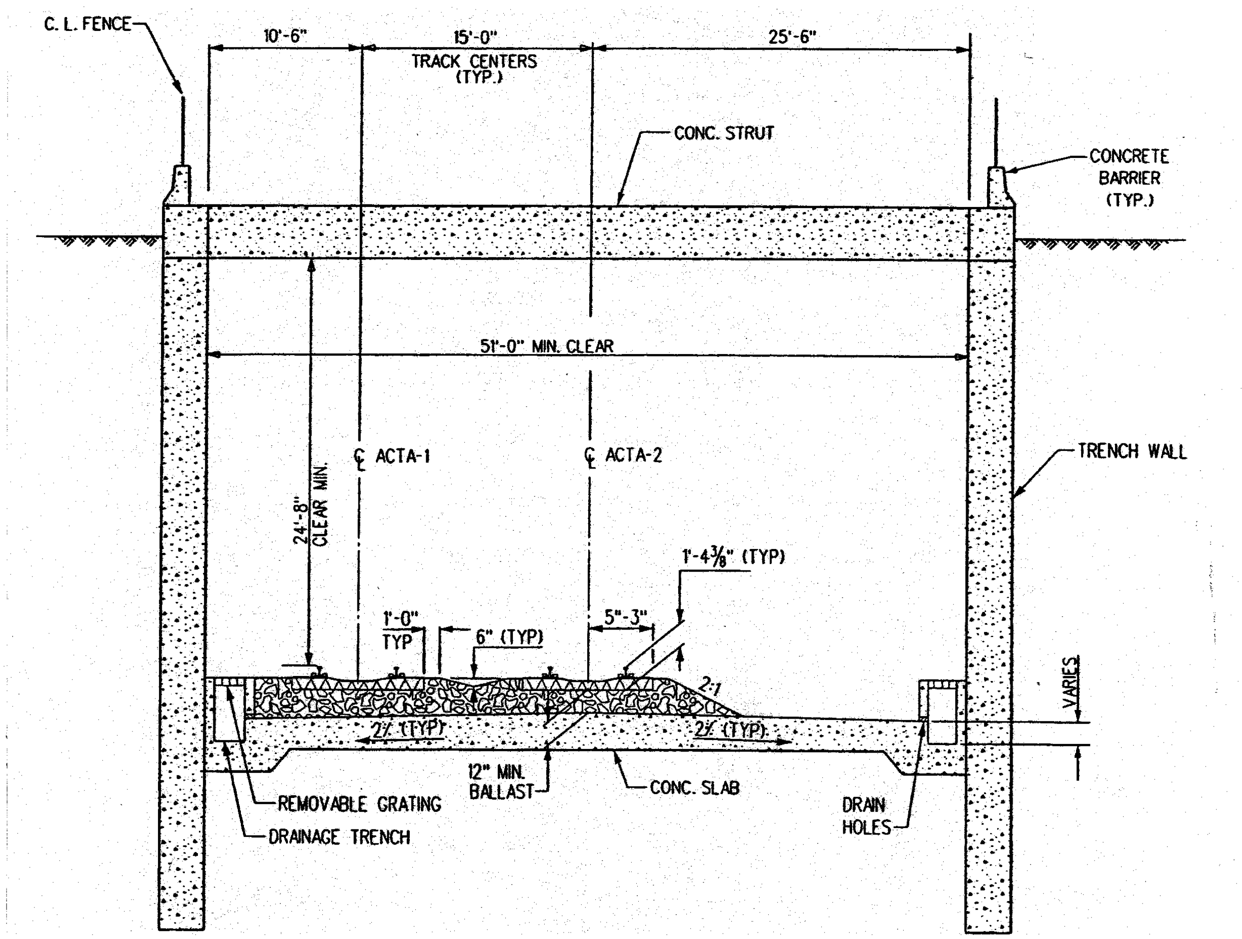

Figure 2: Standard Trench Cross Section

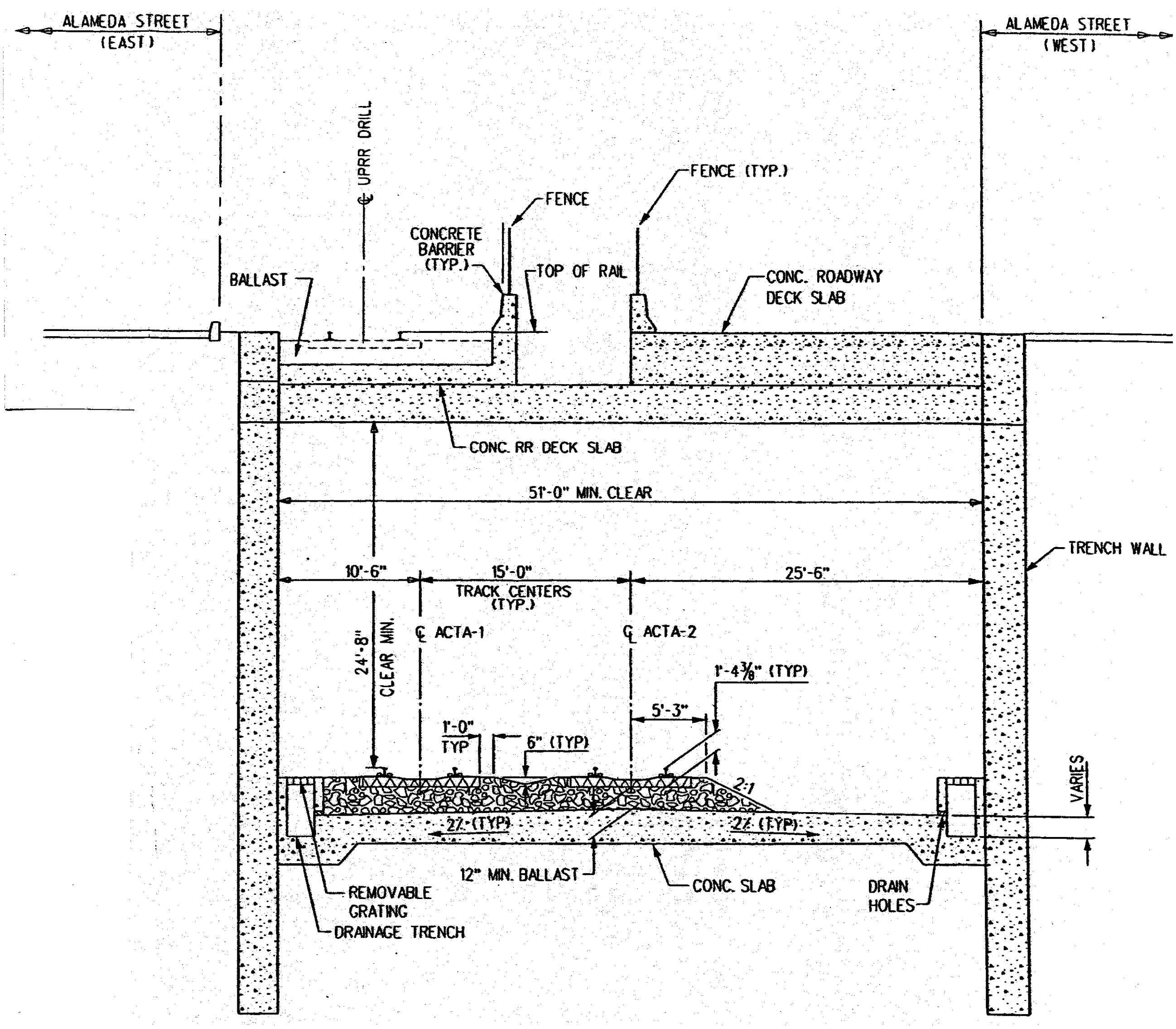

Figure 3: Trench Cross Section with Cantilever Overhangs

FIGURE CAPTIONS:

Figure 1: Map of Alameda Corridor

Figure 2: Standard Trench Cross Section

Figure 3: Trench Cross Section with Cantilever Overhangs