Appendix 5.12A
Heavy Haul Route

Please note: The heavy haul survey includes information to Redondo Beach and also to Huntington Beach (as a separate project).

Long Beach to Huntington Beach	
Harbor Plaza to Pico	Good corner no obstructions Overpasses on Pico are 17' +
Pico to 10th	Transition, no corner Overpass is 17'
10th changes to 9th	
9th to Santa Fe	Make r/h turn onto wrong side to avoid traffic signal.
Santa Fe to Anaheim	Make r/h turn onto wrong side to avoid traffic signal.
Anaheim to Magnolia	Make r/h turn from far left to avoid pedestrian crossing signal on right corner.
Magnolia to Ocean	Good corner. zig zag lights on Ocean
Ocean to Alamitos	Make turn from far right lane of Ocean
Alamitos to Anaheim	Have utility crews rotate lights on Anaheim
Anaheim to PCH	Make wide turn to avoid lights
PCH to Goldenwest	Good corner
Goldenwest to Garfield	Make l/h turn from far right lane
Garfield to Hwy 39	Make the corner from the wrong side of Garfield
Why 39 to PCH	Good corner. Traffic signals are 16'5"
PCH to Newland	Good corner

Summary

The route to Huntington is a short route and should be accomplished in two night move. It is an established high and heavy route. The challenges are that we will have to deal with County as well as Caltrans to obtain permits. L A County are is slow to analyze structures and impose very restrictive rules for moves of this size. The process is time consuming and frustrating, but with plenty of notice (at least 2 months) it shouldn't be a problem. We have moved several loads similar to this one and even larger, into this area in the past.

Vanco rail siding to Huntington Beach

Anaheim to Magnolia	Make r/h turn from far left to avoid pedestrian crossing signal on right corner.
Magnolia to Ocean	Good corner. zig zag lights on Ocean
Ocean to Alamitos	Make turn from far right lane of Ocean
Alamitos to Anaheim	Have utility crews rotate lights on Anaheim
Anaheim to PCH	Make wide turn to avoid lights
PCH to Goldenwest	Good corner
Goldenwest to Garfield	Make l/h turn from far right lane
Garfield to Hwy 39	Make the corner from the wrong side of Garfield
Why 39 to PCH	Good corner. Traffic signals are 16'5"
PCH to Newland	Good corner

Summary

The rail siding at Vanco is on Anaheim street just West of the Long beach area so the route will be the same, just beginning on Anaheim.

Long Beach to Alamitos

Harbor Plaza to Pico	Good corner no obstructions Overpasses on Pico are 17' +
Pico to 10th	Transition, no corner Overpass is 17'
10th changes to 9th	
9th to Santa Fe	Make r/h turn onto wrong side to avoid traffic signal.
Santa Fe to Anaheim	Make r/h turn onto wrong side to avoid traffic signal.
Anaheim to Magnolia	Make r/h turn from far left to avoid pedestrian crossing signal on right corner.
Magnolia to Ocean	Good corner. zig zag lights on Ocean
Ocean to Alamitos	Make turn from far right lane of Ocean
Alamitos to Anaheim	Have utility crews rotate lights on Anaheim
Anaheim to PCH	Make wide turn to avoid lights
PCH to 2nd Street	Good corner
2nd Street to Studebaker	Make l/h turn from far right lane

Summary

The route to Alamitos is a short route and should be accomplished in two-night move. It is an established high and heavy route. The challenges are that we will have to deal with County as well as Caltrans to obtain permits. L A County is slow to analyze structures and impose very restrictive rules for moves of this size. The process is time consuming and frustrating, but with plenty of notice (at least 2 months) it shouldn't be a problem. We have moved several loads similar to this one and even larger, into this area in the past.

Vanco rail siding to Alamitos

Anaheim to Magnolia	Make r/h turn from far left to avoid pedestrian crossing signal on right corner.
Magnolia to Ocean	Good corner. zig zag lights on Ocean
Ocean to Alamitos	Make turn from far right lane of Ocean
Alamitos to Anaheim	Have utility crews rotate lights on Anaheim
Anaheim to PCH	Make wide turn to avoid lights
PCH to 2nd Street	Good corner
2nd Street to Studebaker	Make l/h turn from far right lane

Summary

The rail siding at Vanco is on Anaheim Street just West of the Long beach area so the same beginning at Anaheim Street.

Long Beach to Redondo Beach

Harbor Plaza to Pico	Good corner no obstructions Overpasses on Pico are 17' +
Pico to 10th	Transition, no corner Overpass is 17'
10th changes to 9th	
9th to Santa Fe	Make r/h turn onto wrong side to avoid traffic signal.
Santa Fe to PCH	Make l/h turn onto wrong side to avoid traffic signal.

PCH to Avalon	Make r/h turn from far left to avoid pedestrian crossing signal on right corner.
Avalon to 223rd Street	Good corner.
223rd Street to Vermont	Make turn from far right lane of 223rd Street
Vermont to Torrance	Have utility crews rotate lights on Torrence
Torrance to Normandie	Make wide turn to avoid lights
Normandie to 190th Street	Good corner
190th Street to Prairie Ave.	Make l/h turn from far right lane
Prairie Ave. to Torrance	Make the corner from the wrong side of Prairie
Torrance to Catalina Ave.	Good corner. Traffic signals are 16'5"
Catalina Ave. to Beryl Street	Very tight corner, will have to remove and replace traffic signals on the left side.
Beryl Street to Harbor Drive	Very congested area. Pedestrian signal will have to be removed and replaced

Summary

The route to Redondo Beach is good until the last few turns before the destination. It is a very congested Beach area, and will require some fairly extensive utility work. We would expect some delays and probably some travel-restricted times because of the Beach areas.

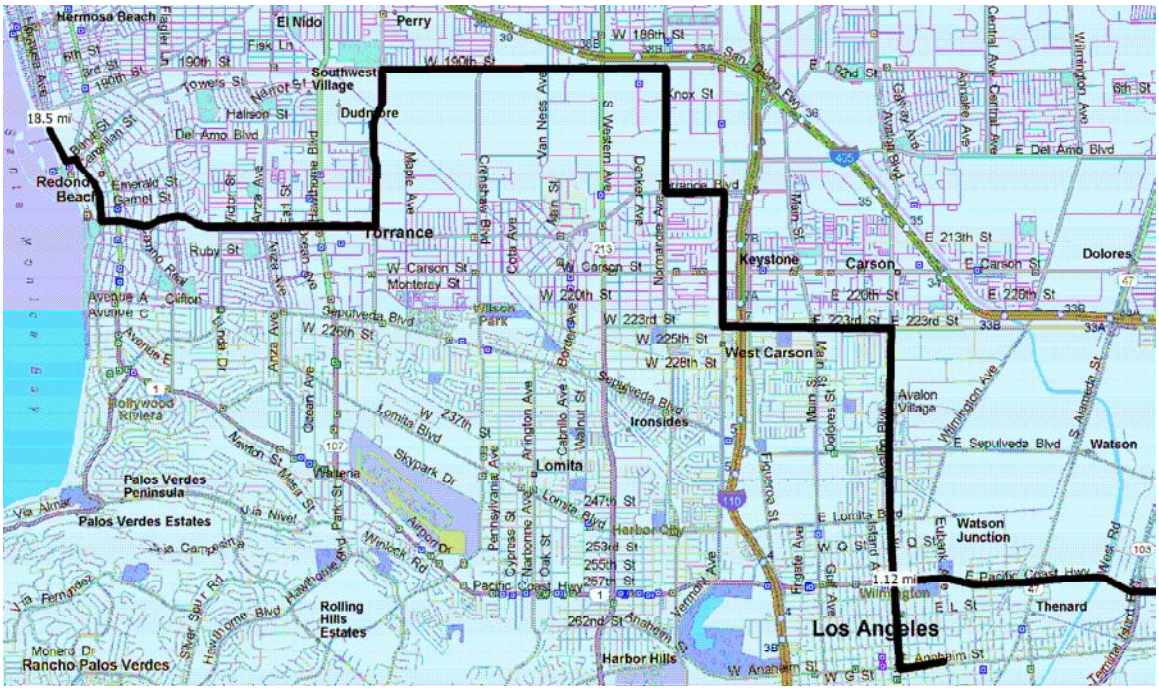
Vanco Rail siding to Redondo Beach	
Anaheim to Avalon	Make r/h turn from far left lane. Rotate traffic lights on Avalon
Avalon to 223rd Street	Good corner.

223rd Street to Vermont	Make turn from far right lane of 223rd Street
Vermont to Torrance	Have utility crews rotate lights on Torrence
Torrance to Normandie	Make wide turn to avoid lights
Normandie to 190th Street	Good corner
190th Street to Prairie Ave.	Make l/h turn from far right lane
Prairie Ave. to Torrance	Make the corner from the wrong side of Prairie
Torrance to Catalina Ave.	Good corner. Traffic signals are 16'5"
Catalina Ave. to Beryl Street	Very tight corner, will have to remove and replace traffic signals on the left side.
Beryl Street to Harbor Drive	Very congested area. Pedestrian signal will have to be removed and replaced

Summary

The Route from the Vanco Rail Siding is the same as from Long Beach with the Exception of a right turn from Anaheim to Avalon.

VANCO rail siding to Redondo Beach



VANCO Rail Siding 711 Anaheim Street

Anaheim Street to Avalon

Avalon to 223rd

223rd to Vermont

Vermont to Torrance

Torrance to Normandie

Normandie to 190th

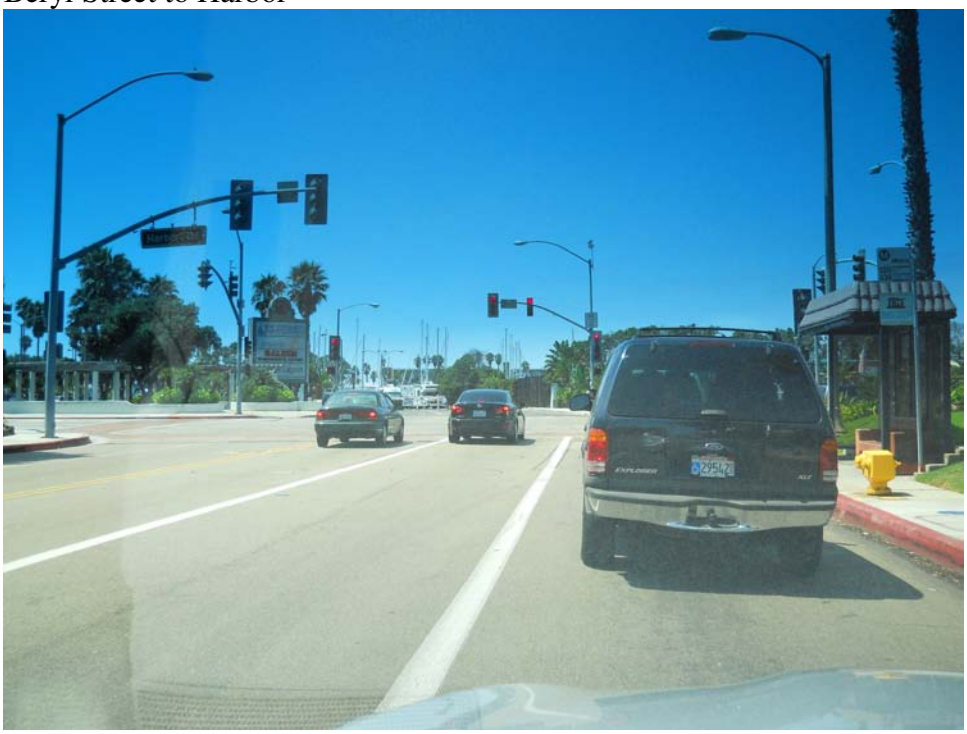
190th to Prairie

Prairie to Torrance

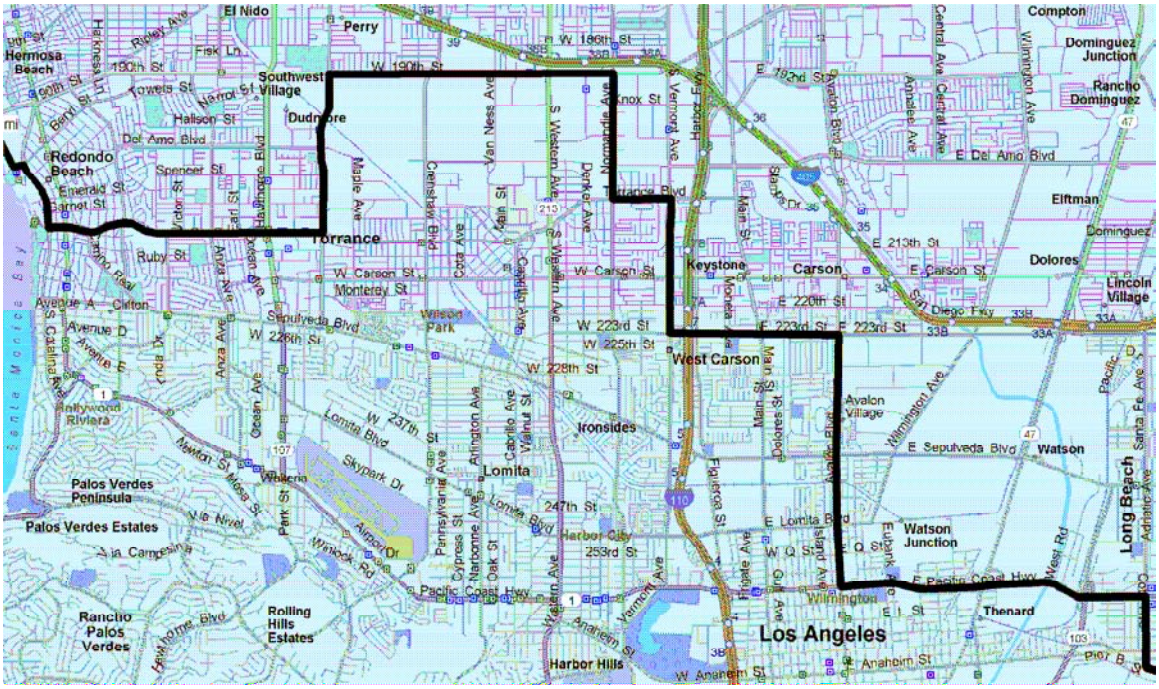
Torrance to Catalina

Catalina to Beryl Street

Beryl Street to Harbor



Long Beach to Redondo Beach



Pico Ave

10th / 9th

9th to Santa Fe

Santa Fe to PCH Hwy 1

PCH to Avalon

Avalon to 223rd

223rd to Vermont

Vermont to Torrance

Torrance to Normandie

Normandie to 190th

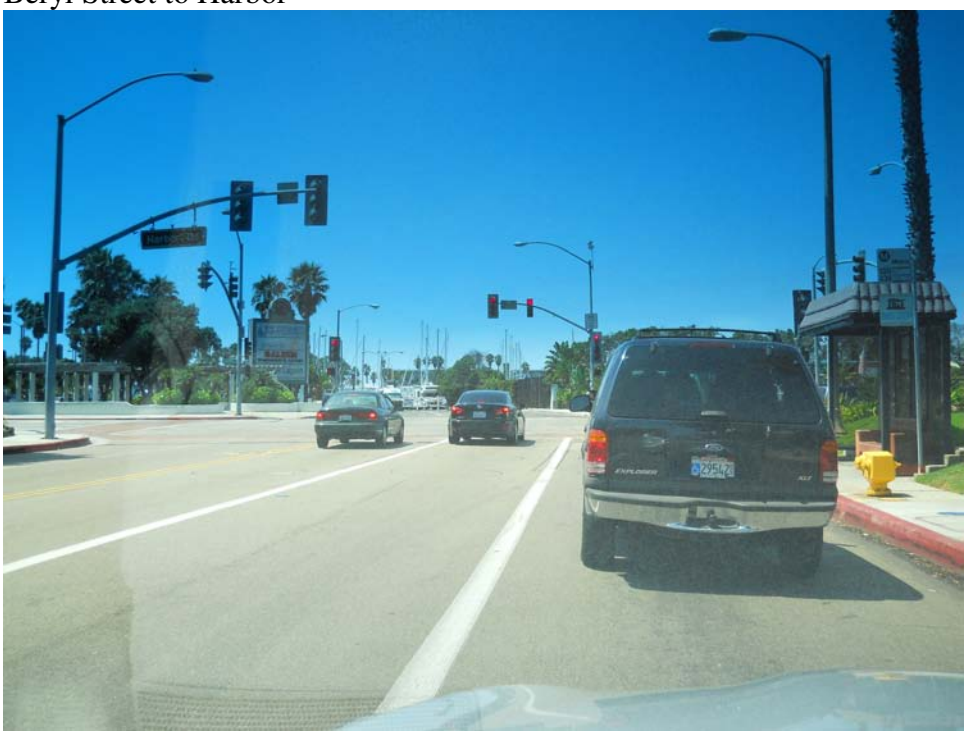
190th to Prairie

Prairie to Torrance

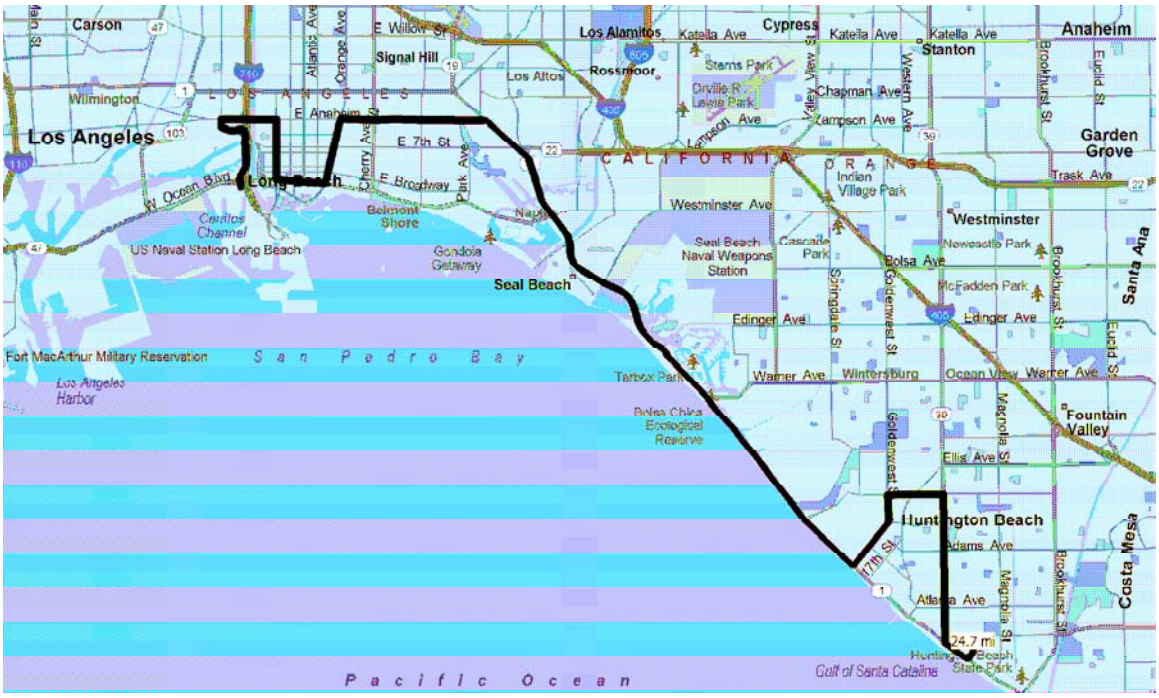
Torrance to Catalina

Catalina to Beryl Street

Beryl Street to Harbor



Long Beach to Huntington Beach



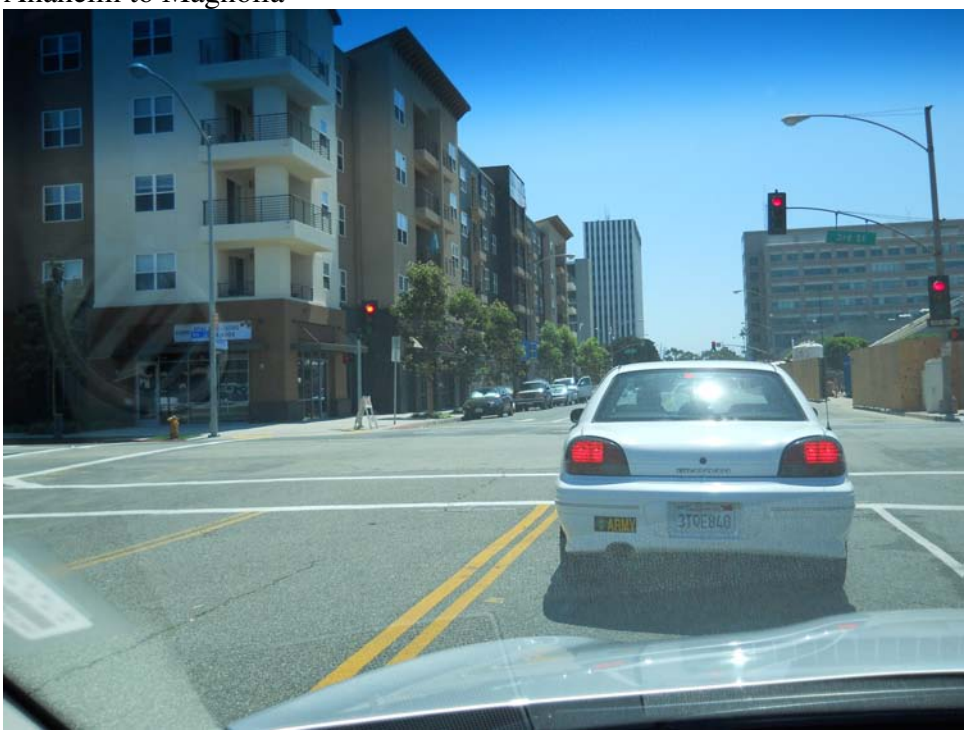
Pico Ave.

10th/9th

10th/9th to Santa Fe

Santa Fe to Anaheim

Anaheim to Magnolia



Magnolia to Ocean

Ocean to Alamitos

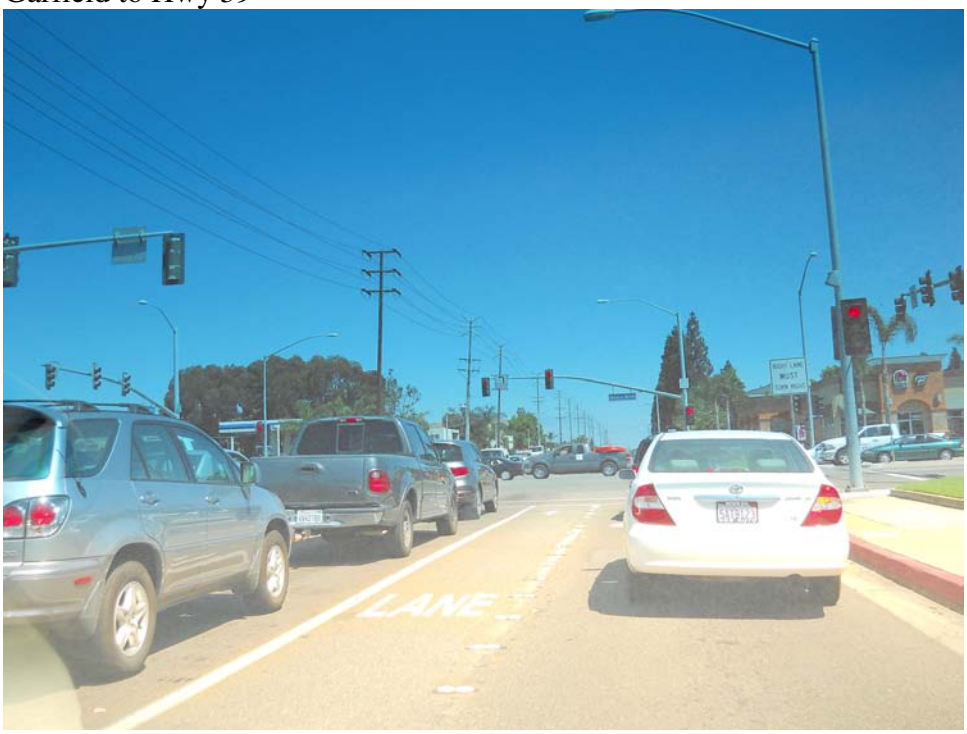
Alamitos to Anaheim

Anaheim to PCH Hwy 1

PCH to Goldenwest

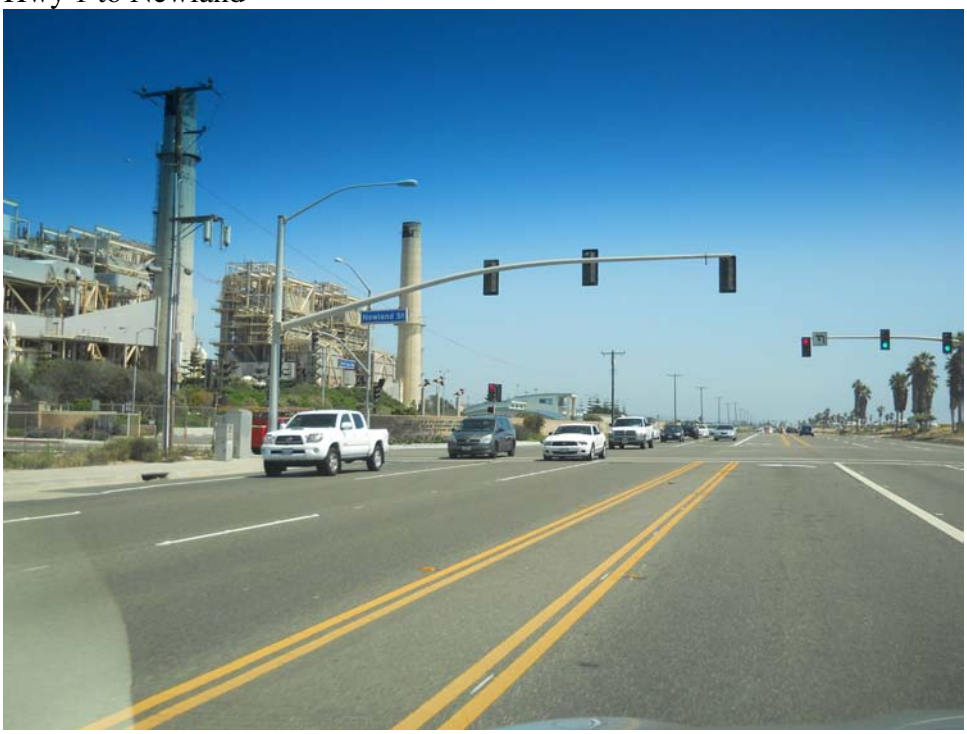
Goldenwest to Garfield

Garfield to Hwy 39

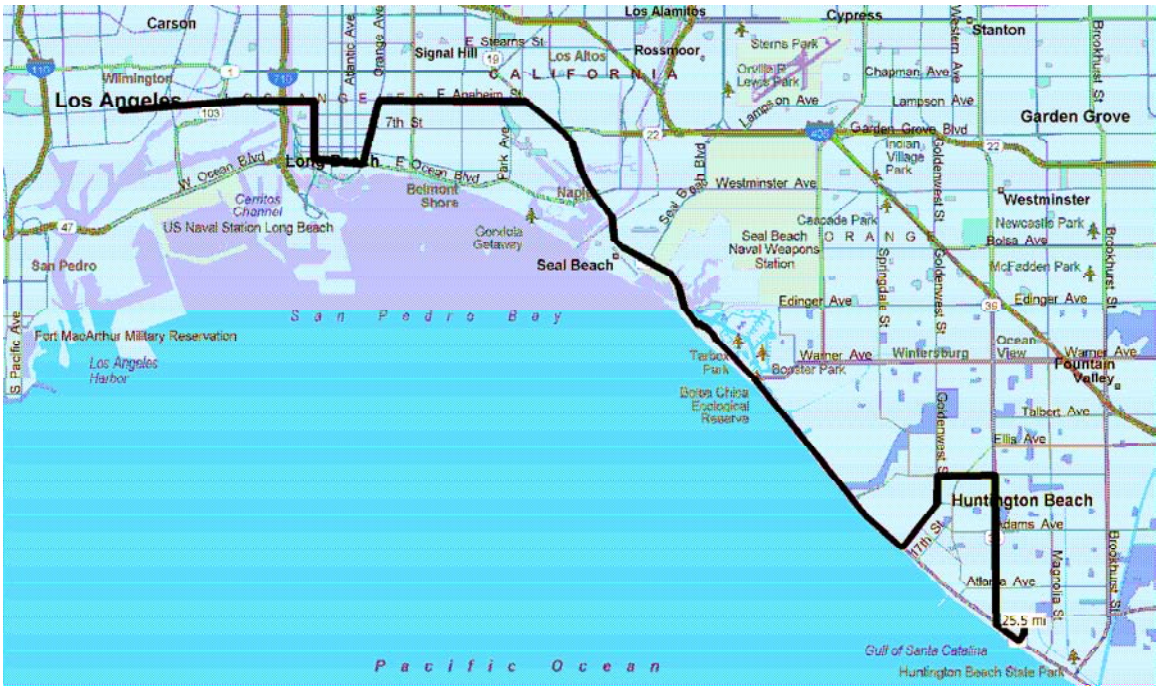


Hwy 39 to PCH

Hwy 1 to Newland

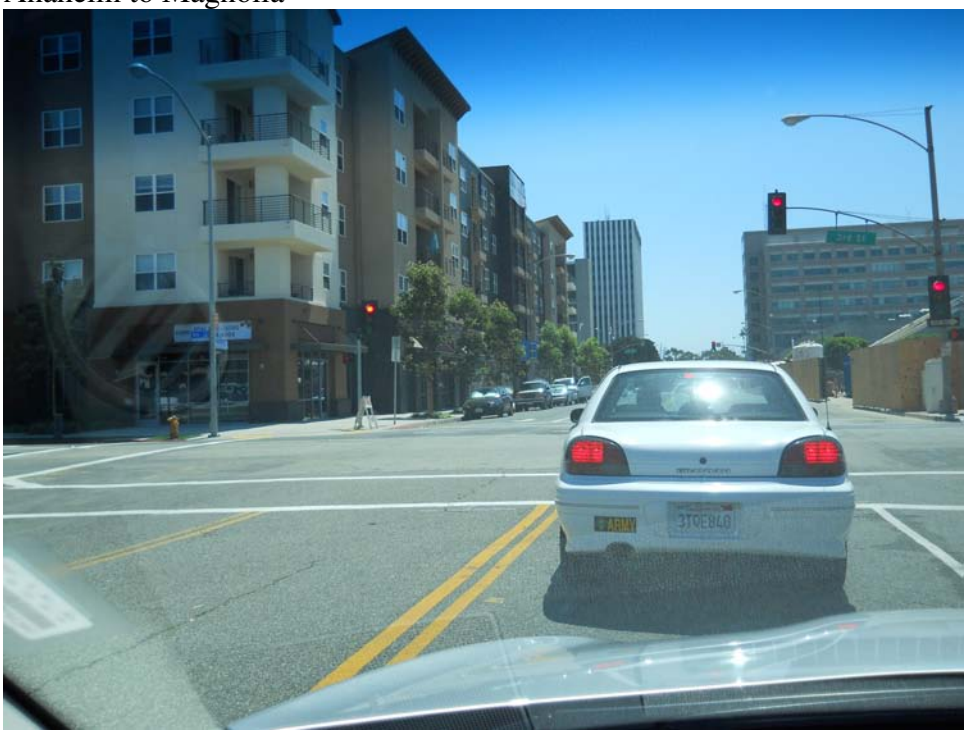


VANCO Rail Siding to Huntington Beach



Anaheim Street

Anaheim to Magnolia



Magnolia to Ocean

Ocean to Alamitos

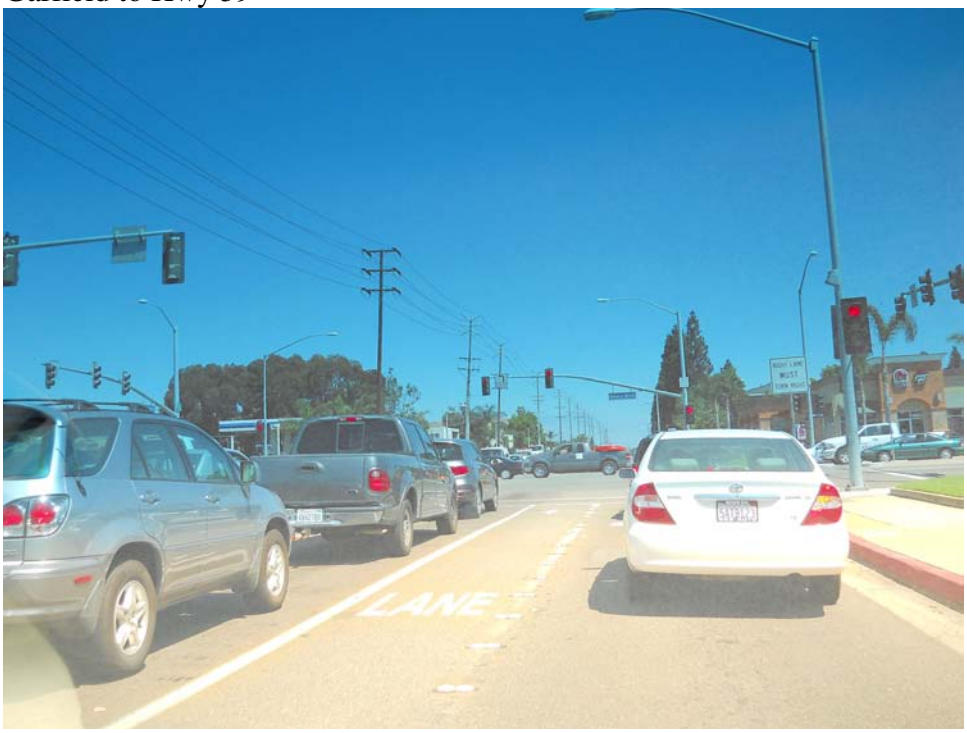
Alamitos to Anaheim

Anaheim to PCH Hwy 1

PCH to Goldenwest

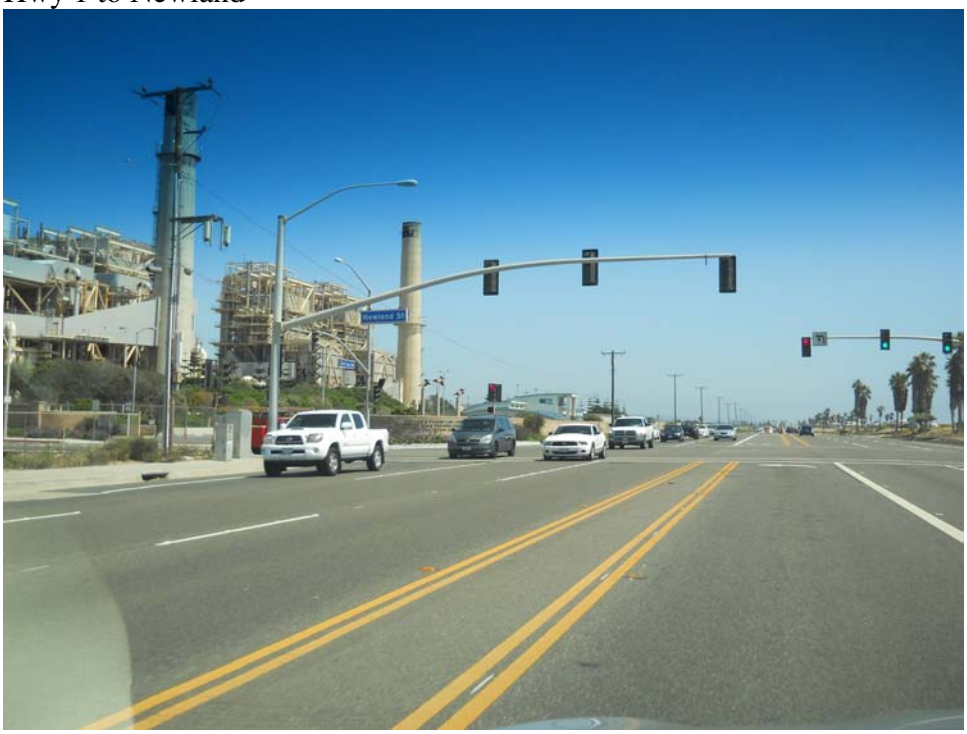
Goldenwest to Garfield

Garfield to Hwy 39

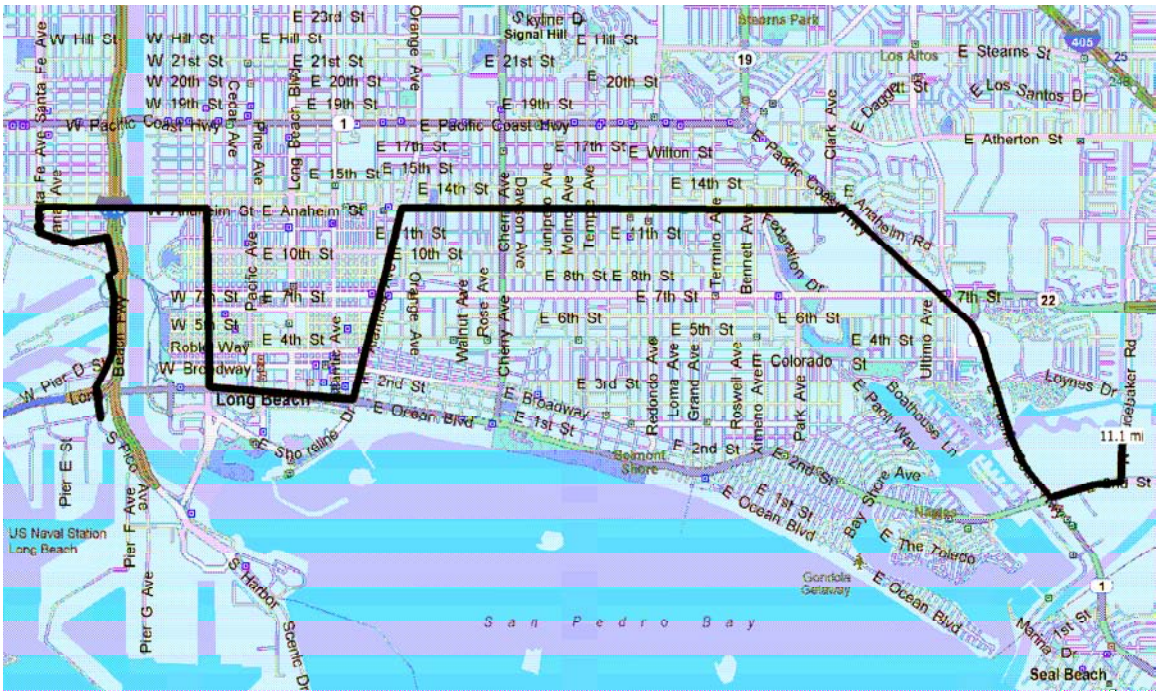


Hwy 39 to PCH

Hwy 1 to Newland



Long Beach to Alamitos



Pico Ave.

10th/9th

10th/9th to Santa Fe

Santa Fe to Anaheim

Anaheim to Magnolia

Magnolia to Ocean

Ocean to Alamitos

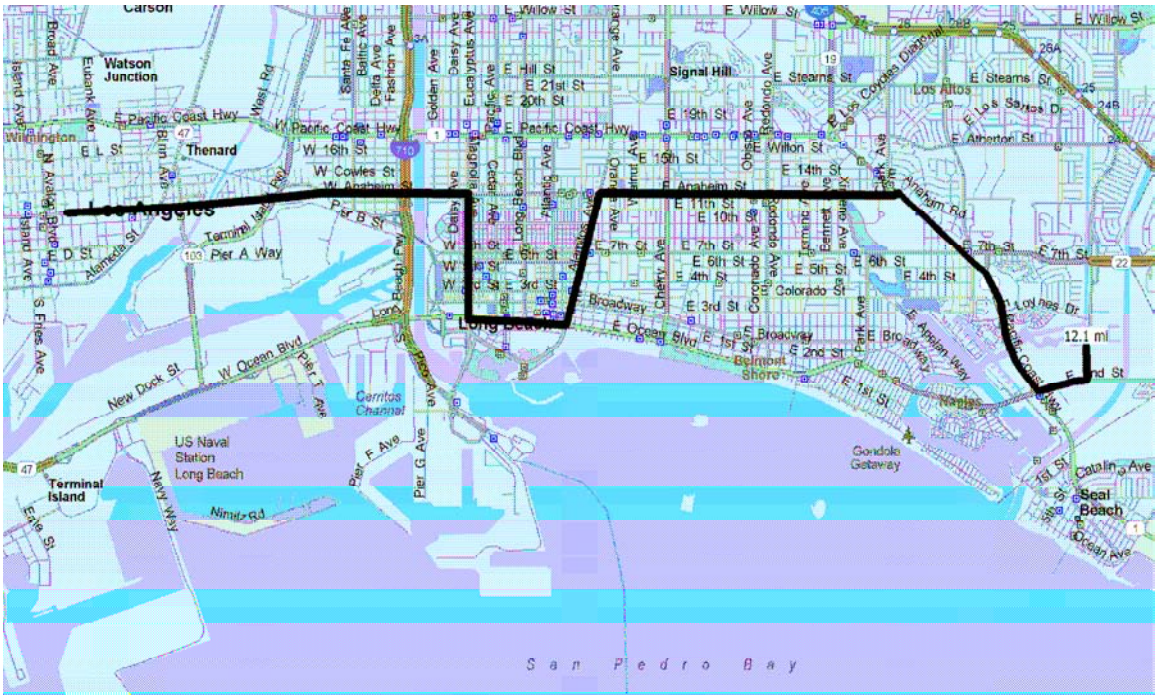
Alamitos to Anaheim

Anaheim to PCH Hwy 1

PCH to 2nd Street

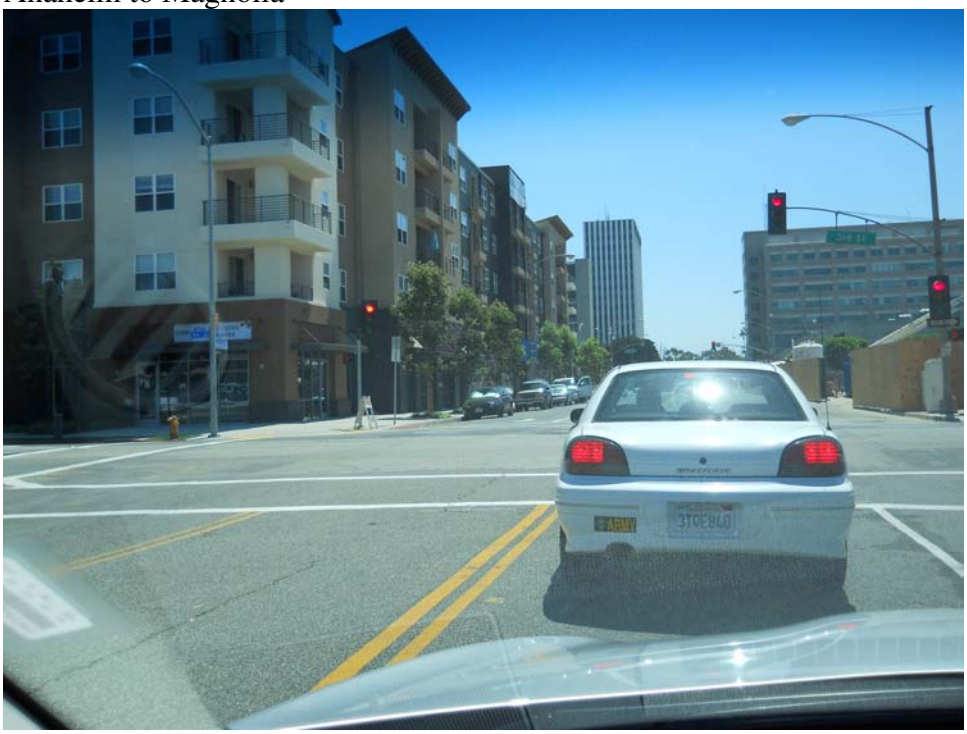
2nd Street to Studebaker

VANCO Rail Siding to Alamitos



Anaheim Street

Anaheim to Magnolia



Magnolia to Ocean

Ocean to Alamitos

Alamitos to Anaheim

Anaheim to PCH Hwy 1

PCH to 2nd Street

2nd Street to Studebaker

The 16 axle dual lane transporter is a proven design that has been successfully permitted, and used to transport heavy loads across the Los Angeles basin, in San Francisco Bay Area, and elsewhere. This transporter's load distribution capabilities are well understood and approved by Caltrans. For its characteristics of high capacity, low height, and "permit-ability", this transporter was the subject for this route study.

Shown below is IRH empty 16 axle trailer

Caltrans' (and the other state agencies') fundamental permitting issue will be the distribution of the weight of the load to the highways, and bridge structures, in order to achieve a footprint on the highway which is equivalent to, or greater, than the 16 axle transporter which was the basis of the study.

In regards to Turbine and Generator height, a suspension beam trailer minimizes the overall height of the load when compared to the use of a deck trailer.

Shown below is a 400,000# load on IRH 16 axle trailer.

Using this type of trailer on the Turbine load with a height of 15' would mitigate the overall height and limit it to maximum of 16'-6". The height of a deck, or platform, trailer is a minimum of 3-ft. and this does not include additional height due to blocking and load spreading hardware. Likewise, the height of the load deck of a gooseneck trailer capable of carrying a Turbine or Generator when combined with the height of blocking, would result in an overall load height exceeding that of a suspension beam arrangement.

This study was conducted to be in conformance with state permitting requirements and with the highest expectations of state permissions being successfully obtained for the route selected.

The Caltrans permitting requirements for high, wide and heavy loads are voluminous. The Caltrans Transportation Permits Manual (TPM) consists of ten (10) chapters and twenty-nine (29) appendices.

Caltrans guards their highways and bridges from overload situations and grants variances (permits) only if the load is not reducible (TPM, Chapter 2, section 301). With the super loads such as this power plant equipment, Caltrans will review every highway bridge crossed.

Regarding the "heavy" issue, the base regulation is that "overweight" is considered to be more than 20,000 lbs per axle. In addition, axle spacing must not be less than 4'-6" apart, and axle groups must be at a not less than 18"-0" minimum spacing to receive full "chart" values (i.e. orange, green and purple charts). To be granted double lane loading requires a vehicle width to be not less than 13"-0" per TPM, Appendix 15.

Regarding the issue of "high and wide", per other Caltrans' TPM Chapter 4 regulations, variances are required for vehicles with:

- Lengths over 135 feet
- Widths over 14 feet

- Heights above 17 feet
- Overhead clearance of 3 inches or less.

TPM Chapter 4 also addresses the provisions for California Highway Patrol escorts, which are based on width, length, speed and weights to be transported. Pilot cars are addressed in TPM Chapter 5 and in Appendix 19.

During the power plant equipment transport, the permitting and escorting agencies will dictate operational details along the permitted route adjusting for traffic, weather, and other daily conditions. Caltrans curfew maps have been established for California's urban areas which restrict routes and define the hours of travel. It may be expected that travel will be at night and during restricted hours.

The arrangement of the convoy for a 16 axle transporter in highway travel will vary with the section of highway to be traversed, but including escort vehicles is typically:

- Law enforcement in lead; close-in, and also ranging ahead
- Pilot car
- Lead transportation vehicle with superintendent
- Pulling prime mover(s)
- 16 axle transporter
- Pusher prime mover(s)
- Gear truck with spare tires, spare parts, tools and welding equipment
- Utility truck with curb jumpers, etc.
- Pilot car
- Law enforcement in rear.

Other vehicles for diverting traffic flow, coning lanes if required, and removing and reinstalling road signs and other obstacles, may accompany the main convoy. All key vehicles will communicate by radio. On long or severe grades a third, and even a fourth, prime mover may be required.

In conducting this study, IRH transportation superintendents, thoroughly experienced in both the movement of large loads, and in dealing with Caltrans, considered the physical characteristics of the equipment to be transported, 16 axle transporter, Caltrans' permit requirements, and the route.

We drew on out extensive experience:

- In moving super loads in California highways
- In moving super loads in the Los Angeles basin area.
- In moving super loads out of L.A., and the Bay area
- With specialized transporters
- With securing transportation permits from Caltrans

As a factor of confidence in this study, please be advised that two (2) experienced IRH transportation superintendents drove each of the routes. The routes were selected with no

structures being lower than 17' vertical clearance. Traffic signals can be avoided unless otherwise noted in the study. Wires are required to be 16'5" above the road surface, and a wire-sliding device will be installed on the load to slide wires that may be lower than the required height. The lead escort vehicle will have a height pole and will communicate to the driver any low wires. Roadside obstacles and mitigations, turning radii, and parking spots were also considered.
The recommended route was selected because of previous success at obtaining permits for the transport of high, wide and heavy loads.

Transportation Risk Factors:

The question of reducibility is certain to be raised by Caltrans in regards to the transportation of the power plant equipment as a single piece. The issue of reducibility is, in fact, built into the Caltrans permitting process in TPM, Chapter 3, and Chapter 4, Variances. A "bona fide economic comparison" (Section 400.3) may be required of the various transportation options for large and heavy objects.

There is a possible or potential risk in a municipality, or a county, taking an unfavorable view of accommodating a highway load which is disruptive due to its size. The high/wide route involves travel, not just on federal and state highways, but also in the greater Los Angeles basin on roads and streets where municipalities or countries will have the power to grant, or deny permits.

The risk factors for the power plant equipment transportation may be summarized as:

- Route surveys, and the fact a technical transportation solution exists, is no guarantee that a state's Department of Transportation permissions will be granted.
- Demands for reducibility of the loads if a highway bridge overload occurs
- Possible reluctance of municipalities or countries to grant permits
- Permitting becomes more complex as the number of agencies involved increases (state, countries, municipalities, law enforcement, utilities)
- Physical changes to the route in the intervening years until transport occurs.
- Other uncontrollable events impacting the planned transportation (e.g. major earthquake)

Permitting Strategic Recommendations:
A recommended strategy for transportation projects with difficult permitting is to contact each agency with a preliminary project transportation plan. The approach is to engage the agencies early, then to proceed from conceptual plans to detailed plans in a manner to build confidence with the authorities and avoid placing agencies in hard positions. The intent is to make the transportation of the power plant equipment a mutual problem, which the agencies help solve.

Any objections the agencies may have to the conceptual plans should be explored to determine their additional information needs. Continued research of the route and engineering of the vehicle then refines issue and designs. At a time appropriate, issues are

revisited with the agencies to establish if objections have been resolved and what the final steps will be for obtaining permits.

In parallel, unavoidable route obstacles such as signs, signals, guardrails, etc., which will interfere with transit, are finalized, identified, as to ownership, and their mitigation measures and resources determined.

The Project Transportation Plan, when ready for execution, will assemble the transportation plans, procedures, routes, permits, contracts with escorting agencies, scope of work and contracts for mitigation measures, safety plans, and all other issues required to successfully and safely conduct the work.

The following pages are the results of the route studies that were conducted. Please refer to the photographs that were previously received on CD.