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Poseidon Resources Corporation
Orange County Desalination Project
**PRELIMINARY ASSESSMENT OF
POTENTIAL WATER TRANSMISSION LINE
ROUTES FOR THE ORANGE COUNTY
DESALINATION PLANT
TO THE OC-44 IN COSTA MESA**

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August 2001



**POSEIDON RESOURCES CORPORATION
ORANGE COUNTY DESALINATION PROJECT**

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PRELIMINARY ASSESSMENT OF POTENTIAL WATER TRANSMISSION LINE ROUTES FOR THE ORANGE COUNTY DESALINATION PLANT TO THE OC-44 IN COSTA MESA

1.1 INTRODUCTION

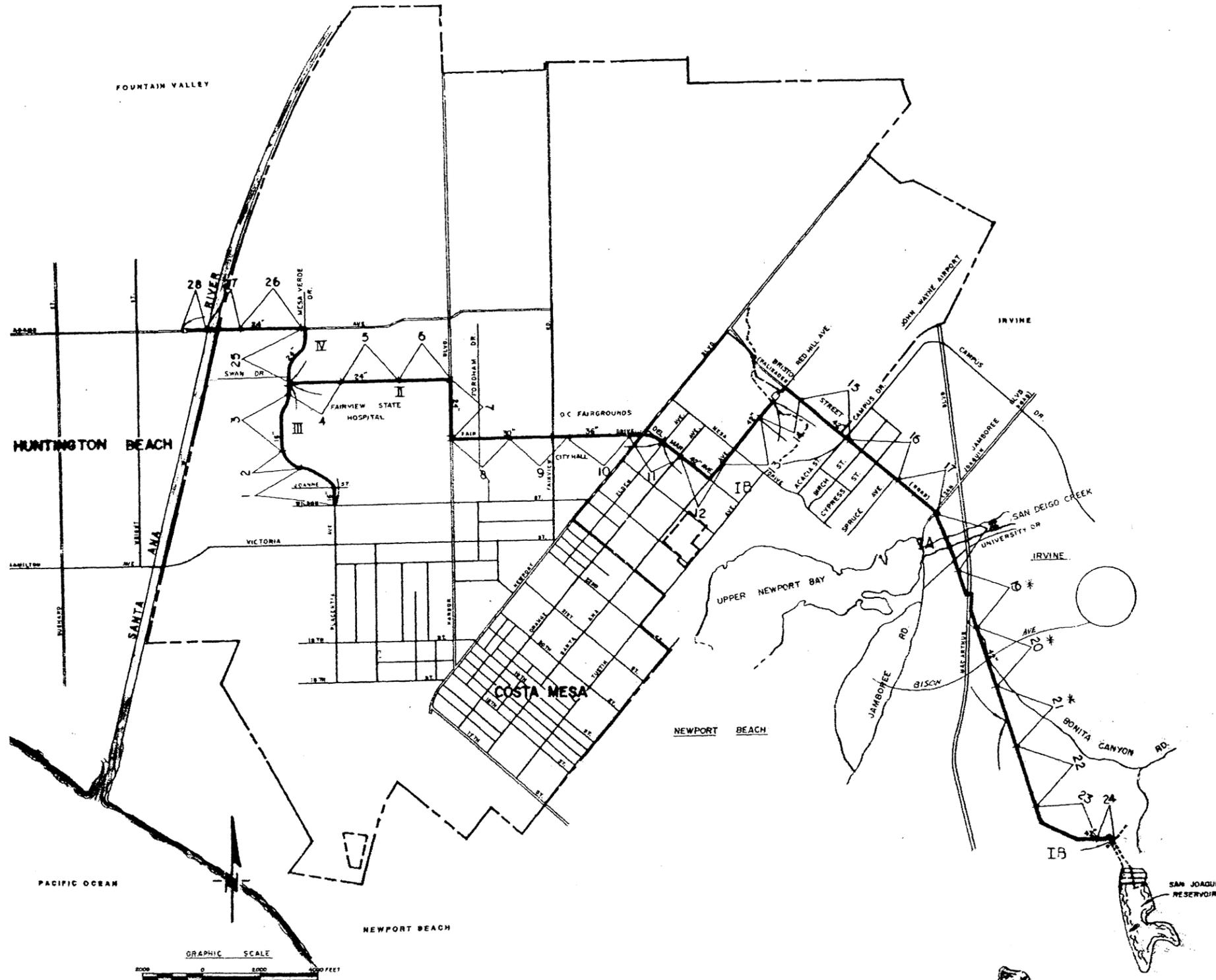
The objective of this work was to conduct preliminary investigations to determine the feasibility of routing a 42 to 48-inch force main from the proposed Orange County Desalination Plant to the 42-inch diameter reach, or segment, of the OC-44 water transmission line in the City of Costa Mesa, California. This proposed connection would allow for the conveyance of high-quality potable water through the OC-44 and, eventually, to south Orange County where water demand is high and alternative sources of water are limited. To determine a feasible route, preliminary meetings were held with the cities of Huntington Beach and Costa Mesa, California to address potential problems with the various routes proposed.

The information presented below is based on limited technical evaluation of pipeline routes. This preliminary assessment was conducted for the purposes of providing information for an Environmental Impact Report only.

1.2 OC-44 TRANSMISSION LINE

The OC-44 transmission line was designed to transfer water from the San Joaquin Reservoir through the eastern limits of the City of Costa Mesa, with turnouts along the route, terminating near the southeastern edge of Huntington Beach. Because the San Joaquin Reservoir is no longer in service, the MWD potable water supply to the OC-44 is now directly off the East Orange County Feeder (EOCF) #2 only. Figure 1 shows the location of the OC-44 transmission line and its associated size at each junction. As shown, the western reaches of the transmission line are of limited capacity (24 and 16-inch) while the eastern reaches are more sizable (42-inch). Under the objectives of this work the flow of the water in OC-44 would be reversed. Thus, the latter reach would be tied into a new 42-inch transmission line, which would be routed from the Orange County Desalination Plant in order to accommodate the projected 50 mgd of potable water produced at the plant. Currently, as shown in Figure 1, the 42-inch reach of the OC-44 is located just east of the 55 Freeway on Del Mar Street in the City of Costa Mesa.

Joint ownership of the OC-44 transmission line between the City of Huntington Beach and Mesa Consolidated Water District (MCWD) exists. A meeting was held with MCWD on May 10, 2001 to provide updated information on the Poseidon SWRO project and identify any potential issues regarding conflicting future uses for the OC-44 line. Similarly, a meeting with the City of Huntington Beach was held on April 10, 2001 to address future uses of the OC-44 transmission line.



OC-44 TRANSMISSION LINE

FIGURE 1

POSEIDON RESOURCES



CLIENT: POSEIDON 6842 PFIG 1.CDR

1.3 DESCRIPTION OF PROPOSED ROUTES

As shown in Figure 2, three proposed routes were devised as a means to convey potable water from the proposed Orange County Desalination Plant to the 42-inch reach of the OC-44 in Costa Mesa. A primary and two alternative routes were proposed. The following sections describe these routes in detail. The routes are divided into reaches for clarity.

1.3.1 Primary Route

An initial northern, or primary, route was proposed. This route (shown in blue on Figure 2) is from the proposed desalination plant at the AES power generation facility north along Brookhurst to Adams and then southeast to the OC-44 connection on Del Mar. The overall length of this route is approximately 40,050 feet. For discussion it has been broken down into the following five reaches:

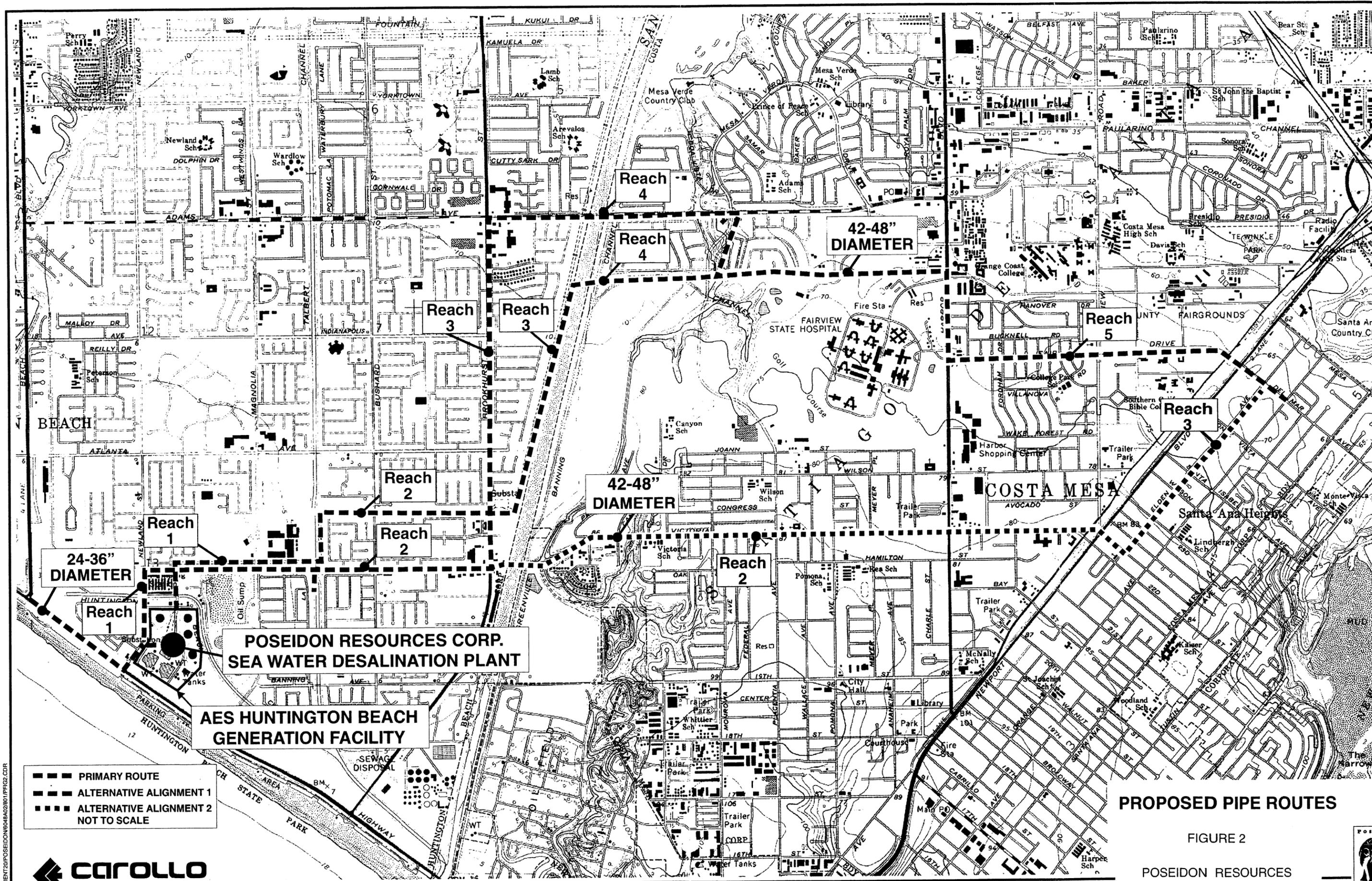
1. Primary Route, Reach 1

The initial reach of the new force main would leave the AES site on the east side of Newland Avenue and proceed north to Hamilton. Approximately two-thirds north along this reach, the pipeline would have to cross a flood control channel at Newland, which would require the trenchless construction or tunneling of the pipeline underneath the drainage channel. The bridge crossing the channel is currently of limited capacity and could not receive a pipe of this size, leaving micro-tunneling, or directional boring as the only viable alternatives.

2. Primary Route, Reach 2

Reach 2 would begin at the intersection of Newland and Hamilton and proceed east along Hamilton to the intersection of Hamilton and Brookhurst. Before crossing the Talbert drainage channel, this route would pass south of the Edison High School in Huntington Beach. Passage under the Talbert drainage channel would require trenchless methods. Traffic flow along this section of Hamilton is currently low to moderate with two lanes along the western reach and expanding to four lanes east of Magnolia.

An abandoned 30-inch pipe previously owned by the Orange County Water District exists along Reaches 1 and 2 (up to the Talbert Channel). This pipe would be removed and replaced by the larger SWRO product pipe. A turn out would be provided near the Talbert channel to connect to an existing 30-inch pipeline conveying groundwater to Newport Beach. There may be a possibility of encountering contaminated soils near the western end of Reach 2, where the reach passes near an oil sump area. Traffic flow is heavy, as Brookhurst is a major north-south corridor in the City of Huntington Beach. Brookhurst currently is a six-lane road through primarily residential areas.



- PRIMARY ROUTE
- - - ALTERNATIVE ALIGNMENT 1
- · · ALTERNATIVE ALIGNMENT 2
- NOT TO SCALE

**POSEIDON RESOURCES CORP.
SEA WATER DESALINATION PLANT**

**AES HUNTINGTON BEACH
GENERATION FACILITY**

Reach 4

Reach 4

42-48" DIAMETER

Reach 3

Reach 3

Reach 5

Reach 3

Reach 2

Reach 2

42-48" DIAMETER

Reach 2

24-36" DIAMETER

Reach 1

PROPOSED PIPE ROUTES

FIGURE 2

POSEIDON RESOURCES

3. Primary Route, Reach 3

Reach 3 would begin at the intersection of Hamilton and Brookhurst and proceed north along Brookhurst to the intersection of Brookhurst and Adams. There are no major intersections along this route, so open trench construction is acceptable. Traffic flow is heavy, as Brookhurst is a major north-south corridor in the City of Huntington Beach. Brookhurst is a six-lane road through primarily residential areas.

4. Primary Route, Reach 4

Reach 4 would begin at the intersection of Brookhurst and Adams and proceed east along Adams to Placentia. At Placentia, the pipeline would turn south, running along Placentia to the Costa Mesa Country Club/golf course at which point the route would proceed east along the northern boundary of the park to Harbor Boulevard. Finally, Reach 4 would run south along the eastern edge of the park (parallel to Harbor) to the intersection of Harbor and Fairview.

Approximately halfway along Adams, the proposed pipe route would have to cross the Santa Ana River and Greenville-Banning Channel. This is a significant crossing of greater than 600 feet. This crossing would require trenchless construction underneath the river and channel as the current bridge crossing at Adams could not support a 42 to 48-inch pipe. Minimal space at this intersection is available for required trenchless construction. In addition, traffic flow along Adams is heavy during rush hour periods. Adams is a six-lane road at this location.

The remaining roadway portions of Reach 4 would include a short stretch along Placentia (approximately 1,500 feet). East of Placentia, the primary route would follow the Costa Mesa Country Club where off-pavement open trenching construction would be possible. The pipeline would pass north of Fairview State Hospital within the northeast corner of the park.

5. Primary Route, Reach 5

Reach 5 of the Primary Route would begin at the intersection of Harbor and Fair and terminate at the OC-44 connection point at the intersection of Del Mar and Orange.

Crossing Harbor Boulevard at Fair from the eastern boundary of Fairview Park would most likely require trenchless construction. Harbor is currently a major north-south corridor and is usually quite congested with a total of six lanes of traffic.

Routing of the pipeline on the north side of Fair would permit the construction of the line off-pavement once the Orange County Fairgrounds is reached. Before reaching the fairgrounds the route passes north of College Park School. East of the fairgrounds, pipeline construction would encounter the 55 Freeway and require trenchless construction underneath this major crossing (approximately 500 to 600 feet). Beyond the 55 Freeway, the pipeline runs along Del Mar street for about 1,200 feet to the connection with the OC-44. Del Mar is a low traffic flow street in residential areas.

1.3.2 Alternative Alignment 1

A first alternative route (Figure 2, Alternative Alignment 1 - black) was proposed, which would traverse along a southern route to the OC-44. This route would rely entirely on the construction of the force main within public easements, through the cities of Huntington Beach and Costa Mesa. The overall distance for this route would be approximately 30,000 feet and has been divided into the three following reaches for discussion:

1. Alternative Alignment 1, Reach 1

The first reach of the first proposed route would follow Reach 1 and 2 of the primary route.

2. Alternative Alignment 1, Reach 2

Reach 2 of the Alternative Alignment 1 would begin at the intersection of Hamilton and Brookhurst in the City of Huntington Beach and traverse the Santa Ana River east along Victoria to the 55 Freeway.

As with the crossing at the Santa Ana River along Adams, the crossing along Victoria would require trenchless construction due to a limitation in bridge capacity there. It is important to note that this area is quite congested and limited space is available for trenchless construction. Victoria Boulevard is currently a main thoroughfare between the cities of Huntington Beach and Costa Mesa and experiences heavy traffic flow. Victoria is a four-lane road in the area concerned.

Reach 2 would run parallel to Victoria School, which may require special conditions for construction and traffic control. Further to the east the reach would pass to the south of Wilson School and to the north of two other schools (Pomona and Rea). At the intersection of Victoria and Harbor Boulevard, trenchless construction would be required by the City of Costa Mesa as the Harbor-Victoria intersection can be extremely congested. Further trenchless construction would be required to cross the 55 Freeway. At this crossing, more land area is available for trenchless construction than is available for the northern route crossings of the 55 Freeway.

3. Alternative Alignment 1, Reach 3

The third and final reach of the second alternative route would begin at the eastern edge of the 55 Freeway and progress a few hundred feet down 22nd Street until turning northeast along Elden to the OC-44 connection point. This reach would be along minor residential streets with no trenchless construction required.

1.3.3 Alternative Alignment 2

The second alternative route proposed (Figure 2, Alternative Alignment 2 - green) was a second northern route, which would progress from the proposed desalination plant north along the Santa Ana River. Eventually, this route would run east through the Costa Mesa Country Club until it would join the proposed Primary Route at Placentia and the northern

park boundary. The length of this proposed route would be approximately 34,450 feet. This alternative route through the City of Huntington Beach would traverse through Southern California Edison (SCE) transmission line easements, allowing for greater off-pavement construction. This route was divided into the following four reaches:

1. Alternative Alignment 2, Reach 1

The initial reach of the first alternative route would run north from the proposed desalination plant at the AES site along SCE easements to an easement area running east and parallel to the northern edge of Hamilton Street. In this section of the reach the pipe could replace the existing abandoned 30-inch pipe, described above. After traversing east through the easement for approximately 3,300 feet, the force main would have to be routed under the Talbert drainage channel using trenchless construction methods to an easement area (Edison Park) running north-south on the eastern edge of the channel.

The SCE easement area running west to east along Hamilton between Newland and the Talbert Channel passes directly south and parallel to the Edison High School. This area is a landscaped park as is the north-south easement parallel to the Talbert Channel, the latter area comprising Edison Park.

2. Alternative Alignment 2, Reach 2

Reach 2 of the Alternative Alignment 2 route would begin at the northern end of Edison Park (parallel to the Talbert Channel) and run east to the Santa Ana River between Atlanta and Hamilton. This reach would run through undeveloped landscape within the SCE easement except for a small nursery east of the Talbert Channel. Within this zone trenchless construction would be required to pass under Brookhurst and possibly Bushard.

3. Alternative Alignment 2, Reach 3

Reach 3 of the Alternative Alignment 2 route would run north-northeast along the Santa Ana River within SCE easement areas. This reach would traverse north from the previous easement area between Atlanta and Hamilton to the northern edge of the Costa Mesa Country Club on the western slope of the Santa Ana River. As with Reach 2, this stretch is essentially undeveloped land except for a small nursery at the terminus of Atlanta Avenue. Open trenching is acceptable within this reach.

4. Alternative Alignment 2, Reach 4

Reach 4 of the second alternative route would pass underneath the Santa Ana River and Greenville-Banning Channel and continue east along the northern boundary of the Costa Mesa Country Club. At Placentia, this alternative route would become the same as that for the Primary Route, described above as Reach 4 (western portion) and 5. Within this proposed route, the crossing of the Santa Ana River would offer more space for trenchless construction than the primary route at Adams for the 600+ foot crossing.

1.4 CITY MEETINGS

Meetings were held with municipalities located along the OC-44 transmission line and those municipalities having a vested interest in any OC-44 operational changes, affecting the supply of MWD water. The cities of Huntington Beach and Costa Mesa were contacted as new pipeline construction through these cities could cause disturbance to residents, primarily through the impact of construction in streets on traffic flow. The proposed pipe routes, primary and alternate, were ultimately decided upon following direct communication with municipal engineers. Similarly, SCE was contacted regarding the routing of a pipeline through SCE easement areas. Ms. Alice Likely with the SCE R/W department was the point-of-contact for these discussions. Ultimately, communication with the cities and SCE led to the development of three potential routes (two northern and one southern) as shown in Figure 2.

1.4.1 City of Huntington Beach

A meeting with the City of Huntington Beach was held on April 10, 2001. In this meeting, an initial northern and southern route was presented to the City by Carollo Engineers. The southern route, shown in Figure 2 (Alternative Alignment 1), remained the same from initial conception although an additional northern route (Alternative Alignment 2) was later added as a result of discussion with the City of Huntington Beach, Costa Mesa, and SCE. Initially, the northern route was proposed to traverse north along Brookhurst Ave, east along Adams, and then to Placentia to join the existing OC-44 line (Figure 2, Primary Route). Though there are no current street moratoriums on any of the routes, the City preferred the southern route along Hamilton Boulevard. It was argued by the City that the northern or primary route would greatly disrupt traffic and may conflict with any future pipe corridors.

Later discussions with the City of Costa Mesa made it clear that the City prefers the northern pipe route for reasons that will be discussed shortly. Consequently, a new alternative, northern route was investigated that would mitigate concerns posed by the City of Huntington Beach. This new northern route entailed the construction of the 42 to 48-inch main within the Southern California Edison (SCE) high voltage transmission power line corridor through the City of Huntington Beach. As shown in Figure 2 (Alternative Alignment 2), this route would virtually eliminate the need for construction within Huntington Beach city streets, resulting in cost savings and less disruption to the City.

Conversations with Mr. Matthew Lamb of the City's Real Estate Services gave valuable information concerning the routing of pipe within SCE easement areas. Overall, the City found this route more favorable than any options previously presented. The following stipulations/recommendations were made concerning construction within Huntington Beach park areas and SCE easement zones:

- If constructed in SCE easements, an agreement would have to be entered into between the pipe owner and SCE, most likely a non-exclusive easement, or a non-cancelable lease. The cost to obtain a non-exclusive lease would roughly be equal to the 30 percent of the pipeline area within the Edison easement times \$18 to \$20.
- The City of Huntington Beach would have to approve the chosen route.

- Construction within parks would have limits for overall trenching length (300 to 500 feet) and total lay-down area. Limited storage of equipment would be allowed within parks.
- The replacement of sod, trees, or any other disturbed structures or vegetation in park areas would be requested.
- Some negotiations would be required to pass through nurseries located along the pipe route, primarily the nursery located south of the Santa Ana river crossing at the end of Atlanta Avenue.
- The City of Huntington Beach would require that some street crossings, such as Bushard or Brookhurst, involve trenchless construction (6 feet below pipe crest elevation) to allow for future expansion and construction of City utility systems.
- Acceptance of construction in park areas by the public is often aided through the donation of some type of park property (i.e., children's playground equipment).

The northern pipe route would follow SCE transmission lines, through some park areas. The initial reaches of the force main would have to run through a parkway south of Edison High School on Hamilton, cross under the Talbert channel, and then run north through Edison Park as shown in Figure 2.

It became apparent that a clear advantage of routing a water main of this dimension under power transmission lines was that easement areas would provide more space for pipe trenchless construction. This was an important issue when considering the future crossing of the Santa Ana River, south of Adams. Routing the pipeline under the river along the northern boundary of Fairview Park in Costa Mesa would require considerable area to be available for trenchless construction.

Conversations with Alice likely of SCE revealed that recent events within the power industry in California have prevented the issuing of non-exclusive easements by SCE. Consequently, despite the benefits associated with routing of pipes through SCE easement areas, this option should be treated as an alternative, not a primary route.

1.4.2 City of Costa Mesa

A meeting with the City of Costa Mesa took place on April 11, 2001. The initial pipe routes that were presented to the City of Huntington Beach were also presented to the City of Costa Mesa. Initially, Costa Mesa accepted the southern pipe route, as this route was preferred, and requested by the City of Huntington Beach and Carollo. However, upon review of a routing map provided to the City by Carollo, the City reversed its stance in favor of the northern route. The reasons given by the City of Costa Mesa for their preference in using a northern route were the following:

- Construction of the pipeline along the northern route would provide the least disturbance to the residents in the City of Costa Mesa through significantly less street trenching and, hence, less impact on traffic.
- Off-street trenching would be possible all along the northern and eastern boundary of Fairview Park and the Costa Mesa Golf Course.

- Off-street trenching would be possible along the southern boundary of the Orange County Fairgrounds.

The routing of the new 42 to 48-inch force main in Costa Mesa would run along side of the existing smaller diameter reaches of the OC-44 in the City of Costa Mesa beginning at Fairview Park. The original pipeline will be left in place as to allow continued use by Mesa Consolidated and proposed use by the Orange County Water District for barrier injection water supply.

1.4.3 Southern California Edison

Given the benefits of routing the proposed pipeline through SCE easements, SCE was contacted to inquire about the possibility of obtaining non-exclusive easements for pipeline construction. A phone conversation on June 5, 2001 with Alice Likely of SCE revealed that there was some uncertainty of obtaining easements from SCE due to the California energy crisis. Routing maps were sent to SCE for review. However, in a letter dated June 21, 2001 from SCE, it was stated that "Edison is not in a position to allow the proposed facilities to be placed within it's rights of way because they will interfere with any future expansion of Edison's facilities." Even given this response, future granting of easements may be possible if the California energy crisis is resolved and SCE becomes once again financially viable.

1.5 CALTRANS AND COUNTY OF ORANGE

The construction of a new 42 to 48-inch line will require crossing the Santa Ana River and the 55 Freeway, both major crossings, constituting considerable lateral traverses.

Though CalTrans could not be contacted concerning the trenchless construction under the 55 Freeway, it is believed that CalTrans should not impede the construction of new water main. Past construction projects by Carollo have passed under major roadways similar to the 55 Freeway with little difficulty.

The crossing of the Santa Ana River will require communication and coordination with the County of Orange. Prior to pipeline construction, an encroachment permit would be required by the county. In addition, a 30-day review period of construction plans would eventually have to pass acceptance with the county before construction could begin. All pertinent information would be forwarded by the county and other appropriate agencies.

1.6 PIPELINE CONSTRUCTION

The majority of pipe work in the proposed northern route would consist of open trench construction. The crossing of major streets, the Santa Ana River, drainage canals, and the 55 Freeway would all involve trenchless construction methods. Table 1 summarizes the estimated lengths of trenching and the number of probable trenchless construction locations required for each proposed route.

Table 1 Construction Details Orange County Desalination Project Poseidon Resources Corporation			
Route	Open Trench [ft]	Under Pavement [ft]	No. of Trenchless Constructions
Primary Route	10,700	29,350	6
Alternative Alignment 1	0	30,000	6
Alternative Alignment 2	30,150	4,300	5

Figure 3 illustrates the various construction techniques that would be utilized to route the 42 to 48-inch water main.

For open trenching, the minimum covering for a 42 to 48-inch pipe would be at least 5 to 6 feet with 2 feet of available workspace on both sides of the pipe. This would require deep trenches (approximately 9 to 10 feet) with appropriate shoring. It is expected that, at this depth, dewatering would be required in regions close to the ocean in Huntington Beach – especially near the AES site. Including required lay-down area for supplies and equipment, a 30-foot easement may be required on trenching operations, often resulting in the shut-down of at least two lanes of traffic on most streets. If this area were not available, equipment and materials would have to be transported in and out of the construction area.

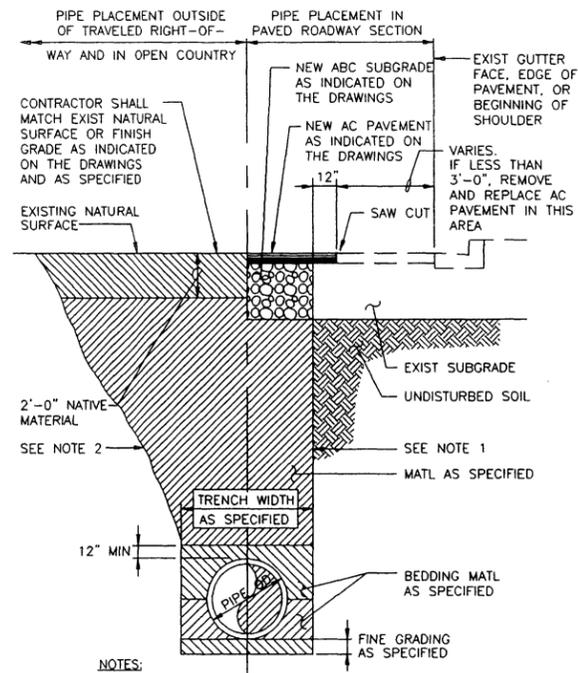
In the event that contaminated soils are found in any trenching areas, proper care would require the covering, transportation, and disposal of contaminated soils to licensed landfills. Otherwise, soils would have to be treated off site. While, it is not expected that contaminated soils will be encountered within City rights-of-way, contaminated soils may be possible near or around the AES site given the history of this area.

For a pipe diameter of this size, the required size of any access construction pit would be a minimum 20 feet by 30 feet and 15 feet by 15 feet for receiving pits. Due to the probable depth and size of this pit, shoring would be required.

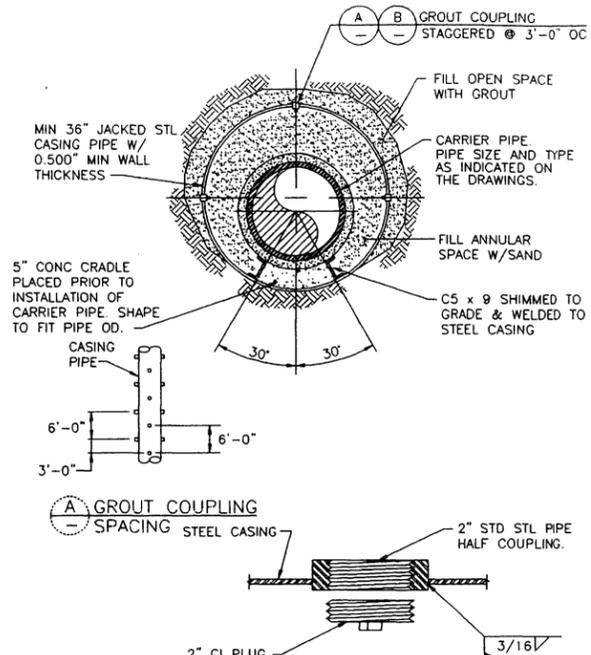
1.7 PRELIMINARY ROUTING PREFERENCE

Although the northern piping route was initially considered as an alternate route, discussions with the cities of Costa Mesa and Huntington Beach led to the conclusion that this particular route would be the currently preferred option now that routing is not possible in SCE easements. Even though the northern route necessitates the use of more linear feet of pipeline as shown in Figure 2, this decision was based on the following list of benefits:

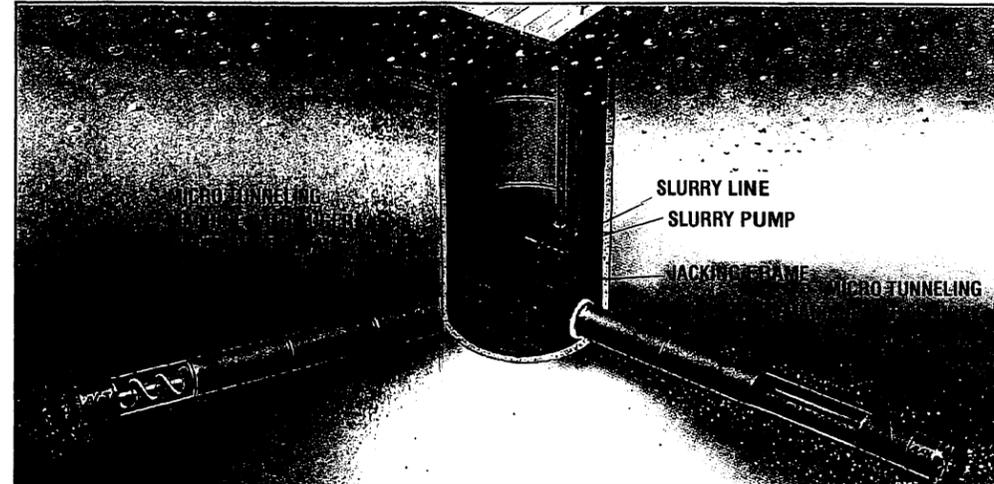
- The northern route entails significantly less construction within streets in Costa Mesa. The proposed southern route traverses streets in Costa Mesa that are more heavily congested. Construction would lead to greater problems in traffic control for the southern route.
- Much greater area for trenching in parks areas in the City of Costa Mesa is available.



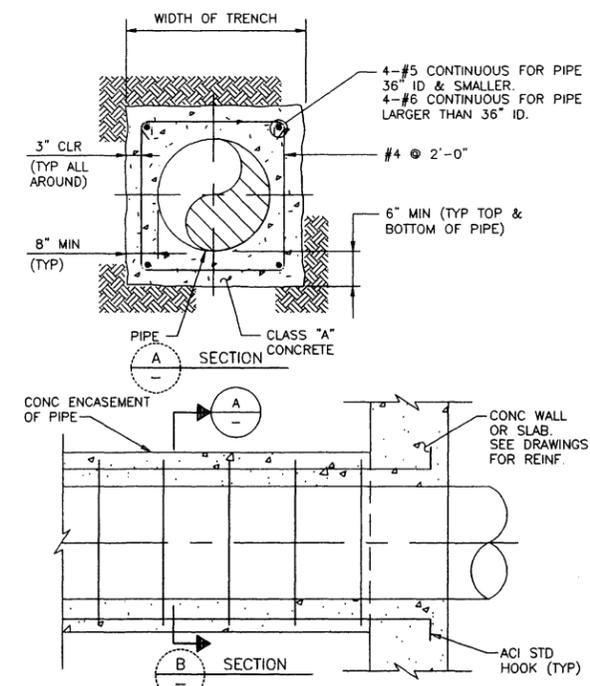
P002 PIPE INSTALLATION AND PAVEMENT REPLACEMENT
TYP



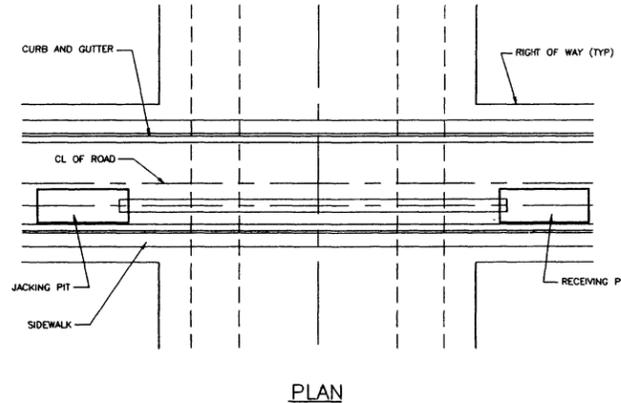
P032 PIPE IN JACKED STEEL CASING
TYP



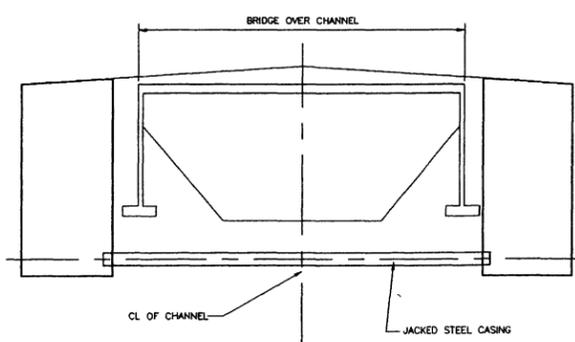
MICRO TUNNELING



P040 CONCRETE ENCASMENT OF PIPE
TYP

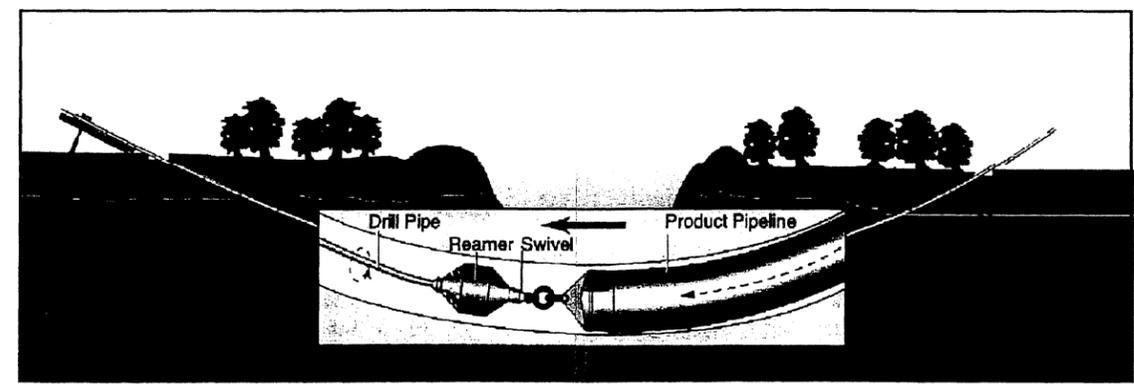


PLAN



SECTION

A TYPICAL PIPE CASING JACKING
NOT TO SCALE



HORIZONTAL DIRECTIONAL DRILLING

PIPELINE CONSTRUCTION

FIGURE 3



CLIENT:20POSEIDON\040402\8_01\FIG3.CDR