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Filed:	January 26, 2005
49th Day:	March 21, 2005
180th Day:	July 25, 2005
Staff:	Jim Baskin
Staff Report:	April 29, 2005
Hearing Date:	May13, 2005
Commission Action:	

STAFF REPORT: REGULAR CALENDAR

APPLICATION NO.:	**1-05-003**
APPLICANT:	**City of Crescent City**
PROJECT LOCATION:	At locations at and below the +10-foot elevation above mean sea level (msl) along an approximately 1,700 lineal foot route commencing from the southwesterly portion of Beach Front Park and from within the bounds of the Crescent City Wastewater Treatment Plant at 210 Battery Street, and routed at-depths of up to -75 feet msl through adjoining subtidal and intertidal beach areas along and on Lighthouse Island, surfacing at a point adjacent to the existing outfall discharge port on Lighthouse Island, Crescent City and unincorporated Del Norte County; APNs 118-020-31 and 118-030-22.
PROJECT DESCRIPTION:	Construction of a 24-inch-diameter effluent outfall line.
LAND USE PLAN DESIGNATION:	HDD Staging Area: Open Space, Public Facility. Outfall Alignment: Harbor Related, Open Space
ZONING:	HDD Staging Area: Coastal Zone Open Space (CZ:O), Coastal Zone General Commercial (CZ:C2).

	Outfall Alignment: Coastal Zone Harbor Related (CZ:HR), Coastal Zone Open Space (CZ:O).
LOCAL APPROVALS RECEIVED:	City of Crescent City Coastal Development Permit No. 05-01, issued April 14, 2005.
OTHER APPROVALS REQUIRED:	(Pending) U.S. Army Corps of Engineers FCWA Section 404 Nationwide Permit No. 7 (File No. 24461N); and (Pending) North Coast Regional Water Quality Control Board FCWA Section 401 Water Quality Certification and/or Waste Discharge Requirements (File No. 1B05010WNDN).
SUBSTANTIVE FILE DOCUMENTS:	*Final Crescent City Wastewater Facilities Plan* (Brown and Caldwell, November 2003); *Crescent City Wastewater Facilities Plan Technical Memoranda* (Brown and Caldwell, November 2003); *Crescent City Wastewater Outfall Biological Monitoring Program* (Boyd and Warburton, October 2003); *Crescent City Wastewater Project Environmental Impact Report Supplement* (Michael Sweeney AICP, October 2004); *Report of Geotechnical Engineering Services Crescent City Wastewater Treatment Plant* (GeoDesign, Inc., December, 2004); and City of Crescent City Local Coastal Program.

SUMMARY OF STAFF RECOMMENDATION

Staff recommends that the Commission approve with conditions the proposed construction of a new 24-inch-diameter effluent outfall line to serve the existing regional wastewater treatment plant at Crescent City in Del Norte County. The purpose of the project is to relieve the hydraulic "bottleneck" the City's wastewater works is experiencing in conveying treated effluent from the plant through the existing 12-inch-diameter line to the receiving waters of the Pacific Ocean just offshore of Lighthouse Island at Battery Point. The restriction caused by the undersized outfall line contributes to periodic uncontrolled releases of untreated sewerage into the harbor especially during the wet winter season when the treatment plant is experiencing high inflow and infiltration of surface and groundwater runoff. The development is the first of several

facility improvements mandated by the North Coast Regional Water Quality Control through a series of cease & desist orders and waste discharge elimination system permits issued to the City since 2000.

The project site comprises the subterranean route of the replacement outfall line as well as any at-surface portions of the wastewater treatment plant and adjoining Beach Front Park situated at and below the mean high tide line, the Commission's original and retained jurisdictional area, corresponding to the 10-foot elevation contour above mean sea level (msl). Other portions of the outfall line boring and installation project residing on coastal lands above the ten-foot contour are addressed within the companion coastal development permit approved by the City of Crescent City on April 14, 2005.

The project is located in immediate proximity to the City's southwestern harbor and oceanfront areas. The project raises three principal concerns regarding Coastal Act issues, ensuring the protection of: (1) coastal water quality; (2) potential adverse environmental impacts to marine biological resources; and (3) coastal access and recreational opportunities.

The applicant would confine the staging and drilling headworks portions of the project to public facility lands within and adjacent to the existing wastewater treatment plant and under-utilized portions of the Beach Front Park existing road rights of way, and would use horizontal directional drilling and trenching within or on opposite sides of the intertidal route of the new pipeline from the ESHAs to minimize impacts to these resource areas.

Although horizontal directional drilling can be the least environmentally damaging feasible alternative for avoiding significant impacts to ESHAs, drilling produces a risk of *farceurs* or "frac-outs," where drilling fluids are discharged into the environment through factures and other planes of weakness within the overlying rock bodies. The Commission's Staff Geologist has reviewed the geotechnical analyses and has determined that, in general, adequate information has been provided to enable the drilling contractor to perform borings in an environmentally safe manner. The Staff Geologist has recommended that the directional drilling be performed consistent with the geotechnical recommendations and that a drilling fluid spill contingency plan be required. The staff recommendation includes Special Condition Nos. 1 and 2 setting forth that the project incorporate the recommendations within the geo-technical report as well as requiring that the applicant submit a final drilling muds spill contingency plan for the review and approval of the Executive Director to include a revised project plan and restoration plan in the event of a significant frac-out from directional boring activities where to occur. This condition would ensure that adjustments are made to avoid additional farceurs upon project re-initiation and that the impacts of the development will be fully mitigated. Special Condition No. 3 requires the applicant's assumption of risk, waiver of liability and indemnification of the Commission that is generally imposed on

applicants proposing projects in areas subject to high risk of flood, coastal erosion, and other geologic hazards.

Recommended Special Condition No. 4 further requires that the applicant undertake the development consistent with the Drilling Fluid Disposal, Permeation Grouting Control, Excavated Materials Disposal, and Horizontal Directional Drilling Environmental Controls Plans submitted by the applicant, which detail specific procedures to be followed to minimize discharges of pollutants. As conditioned, staff believes the project would be consistent with Section 30231, 30233, and 30253 of the Coastal Act.

Staff believes the proposed project as conditioned is consistent with the Coastal Act and recommends approval. The motion to adopt the staff recommendation of approval with conditions in found on page 5.

STAFF NOTES

1. Jurisdiction and Standard of Review.

The proposed project is located within and adjacent to the incorporated boundaries of the City of Crescent City, along the reclaimed former margins of Crescent City Harbor in Del Norte County. The City of Crescent City has a certified LCP, but the project site is within the Commission's original coastal development permit jurisdiction in an area that is subject to the public trust corresponding to areas at and below the +10-foot elevation above sea level as measured from the 1988 North American Vertical Datum ($NAVD_{88}$). Therefore, the standard of review that the Commission must apply to the project is the policies of Chapter 3 of the Coastal Act.

2. Scope of Project Review and Permit Authorization

This staff report addresses only the coastal resource issues affected by the proposed replacement wastewater effluent outfall line and discharge port, sets forth recommended special conditions to reduce and mitigate significant impacts to coastal resources and achieve consistency with the Chapter 3 policies of the Coastal Act, and provides findings for conditional approval of the amended project. All other analysis, findings, and conditions regarding the portions of the subject outfall replacement project within the City of Crescent City's permitting jurisdiction (i.e., drilling pad, spoils pile, and upland staging area) remain as authorized by the City's Planning Commission on April, 14, 2005 pursuant to Coastal Development Permit No. CDP-05-01 (see Exhibit No. 9). Furthermore, any future related capacity upgrades to the processes within the wastewater treatment plant or its collection system as mandated by the North Coast Regional Water Quality Control Board to remediate the current illegal discharges, or pursuant to a long-range facilities capacity plan to accommodate waste discharges associated with the planned growth in the regional urban services areas within the City and in surrounding

portions of Del Norte County served by the Crescent City treatment works, shall be the subject of additional coastal development permit hearing before the County and City. An approval or denial of a coastal development permit for the related treatment plant improvements located within the coastal zone (i.e., the treatment plant site proper, major collection system trunk lines leading to the plant, pumping stations, or bio-solid disposal sites) would be appealable to the Commission.

STAFF RECOMMENDATION

The staff recommends that the Commission adopt the following resolution:

I. MOTION, STAFF RECOMMENDATION, AND RESOLUTION

The staff recommends that the Commission adopt the following resolution:

Motion:

I move that the Commission approve Coastal Development Permit No. 1-05-003 pursuant to the staff recommendation.

Staff Recommendation of Approval:

Staff recommends a YES vote. Passage of this motion will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of the majority of the Commissioners present.

Resolution to Approve Permit:

The Commission hereby approves a coastal development permit for the proposed development and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the permit complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment, or 2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.

II. STANDARD CONDITIONS: See attached.

III. SPECIAL CONDITIONS:

1. Drilling Fluid Spill Contingency Plan

A. **PRIOR TO ISSUANCE OF COASTAL DEVELOPMENT PERMIT NO. 1-05-003,** the applicant shall submit for Executive Director approval a project-specific horizontal directional drilling ("HDD") fluid monitoring and spill contingency plan that includes: (a) an estimate of a reasonable worst case release of drilling fluids into drainages or wetlands caused by project operations; (b) a clear protocol for monitoring and minimizing the use of drilling fluids during HDD operations, including criteria for identifying an unanticipated drilling fluid release and proposed fracture sealants; (c) a response and clean-up plan in the event of a spill or accidental discharge of drilling fluids; (d) a list of all clean-up equipment that will be maintained on-site; (e) the designation of the onsite person who will have responsibility for implementing the plan; (f) a telephone contact list of all regulatory and public trustee agencies having authority over the development and/or the project site and its resources to be notified in the event of a spill or material release; and (g) a list of all fluids, additives, and sealants that will be used or might be used, together with Material Safety Data Sheets for each of these materials.

B. The permittee shall undertake horizontal directional drilling activities in accordance with the approved final plan. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plan shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is required.

C. In the event that a spill or accidental discharge of drilling fluids occurs during horizontal directional drilling operations, all construction shall cease and shall not recommence except as provided in subsection (D) hereof:

D. Following discovery of the spill or accidental discharge of drilling fluids, the permittee shall submit to the Executive Director a revised project and restoration plan prepared by qualified professional(s) that provides for: (1) necessary revisions to the proposed project to avoid further spill or accidental discharge of drilling fluids; and (2) restoration of the area(s) affected by the spill or accidental discharge to pre-project conditions. The revised project and restoration plan shall be consistent with any applicable requirements of the State and/or Regional Water Resources Control Board(s). The revised project and restoration plan shall be processed as an amendment to the coastal development permit. Construction may not recommence until after an amendment to this permit is approved by the Commission.

2. **Conformance of Horizontal Directional Drilling Activities to Geotechnical Report**

A. The permittee shall undertake the horizontal directional drilling activities for the proposed wastewater effluent outfall line and discharge port installation development in accordance with all recommendations contained in the engineering geo-technical investigation titled *Report of Geotechnical Engineering Services Crescent City Wastewater Treatment Plant*, as prepared by GeoDesign, Inc. for Brown and Caldwell, dated December, 2004.

B. Any proposed changes to the approved horizontal directional drilling activities shall be reported to the Executive Director. No changes to the approved horizontal directional drilling activities shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is required.

3. Assumption of Risk, Waiver of Liability and Indemnification Agreement

By acceptance of this permit, the applicants, on behalf of: (1) themselves; (2) their successors and assigns; and (3) any other holder of the possessory interest in the development authorized by this permit, acknowledges and agrees: (i) that the site may be subject to hazards from waves, storm waves, erosion, and geologic instability; (ii) to assume the risks to the applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; (iv) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards; and (v) to agree to include a provision in any subsequent sublease or assignment of the development authorized by this permit requiring the sublessee or assignee to submit a written agreement to the Commission, for the review and approval of the Executive Director, incorporating all of the foregoing restrictions identified in (i) through (v).

4. Implementation of Horizontal Directional Drilling Pollution Prevention and Environmental Control Plans

The development shall be performed consistent with the Drilling Fluid Disposal, Permeation Grouting Control, Excavated Materials Disposal, and Horizontal Directional Drilling Environmental Controls Plans as developed by Brown and Caldwell Environmental Engineers and Consultants, Inc., as contained in Exhibit No. 5 of this staff report.

5. Regional Water Quality Control Board Approval

PRIOR TO THE ISSUANCE OF COASTAL DEVELOPMENT PERMIT NO. 1-05-003, the permittee shall submit a copy of the Clean Water Act Section 401 certification and Waste Discharge Requirements issued by the North Coast Regional Water Quality Control Board granting approval for the project or evidence that no such certification or discharge authorization is required. The permittees shall inform the Executive Director of any changes to the project required by the Regional Board. Such changes shall not be incorporated into the project until the permittees obtain a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is legally required.

The permittee shall inform the Executive Director of any changes to the project required by the Regional Board. Such changes shall not be incorporated into the project until the applicant obtains a Commission amendment to this coastal development permit, unless the Executive Director determines that no amendment is required.

6. State Lands Commission Review

PRIOR TO ISSUANCE OF COASTAL DEVELOPMENT PERMIT NO. 1-05-003, the applicant shall submit to the Executive Director, a written determination from the State Lands Commission that:

a. No State lands are involved in the development; or

b. State lands are involved in the development and all permits required by the State Lands Commission have been obtained; or

c. State lands may be involved in the development, but pending a final determination an agreement has been made with the State Lands Commission for the project to proceed without prejudice to that determination.

7. Outfall Line Installation Documentation

Within 30 days of the completion of the installation of the outfall line and discharge port, the applicant shall submit to the Executive Director of the Coastal Commission the as-built plans, including the depth of burial, of the outfall line and discharge port.

IV. FINDINGS AND DECLARATIONS.

A. Project Description.

The City of Crescent City proposes to construct a new 24-inch-diameter effluent outfall line to serve the existing regional wastewater treatment plant at Crescent City in Del Norte County. The purpose of the project is to relieve the hydraulic "bottleneck" the

City's wastewater works is experiencing in conveying treated effluent from the plant through the existing 12-inch-diameter line to the receiving waters of the Pacific Ocean just offshore of Lighthouse Island near Battery Point. The restriction caused by the undersized outfall line contributes to periodic uncontrolled releases of untreated sewerage into the harbor especially during the wet winter season when the treatment plant is experiencing high inflow and infiltration of surface and groundwater runoff. The development is the first of several facility improvements mandated by the North Coast Regional Water Quality Control through a series of cease & desist orders and waste discharge elimination system permits issued to the City since 2000. Crescent City and Del Norte County completed a feasibility study that evaluated alternatives for wastewater treatment, bio-solids disposal, and collection system and ocean outfall improvements. A directionally drilled outfall alternative was selected to reduce the environmental impacts associated with the construction of a replacement ocean outfall.

Construction of the new effluent outfall would begin at the existing WWTP. A 500-foot segment of 36-inch diameter ductile iron pipe would be installed below ground using conventional installation methods between the WWTP and the directionally drilled segment to the southwest. An approximately 1,700-foot section of 24-inch-diameter interlocking steel pipe with a wall thickness of 0.5-inch would be installed between Beach Front Park and the existing outfall on the south side of the Battery Point Lighthouse using the horizontal directional drilling (HDD) method. The HDD drill rig would be set up on a pad situated in the southwesterly corner of Beach Front Park. Drilling operations would begin by boring a four-inch diameter pilot hole. The pilot hole would be reamed to an interior diameter of about 32 inches. HDD uses a bentonite drilling fluid pumped under pressure through the drill stem to rotate a cutting head and to transport the cuttings to an earthen sump near the drill bit entry point. The drilling fluid and cutting are pumped through a processing unit to remove the cuttings and the fluid is reused. Drilling fluid would fill the borehole until the pipe is inserted. After new pipe is inserted through the borehole, inflatable plugs would be inserted in both ends and the new section of pipeline would be pressure tested. Drilling fluid and cuttings would be removed from the site and transported to a permitted hazardous waste disposal facility when drilling is complete.

Weak or unconsolidated earthen material along the borehole pathway can allow drilling fluid to escape the borehole and rise to the surface. A geotechnical study was conducted to evaluate the potential for drilling fluid loss through fractures in the subsurface. The study identified slightly to moderately fractured siltstone and sandstone of the Battery Formation in the outfall area that could cause the release of drilling fluid to coastal waters. To mitigate for the potential loss of drilling fluid, injection grouting would be performed along an approximately 200-foot section of the pipeline alignment at the outfall end of the pipeline. The purpose of injection grouting is to plug rock fractures prior to drilling horizontally through the fractured area to reduce the risk of drilling fluid loss. Environmental controls for directional drilling and best management practices would be implemented to prevent impacts to water quality. The City has prepared and

submitted a Drilling Fluid Release Monitoring Plan ("Plan") for the proposed HDD excavation. The Plan outlines monitoring procedures for the HDD operations to identify a loss of drilling fluid and to detect a release to the surface. The monitoring criteria and procedures contained in the City's Plan would be incorporated into the selected HDD contractor's workplan. The HDD contractor's and engineer's personnel would attend onsite training prior to the start of construction that would cover the Plan, the need for environmental protection measures, conformance with permit conditions, and other related matters.

A stainless steel pressure vessel ("manhole") would be installed near the end of the new outfall pipe. An area of approximately 20 square feet would be disturbed in the installation of the manhole. Construction of the manhole involves hand tools and labor to excavate a hole through native rock materials and some existing concrete associated with the existing outfall pipe. Compressors to power the excavation equipment would be station at upland sites on Lighthouse Island with connecting flexible pneumatic hoses routed over the intertidal areas. Concrete waste would be hauled offsite. Native rock would be side cast to the adjacent ocean and shoreline area around the manhole. Drilling the outfall bore would be conducted on non-holiday weekdays from 7:30 am to 5:30 pm and 8:00 am to 4:00 pm on Saturdays. Installation of the manhole would be conducted during daylight hours at low tide intervals. The applicant anticipates the proposed project would commence in July 2005 and be completed by September 2005.

B. Site Description.

The project site is located within and adjacent to the City of Crescent City's municipal boundaries along the north side of Crescent City Harbor, between the City's Beach Front Park and Battery Point (see Exhibit Nos. 1-3). The Crescent City Water Pollution Control Facility and the adjoining parklands are owned by the City of Crescent City. The intertidal and offshore rocky areas overlying the distal portions of the replacement outfall line and discharge port constitute state sovereign and public trust lands under the administration of the State Lands Commission.

The project site is situated at an approximately 0-29 feet elevation above the beach area north of the Battery Point headland. The site slopes gently downward from south to north and rises slightly from its eastern street frontage toward the western blufftop. The site of the HDD drilling headworks, related staging area, and route of the outfall line is generally flat in topography. Seaward from the toe of the low uplifted terrace on which the treatment plant is sited, the beach face consists of a narrow, approximately 100-ft.-wide bermed cobble area grading into a rocky intertidal zone. The immediate offshore area is occupied by numerous partially submerged rocks and stacks. To the north, the beach narrows into a steep cliff along the flanks of the Lighthouse Island and Battery Point headlands.

Vegetative cover across much of the park site consists of upland grasses and ruderal forbs, including sweet vernal grass (Anthoxanthum odoratum), soft chess (Bromus hordeaceus), field mustard (Brassica rapa), curley dock (Rumex crispus) and beach strawberry (Fragaria chiloensis). A portion of the outfall line alignment in the vicinity of the base of the B Street Dock is vegetated with a sparse mixture of native coastal willow (Salix hookeriana) and non-native shrubs and vines, including rosea iceplant (Drosanthemum floribundum), common iceplant (Mesembryanthemum crystallinum), and cow parsnip (Heracleum lanatum). Although the majority of the outfall line passes beneath subtidal and intertidal wetlands, the terminal end of the outfall and discharge port would be located within an open rocky intertidal area containing a low diversity of sensitive marine organisms including rockweed and encrusting brown algae (Fucus sp.) scattered clusters of barnacles (Balanus, Chthalamus, and Pollicipes sp.), and limpets (Acmea sp.).

The project site abuts the southwestern ends of "A" and "B" Street, sub-collector routes that divide the City's visitor-serving commercial district and blufftop residential areas to the west and north from the open space and public facility areas to the east and adjacent to the Crescent City Harbor. Development in the project vicinity is sparse due to the high tsunami risk for this area. Land uses in the immediate vicinity of the project property are primarily public facilities, comprising the wastewater treatment plant, Beach Front Park, Battery Point Park, the "B" Street Fishing Pier, and the Battery Point Lighthouse.

Those portions of the subject property within the coastal zone have a Public Facility and Open Space land use designations. The property is zoned Coastal Zone – Open Space (CZ-O), Coastal Zone General Commercial (CZ:C2), and Coastal Zone Harbor Related (CZ:HR).

The parcel is not located within a formally designated Highly Scenic Area, as the City's LCP does not make that distinction for any specific sites, but focuses instead on the "scenic highway corridor" visible from Highway 101 at the City's southern entrance. Nevertheless, views from the project site and through the project site from "A" and "B" Streets, from Beach Front Park, and along Howe Drive are remarkable, consisting of nearby harbor, jetty, and pier vistas to the south, numerous sea stacks to the northwest, and views of the Battery Point Lighthouse directly offshore. Due to a depression within the area where the drilling headworks would be stationed and the presence of a small scarp between "B" Street and the parking lot for the Battery Point Lighthouse that would serve as a backdrop to the materials staging area, potential interference with views to and along the coast from the temporary presence of the above-grade project equipment is somewhat muted.

The project site lies within the coastal development permitting jurisdictions of the City of Crescent City and the Commission. All development portions situated above the +10-foot elevation above sea level ($NAVD_{88}$) are located within the City's jurisdiction. These project components include the horizontal directional drilling headworks, drilling fluids

recovery area, and spoils storage areas within Beach Front Park and the materials and equipment staging area along the southwest side of lower "B" Street near the base of the "B" Street Fishing Pier. All portions situated at an elevation at or below the +10-foot elevation, whether located at the surface or at subsurface elevations along the outfall borehole path, and, on Lighthouse Island, regardless of their elevation, are within the Commission's permit jurisdiction. These project portions include the entire subterranean route of the proposed outfall borehole as well as the site of the manhole installation at the discharge port end of the pipeline.

C. Planning and Siting New Development and Publicly-Owned Wastewater Treatment Works.

Section 30250(a) of the Coastal Act states in applicable part that:

> *New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources*... [Emphasis added.]

Coastal Act Section 30254 states, in applicable part:

> *New or expanded public works facilities shall be designed and limited to accommodate needs generated by development or uses permitted consistent with the provisions of this division... Where existing or planned public works facilities can accommodate only a limited amount of new development, services to coastal dependent land use, essential public services and basic industries vital to the economic health of the region, state, or nation, public recreation, commercial recreation, and visitor-serving land uses shall not be precluded by other development.* [Emphasis added.]

Coastal Act Section 30254.5 states:

> *Notwithstanding any other provision of law, the commission may not impose any term or condition on the development of any sewage treatment plant which is applicable to any future development that the commission finds can be accommodated by that plant consistent with this division. Nothing in this section modifies the provisions and requirements of Sections 30254 and 30412.*

Cited Coastal Act Section 30412 states, in applicable part:

...

(b) The State Water Resources Control Board and the California regional water quality control boards are the state agencies with primary responsibility for the coordination and control of water quality. The State Water Resources Control Board has primary responsibility for the administration of water rights pursuant to applicable law. The commission shall assure that proposed development and local coastal programs shall not frustrate this section. The commission shall not, except as provided in subdivision (c), modify, adopt conditions, or take any action in conflict with any determination by the State Water Resources Control Board or any California regional water quality control board in matters relating to water quality or the administration of water rights.

Except as provided in this section, nothing herein shall be interpreted in any way either as prohibiting or limiting the commission, local government, or port governing body from exercising the regulatory controls over development pursuant to this division in a manner necessary to carry out this division.

(c) Any development within the coastal zone or outside the coastal zone which provides service to any area within the coastal zone that constitutes a treatment work shall be reviewed by the commission and any permit it issues, if any, shall be determinative only with respect to the following aspects of the development:

(1) The siting and visual appearance of treatment works within the coastal zone.

(2) The geographic limits of service areas within the coastal zone which are to be served by particular treatment works and the timing of the use of capacity of treatment works for those service areas to allow for phasing of development and use of facilities consistent with this division.

(3) Development projections which determine the sizing of treatment works for providing service within the coastal zone.

The commission shall make these determinations in accordance with the policies of this division and shall make its final determination on a permit application for a treatment work prior to the final approval by the State Water Resources Control Board for the funding of such treatment works. Except as specifically provided in this subdivision, the decisions of the State Water Resources Control Board relative to the

> *construction of treatment works shall be final and binding upon the commission.*
>
> *(d) The commission shall provide or require reservations of sites for the construction of treatment works and points of discharge within the coastal zone adequate for the protection of coastal resources consistent with the provisions of this division...* [Emphases added.]

The primary intent of Section 30250 is to direct new development toward areas where community services are provided and potential impacts to resources are minimized. Secondly, Section 30250 also requires that in locating such development, including the associated water supplies, wastewater treatment, and/or other forms of supporting infrastructure that such development be located so as not to cause significant adverse effects, either individually or cumulatively, on coastal resources. Section 30254 of the Coastal Act set limitation on the approval of new or expanded public works facilities such that their development is scaled to accommodate needs generated by anticipated and/or planned levels of development. Coastal Act Section 30254.5 places limitations on the Commission's ability to impose permit terms or conditions on the development of any sewage treatment plant which would prejudice or otherwise obviate the plant's ability to provide sewage treatment to any Coastal Act-consistent future development that the Commission determines could be accommodated by the plant. Coastal Act Section 30412 further restrains the Commission's actions with regard to water quality issues, especially the development of publicly owned wastewater treatment works, prohibiting the Commission from taking actions that would be in conflict with the State or Regional Water Quality Boards and restricting the determinations on the development of such treatment works within the coastal zone to issues regarding: (a) the siting and visual appearance of the treatment works; (b) geographic and temporal limits of service areas; (c) the timing of the use of capacity of treatment works for those service areas to allow for phasing of development; and (d) the sizing of treatment works as determined by development projections.

The principal issues regarding the proposed replacement outfall's consistency with the new development and wastewater treatment facility policies of the Coastal Act is whether the new outfall is sized appropriately to provide wastewater treatment capacity that does not exceed the planned growth within its service area. According to the City's Public Works Director, the existing 12-inch-diameter pipe is undersized for the currently permitted treatment plant, having only a three million gallons per day (MGD) capacity under gravity flow. However, to accommodate the plant's 8 MGD outfall discharges experienced during wet weather flows, the City employs two 125-horsepower pumps to pressurize the effluent through the current outfall line. The replacement 24-inch-diameter line would have an 11 MGD gravity capacity. The City intends initially to allow effluent to flow under the force of gravity through the new outfall. Once further enhancements have been made to the treatment works to further correct the unpermitted wet weather bypass discharges and to accommodate anticipated growth in the plant's service area over

the next 20-year planning horizon, pumping can again be utilized to pressurize the effluent being discharged through the outfall to meet future demand, by boosting the outfall's hydraulic capacity to 19-20 MGD.

The proposed replacement of the outfall line is being undertaken to resolve an existing hydraulic capacity problem that is causing period discharges of effluent beyond the plant's permitted limits, both qualitatively and quantitatively, associated with the influx of high volume flows during the wet season. The outfall is not being replaced to otherwise enhance or expand the plant's overall throughput treatment capacity, change the bio-chemical composition of the effluent through dilution or concentration, or alter the hydraulic dynamics of the ocean discharge of treated wastewater beyond that presently licensed for the facility under the National Pollution Discharge Elimination System as administered by the North Coast Regional Water Quality Control Board.

Thus, as based on the above set of circumstances, the proposed development is consistent with Coastal Act Section 30250(a) to the extent that the outfall lines has been designed and sized so as not to have significant adverse effects, either individually or cumulatively, on coastal resources from growth inducement that could result from an oversized treatment facility. Furthermore, given the limitation on the scope of actions taken by the Commission as discussed in other findings sections of this report, the proposed development as conditionally approved would also be in conformance with Sections 30254 and 30254.5. Therefore, Commission finds that the proposed project is consistent with Sections 30250, 30254, and 30254.5 of the Coastal Act.

D. Local Government Approval.

Those portions of the outfall replacement project located above the ten-foot elevation contour are situated within the City of Crescent City's coastal development permitting jurisdiction (see Exhibit No. 3). On April 14, 2005, the City's Planning Commission approved Coastal Development Permit No. 05-01 finding the proposed development consistent with the policies and standards of its certified LCP (see Exhibit No. 6). The Planning Commission's actions were not appealed to the City Council. Assuming no appeal of the City's approval is filed in a timely manner with the Commission, the City's conditional approval will become effective on May 12, 2005, ten days after the Commission's receipt of the City's Notice of Final Local Action on April 27, 2005.

E. Protection of Marine Resources and Coastal Water Quality.

Section 30230 of the Coastal Act states, in applicable part:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological*

> *productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231 of the Coastal Act addresses the protection of coastal water quality in conjunction with development and other land use activities. Section 30231 reads:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of wastewater discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantially interference with the surface water flow, encouraging, wastewater reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Section 30233(a) of the Coastal Act provides as follows, in applicable part:

> *The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:*
>
> ...
>
> *(5) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines...* [emphases added]

The above policies set forth a number of different limitations on what development projects may be allowed in coastal wetlands. For analysis purposes, the limitations can be grouped into four general categories or tests. These tests are:

- The purpose of the filling, diking, or dredging is for one of the uses enumerated in Section 30233(a);
- The project has no feasible less environmentally damaging alternative;
- Feasible mitigation measures have been provided to minimize adverse environmental effects; and

- The biological productivity and functional capacity of the habitat shall be maintained and enhanced where feasible.

1. Permissible Use for Fill

The first test for a proposed project involving fill is whether the fill is for one of the eight allowable uses under Section 30233(a). Among the allowable uses, the use which most closely match the project objectives are enumerated in Section 30233(a)(5) involving dredging, diking, and/or fill for "incidental public service purposes," such as "burying cables and pipes," and the "maintenance of existing intake and outfall lines."

The construction of the proposed outfall line is being proposed in the interest of the water quality of the Crescent City area consistent with state and federal standards through maintaining the reliable year-round operation of the wastewater treatment plant. The purpose of such development is not to expand or otherwise enhance the wastewater treatment facility's capacity, only to stabilize and protect it. Accordingly, the purpose of the fill and dredging for construction of the proposed replacement outfall line is for an "incidental public purpose."

Therefore, the Commission finds that the filling for the shoreline revetment structure is not for one of the allowable uses for dredging, diking, and filling of coastal waters pursuant to Section 30233(a)(5) of the Coastal Act.

2. Least Environmentally Damaging Feasible Alternative

The second test of Section 30233(a) is whether there are feasible less environmentally damaging alternatives to the proposed project. In this case, the Commission has considered project options, and determines that there are no feasible less environmentally damaging alternatives to the project as conditioned. Alternatives that have been identified include: (1) construction of outfall using at-grade excavation trenching; (2) construction of treatment wetlands or irrigation application of treated effluent on adjoining public lands; and (3) the "no project" alternative.

a. Installation of Outfall Using Trench Excavation Construction Methods

One alternative to the proposed project would be to utilize traditional "cut and cover" trenching excavation methods for constructing the replacement outfall line. Under this option, the entire 1,700-foot length of the discharge line would be excavated to an appropriate depth to provide an adequate gravity flowline gradient and secure the conduit from exposure to damage from waves and other environmental forces. This alternative would have far greater environmental impacts to coastal resources than would the proposed project. Over 5,000 square feet of intertidal area would be directly altered to install the line. The closure of more than a ¼ mile of beachfront to public access and recreational use would be

necessitated during the course of the outfall's construction. Furthermore, such open trenching would have far greater potentials to cause impacts to the quality of the surrounding coastal waters.

b. On-land Irrigation Application / Installation of Constructed Wetlands Treatment Marshes within Beach Front Park

Another project alternative to resolving the hydraulic limitations associated with the current system of ocean discharging would be to develop facilities for the on-land disposal of the treatment plant effluent. As an alternative to ocean discharging, many sewage treatment plants utilize either constructed wetlands or, especially in more landward locations, apply the treated the treated effluent as irrigation water onto open fields. The City owns the adjoining 176 acres comprising Beach Front Park where such a disposal system could theoretically be developed. However, notwithstanding having ownership over a potential site, the financial costs associated with the construction, installation of necessary pumping facilities, and on-going operation and maintenance of treatment wetlands are significant. Additionally, land application through field irrigation with treated effluent requires a receiving area with adequate percolation and/or evapo-transpiration to efficiently receive the treated wastewater without risks to public health and environmental quality resulting (e.g. disease vector and odor nuisances, soil nitrification, eutrophication of adjoining coastal waters). In either case, the loss of the City's major public parkland to develop such a land-based effluent disposal scheme would constitute a significant impact to coastal recreational opportunities in the area.

c. No Project Alternative

The no project alternative means that no replacement outfall would be constructed at the site. The objective of the proposed project — to prevent further releases of untreated sewage into coastal waters — would not be met. As a consequence the water quality of the Crescent City Harbor, and nearby ocean waters would continue to be adversely impacted, resulting in temporary degradation to the beneficial uses of those waters for commercial and sports fishing, and water-related recreation, among others. Without the proposed outfall replacement, the coastal resources of the Crescent City area, particularly the environmentally sensitive aquatic habitat it affords would continue to be put at significant risk of damage. Such continued releases of untreated sewerage would also represent a significant adverse impact to public health and safety.

Based on the alternatives analysis above, the Commission concludes that there are no feasible less environmentally damaging feasible alternatives to the proposed project as conditioned.

3. Feasible Mitigation Measures

The third test set forth by Section 30230 and 30233 is whether feasible mitigation measures have been provided to minimize significant adverse environmental impacts.

The proposed project could have three potential adverse effects on the environment of Crescent City Harbor surroundings. The project could have potential adverse impacts to: (a) rocky shore intertidal marine wetlands from installation of the outfall pressure vessel manhole; (b) estuarine and marine water quality from the release of drilling muds through fractures in the rock bodies overlying the outfall bore; and (c) on-land coastal recreational areas, and marine and estuarine water quality from fuel or hydraulic fluid spills. The potential adverse impacts and their mitigation are discussed in the following four sections:

a. Rocky Shore Intertidal Marine Wetlands

As detailed in Project Description Findings Section IV.A, the project would result in the excavation and fill of approximately 20-square feet of rocky intertidal wetlands consisting of the consolidated materials that comprises the sides of surge channel where the pressure vessel manhole would be installed at the discharge end of the outfall. These areas are largely denuded of vegetation and consist primarily of bare rock face with scattered encrusting mollusks and other marine organisms typically found in high-energy, splash zone supra-tidal environments. Because of the location of the materials above the intertidal range of the bay, this area is periodically inundated during high tides. Accordingly, notwithstanding the sparsity of vegetation and the nominal habitat potential these areas afford, the subject area would meet the Commission's definition of "wetlands."[1]

The community of organisms that inhabit the surge channel area, though low in density, would be lost as a result of the construction of the manhole. However, the proposed concrete to be placed to secure the structure would provide surfaces for these encrusting organisms to re-colonize in amounts similar to what presently exists at the site. Therefore, the Commission finds that no additional mitigation is necessary for the loss of rocky shoreline intertidal marine wetland habitat associated with the proposed project.

b. Estuarine and Marine Water Quality

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[1] Refer to U.S. Fish and Wildlife Service - Office of Biological Services' Publication No. FWS/OBS-79/31 "Classification of Wetlands and Deepwater Habitats of the United States" (Lewis M. Cowardin, et al, USGPO December 1979) for a further discussion of the definition of the extent of marine wetland habitats.

Probably the greatest concern related to the project's potential environmental impacts is that horizontal directional drilling activities associated with the installation of outfall under or near the marine, intertidal, and terrestrial wetlands along the routes could result in release of drilling fluids (bentonite) into these resource areas. Most likely is the release of bentonite as a result of a *farceur* or "frac-out," the propagation of fractures from the drilling bore to the surface of the ground. Frac-outs result from drilling through brittle, fractured and/or poorly consolidated rocks or sediments, the maintenance of too-high fluid pressures in the bore during drilling, and drilling at too shallow a depth below the ground. Such frac-outs have occurred in past directional boring activities associated with an AT&T fiber optic communications cable installation project in the Point Arena area of Mendocino County during the early 1990s that was approved by the Commission. A similar assemblage of sheared and faulted rock types, known regionally as the Franciscan Formation, would be crossed by directional drilling activities for the Crescent City outfall project as were encountered in the Point Arena area that resulted in impacts to riparian aquatic habitat from releases of bentonite-based drilling muds into the watercourses crossed-under in the referenced cable installation project.

The most effective way to guard against the release of drilling fluid into the environment through frac-out is to drill in geologic strata that are least susceptible to frac-out. A site specific geotechnical analyses of the geology at the bore site is the most effective way of determining how deep the boring must be made to avoid boring through geologic strata that is susceptible to frac-out. The applicant has commissioned such a study and, as discussed further in Geologic Stability Findings Section IV.F below, the applicant proposes to perform the subsurface depths that would largely avoid the fractures and faulting with the overlying strata along the replacement outfall line's route. As a preemptory measure, the applicant proposes to inject grouting into the pilot borehole along the last 200 feet of the outfall line's bore path to seal any inactive fissures and provide further lateral strength to the rock body for resisting the stresses from the drilling of the ascending section of the bore at the outfall's discharge port end. In addition, the applicant has drafted a drilling mud release contingency plan for responding to any unanticipated release of drilling muds through any frac-outs that might form along the outfall's route.

To assure the protection of marine and estuarine water quality, the Commission attaches Special Condition Nos. 1 and 2. Special Condition No. 1 requires the applicant to submit for the Executive Directors review and approval a final drilling mud release contingency plan to include specific content as to actions to be taken to minimize the release (cease operations), contain and clean-up the released materials, remediate any environmental damage associated with the release, and to amend the project as needed to prevent any future releases. Special Condition No. 2 requires the applicants to perform the directional drilling

consistent with the recommendations of the geo-technical report prepared for the project. Therefore, the Commission finds that as conditioned, the project will not result in significant adverse impacts to marine or estuarine water quality.

c. Accidental Hazardous Materials Spills

Given the scope of the project, re-fueling or lubricating motorized equipment (i.e., drilling headworks, air compressors, electrical generators, etc.) during project construction is anticipated. When re-fueling of equipment is undertaken, the applicant proposes to conduct any such re-fueling or lubrication within the bermed bounds of the drilling pad and/or the materials and equipment staging area where facilities would be in place to minimize the occurrence and magnitude of impact of fueling spills. Such spills could adversely affect the land resources within the project area and the water quality of the adjoining marine environment. Special Condition No. 4 requires the applicant to undertake the proposed development consistent with the Drilling Fluid Disposal, Permeation Grouting Control, Excavated Materials Disposal, and Horizontal Directional Drilling Environmental Controls Plans. These plans include water quality best management practices for the prevention of hazardous material spills and provisions for prompt containment and clean-up of any spills which may inadvertently occur. As conditioned, potential adverse impacts from accidental fuel or oil spills to land and marine resources will be reduced to less-than-significant levels.

As proposed and conditioned, the Commission finds that feasible mitigation is included within the project design to minimize all significant adverse impacts associated with the proposed filling of coastal waters.

4. Maintenance and Enhancement of Marine Habitat Values

The fourth general limitation set by Section 30233 and 30231 is that any proposed filling in tidal waters or submerged land must maintain and enhance the biological productivity and functional capacity of the habitat, where feasible.

As discussed above, the project will not have significant adverse impacts on the marine resources of Humboldt Bay. The mitigation measures incorporated into the project and required by the Special Conditions discussed above will ensure that the construction of the outfall line would not significantly adversely affect the biological productivity and functional capacity of the tidal waters or marine resources. Furthermore, by reducing the possibility for back-flow induced uncontrolled releases of untreated sewerage associated with the current under-sized discharge line, the project will help protect marine aquatic habitats from being further degraded. Therefore, the Commission finds that the project, as proposed, will maintain and enhance the biological productivity and functional

capacity of the habitat consistent with the requirements of Section 30233 and 30231 of the Coastal Act.

5. Conclusion

The Commission thus finds that the dredging and filling of wetlands is for an allowable purpose, that there is no feasible less environmentally damaging alternative, that feasible mitigation measures have been provided and the adverse environmental effects associated with the dredging and filling of coastal waters have been avoided or minimized, and that estuarine habitat values will be maintained or enhanced. Therefore, the Commission finds that the proposed development, as conditioned, is consistent with Sections 30230, 30231 and 30233 of the Coastal Act.

F. Geologic Stability.

The Coastal Act contains policies to assure that new development provides structural integrity, minimizes risks to life and property in areas of high flood hazard, and does not create or contribute to erosion. Section 30253 of the Coastal Act states in applicable part:

> *New development shall:*
>
> (1) *Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
>
> (2) *Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.* [Emphasis added.]

Coastal Act Section 30253 requires the project to assure long-term stability and structural integrity, minimize future risk, and avoid additional, more substantial protective measures in the future. This requirement is particularly relevant to the proposed project given the often highly sheared and faulted strata through which the proposed project would be installed.

The project involves the construction of an approximately 1,700-lineal-foot-long replacement wastewater effluent outfall line along a subterranean route beneath submerged and intertidal shoreline areas using horizontal directional drilling methods. To ensure that the construction of the outfall is designed and undertaken in a manner to avoid any impacts to coastal resources associated with development within the inherently geologically unstable coastal settings, the applicant contracted civil and geo-technical engineering investigations for the project (see Exhibit No. 8).

The geo-technical report (GeoDesign Inc. December 2004) found the proposed alignment of the replacement outfall to be underlain with unconsolidated Quaternary-aged beach sediments above moderately to slightly fractured siltstone and sandstone of the Battery Formation. These sediments are in turn underlain by variable fractured siltstone, sandstone, and mudstone of the Franciscan Formation.

Based on preliminary core samples taken along the proposed path of the replacement outfall line and subsequent engineering analysis, the proposed subsurface route of the outfall through the overburdening low tensile strength, sheared, faulted, and weakly-consolidated Franciscan and Battery Formations materials would subject the project to potential hydro-fracturing of the borehole during its construction with the possibility of drilling fluids being released into coastal waters. To minimize these risks, the geo-technical analysis recommended that the bore for the outfall line be set at a 75-foot-depth through the areas of known fracture and faulting. In addition, to further strengthen the rock body at the discharge port end of the boring, injection grouting of the fractures and fault planes along the ascending last 200 feet of the outfall pathway was recommended. With these modifications, the report determined that the pipeline design would be adequate to withstand the geophysical and hydraulic forces that would be experienced at the project site, both during the outfall's construction phase and over the roughly 50-year economic lifespan of the pipeline.

The Commission's staff geologist has reviewed the geo-technical report and has concluded that provided the recommendations of the geo-technical report are followed during construction of the outfall, and with the provisions for a drilling fluids release contingency plan in place as further discussed in Protection of Marine Resources and Coastal Water Quality Findings Section IV.E above, the development's exposure to and instigation of geologic instability would be minimized consistent with Section 30253.

To assure that the project assures stability and structural integrity, and neither creates nor contributes significantly to erosion, geologic instability, or destruction of the site or surrounding area, the Commission attaches Special Condition No. 2. Special Condition No. 2 requires the applicant to conduct the construction of the outfall pipeline consistent with the recommendations contained within the geotechnical report

Additionally, the Commission attaches Special Condition No. 3, which requires the applicant to assume the risks of farceurs, damage to the proposed pipeline, and other destruction or injury due to hazards from waves, storm waves, erosion, and geologic instability and waive any claim of liability on the part of the Commission. Given that the applicant has chosen to implement the project despite these risks, the applicant must assume the risks. In this way, the applicant is notified that the Commission is not liable for damage as a result of approving the permit for development. The condition also requires the applicant to indemnify the Commission in the event that third parties bring an action against the Commission as a result of the failure of the development to withstand hazards.

Thus, the project as proposed and conditioned would assure stability and structural integrity, primarily because the outfall line and discharge port have been designed with site-specific conditions taken into account, utilizing established design principles to ensure the structure can adequately withstand the geophysical and hydraulic forces it would be exposed to during the economic lifespan of the facility. In addition, the inherent instability of the rock bodies through which the bore for the outfall line would traverse were identified and appropriate actions taken to further minimize potential releases of drilling fluids through these fractures and planes of weakness. Therefore, the Commission finds the project as designed and conditioned to follow the recommendation of the geotechnical analysis would minimize risks to life and property in areas of high flood hazard, and assure stability and structural integrity of the site and its surroundings so that the need for further or additional shoreline protective works would be avoided, as required by Section 30253.

G. Public Access and Coastal Recreation.

Coastal Act section 30210 states:

> *In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.*

Coastal Act section 30211 states:

> *Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.*

Section 30212 (a) in part states:

> *Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects ...*

Coastal Act section 30214(a) states:

(a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on the facts and circumstances in each case including, but not limited to, the following:

(1) Topographic and geologic site characteristics.

(2) The capacity of the site to sustain use and at what level of intensity.

(3) The appropriateness of limiting public access to the right to pass and repass depending on such factors as the fragility of the natural resources in the area and the proximity of the access area to adjacent residential uses.

(4) The need to provide for the management of access areas so as to protect the privacy of adjacent property owners and to protect the aesthetic values of the area by providing for the collection of litter.

Section 30210 of the Coastal Act requires that maximum public access shall be provided consistent with public safety needs and the need to protect natural resource areas from overuse. Section 30212 of the Coastal Act requires that access from the nearest public roadway to the shoreline be provided in new development projects except where it is inconsistent with public safety, military security, or protection of fragile coastal resources, or adequate access exists nearby. Section 30211 requires that development not interfere with the public's right to access gained by use or legislative authorization. Section 30214 of the Coastal Act provides that the public access policies of the Coastal Act shall be implemented in a manner that takes into account the capacity of the site and the fragility of natural resources in the area. In applying Sections 30210, 30211, 30212, and 30214, the Commission is also limited by the need to show that any denial of a permit application based on these sections, or any decision to grant a permit subject to special conditions requiring public access, is necessary to avoid or offset a project's adverse impact on existing or potential access.

The route of the replacement outfall line is located between the first public road and the sea. Therefore, the Commission must consider whether requiring public access is appropriate in this case. The proposed development does not require the provision of any new public access under Section 30212(a)(2) as adequate public access exists nearby, to and along adjacent beaches, and to the ocean and harbor waters. Moreover, Sections 30210-30214 require that the public access policies be implemented in a manner that takes into account public safety and the protection of fragile coastal resources.

The boring of the outfall and installation of the discharge port creates a hazard for those who venture too near the drilling, staging, excavation sites as the work entails the operation of large mechanized equipment, the use of hazardous substances, and traffic associated with delivery and material disposal vehicles. To prevent unsafe entry into areas in proximity to the drilling and staging sites, portable chain-link construction fencing would be temporarily installed around the perimeter of these areas for the three-month duration of the project.

The project will cause some temporary interference with public access along the harbor shore, within Beach Front Park, on the sides of the "B" Street near the base of the fishing pier, and on the seaward side of Lighthouse Island. However, this impact on public access use would not be significant as the deprival of access would only occur over a relatively short three-month duration of the project and the affected area is relatively small. The majority of Beach Front Park, the 1,700-foot length of beach above the replacement outfall route, the "B" Street Fishing Pier, and the Battery Point Lighthouse would remain open to public access and recreational use throughout construction of the replacement outfall.

The Commission therefore finds that the project, as proposed to temporarily exclude public access through the at-grade construction, equipment storage, and staging areas to protect the public from potential injuries, is consistent with the public access and recreational policies of the Coastal Act.

H. California Environmental Quality Act.

Section 13906 of the Commission's administrative regulation requires Coastal Commission approval of Coastal Development Permit applications to be supported by a finding showing the application, as conditioned by any conditions of approval, to be consistent with any applicable requirements of the California Environmental Quality Act (CEQA). Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are any feasible alternatives or feasible mitigation measures available, which would substantially lessen any significant adverse effect that the activity may have on the environment.

The Commission incorporates its findings on conformity with LCP policies at this point as if set forth in full. These findings address and respond to all public comments regarding potential significant adverse environmental effects of the project that were received prior to preparation of the staff report. As discussed above, the proposed project has been conditioned so as to be found consistent with the Coastal Act. As specifically discussed in these above findings which are hereby incorporated by reference, mitigation measures that will minimize or avoid all significant adverse environmental impacts have been made requirements of project approval. As conditioned, there are no other feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse impacts which the activity may have on the environment. Therefore, the Commission finds that the proposed project, as conditioned to mitigate the identified impacts, can be found consistent with the requirements of the Coastal Act to conform to CEQA.

EXHIBITS

1. Regional Location Map
2. Vicinity Map
3. Excerpt, LCP Post-certification Jurisdictional Map – City of Crescent City
4. Project Description Narrative, Site Plans, and Cross-sectional Diagrams
5. Excerpt, Drilling Muds Pollution Prevention and Horizontal Directional Drilling Environmental Controls Plan
6. Excerpt, Outfall Biological Monitoring Program
7. Excerpt, Geo-technical Engineering Report
8. Review Agency Correspondence

APPENDIX A
STANDARD CONDITIONS

1. Notice of Receipt and Acknowledgement. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable amount of time. Application for extension of the permit must be made prior to the expiration date.

3. Interpretation. Any questions of intent of interpretation of any condition will be resolved by the Executive Director of the Commission.

4. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

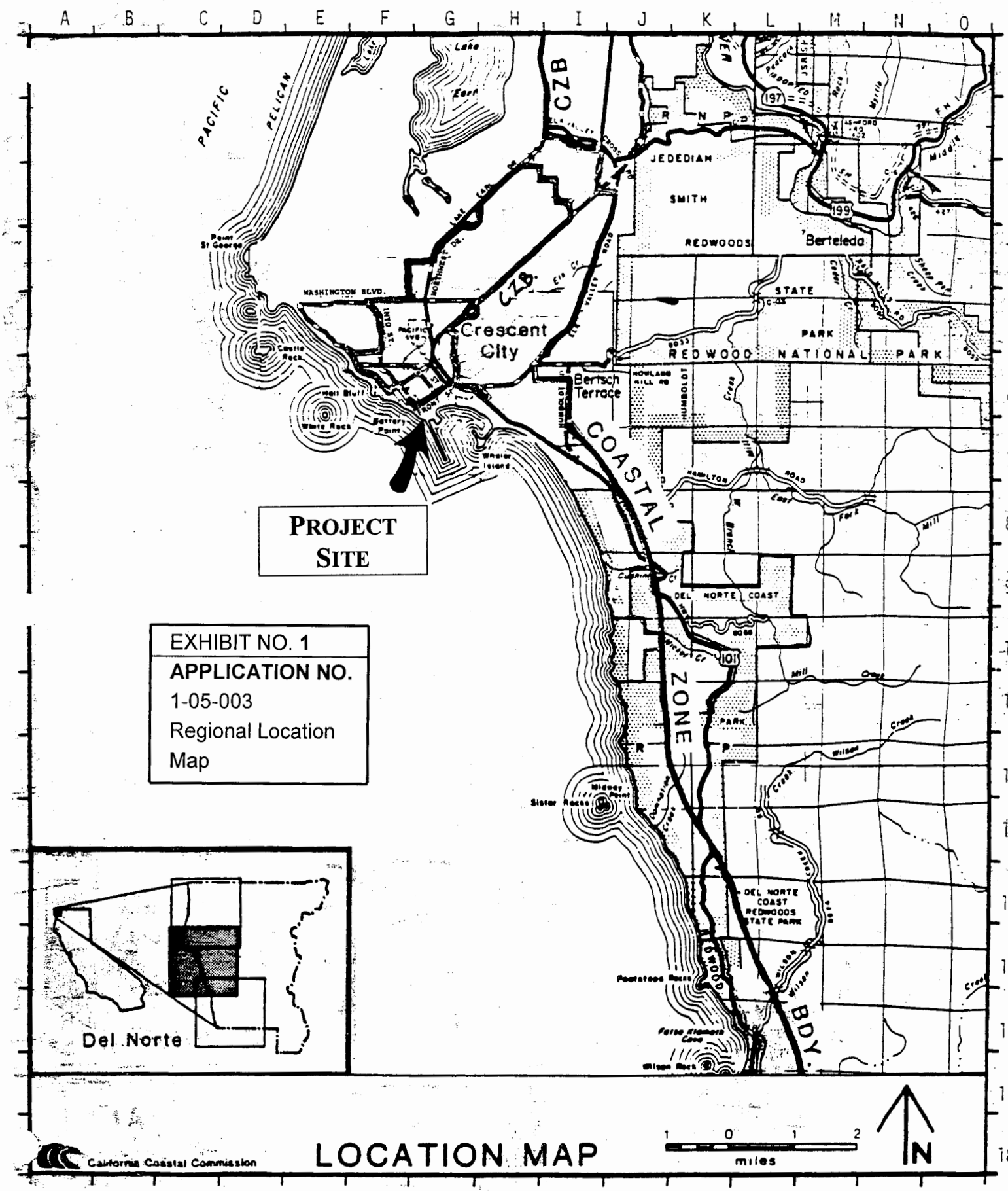


EXHIBIT NO. 1

APPLICATION NO.

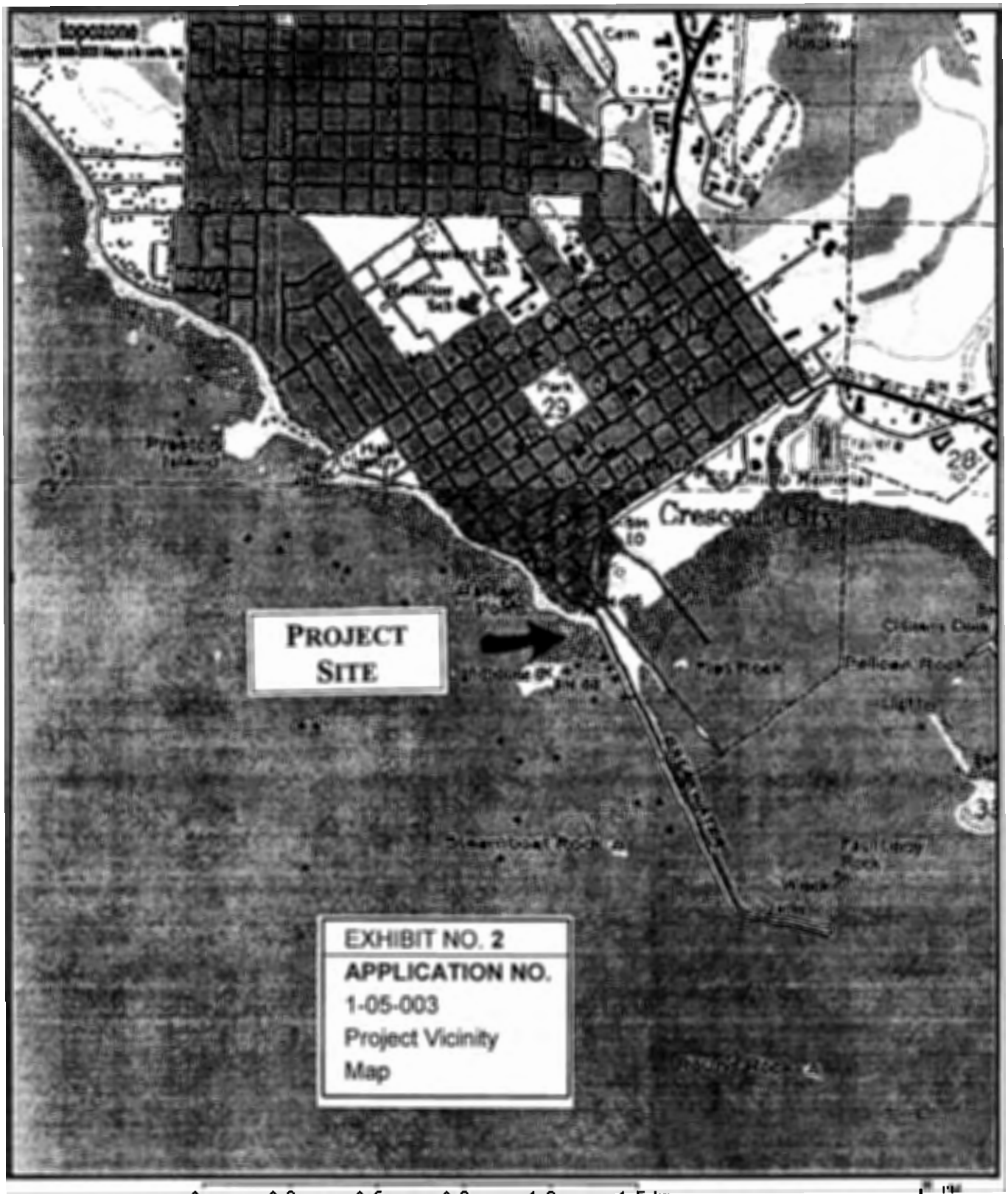
1-05-003

Regional Location Map

California Coastal Commission

LOCATION MAP

County of Del Norte



0 0.3 0.6 0.9 1.2 1.5 km

0 0.2 0.4 0.6 0.8 1 mi

Map center is UTM 10 399849E 4622333N (WGS84/NAD83)
SISTER ROCKS quadrangle
Projection is UTM Zone 10 NAD83 Datum

M=16.532
G=-0.802

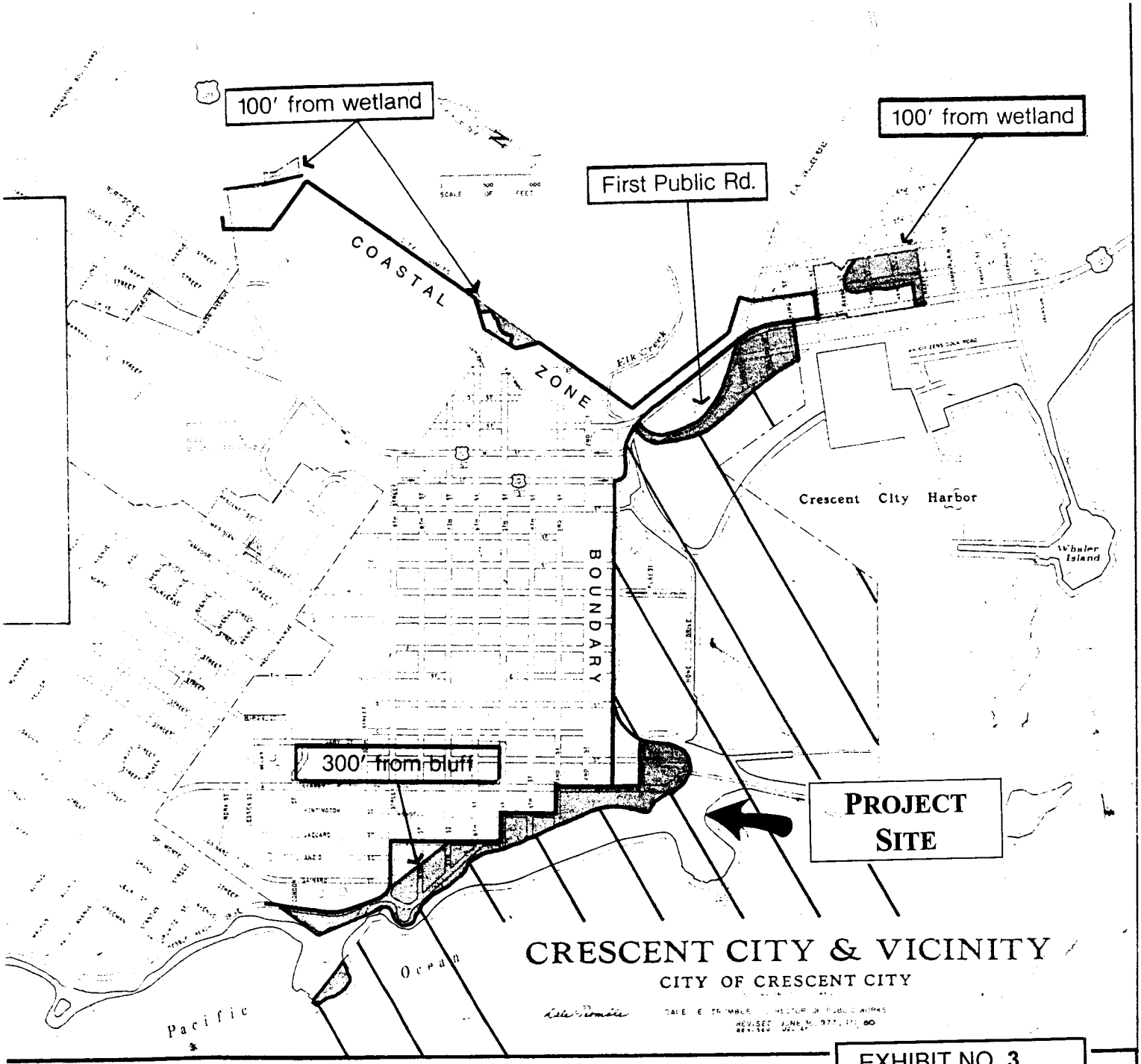


EXHIBIT NO. 3

APPLICATION NO.

1-05-003

Excerpt, LCP Post-certification Jurisdictional Map – City of Crescent City

Figure 2. Project Elements - WWTP Improvements (**Source:** Facilities Plan Update 2004, Brown & Caldwell)

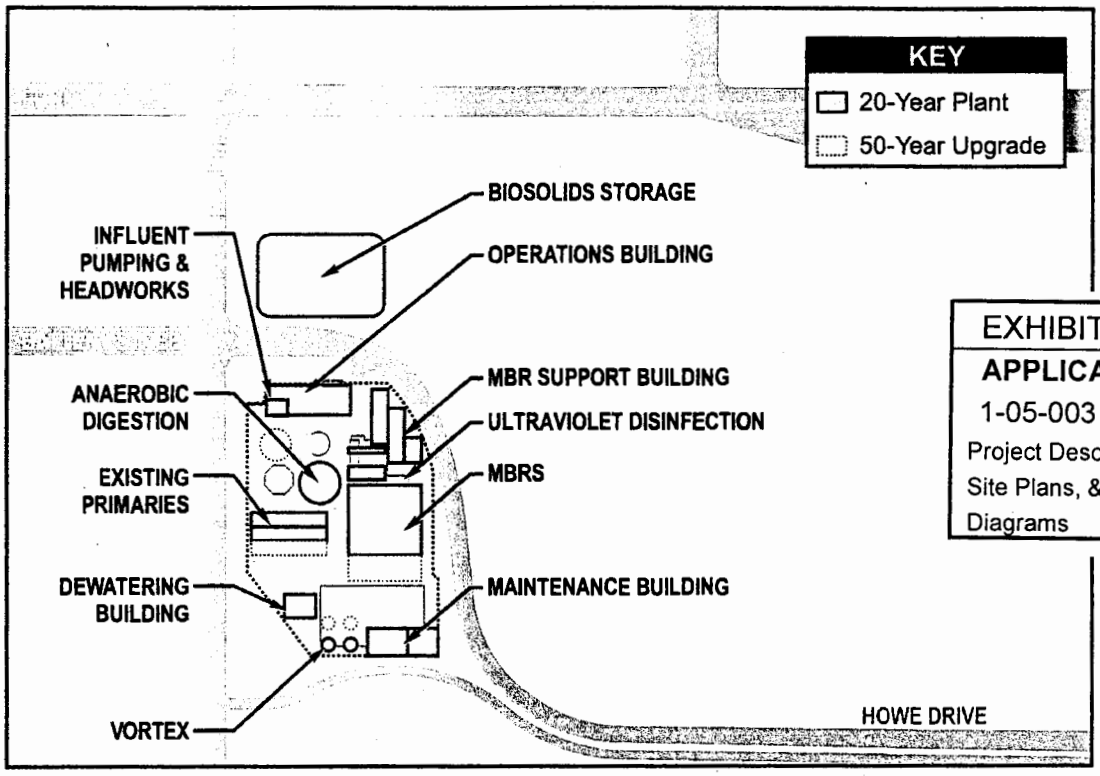
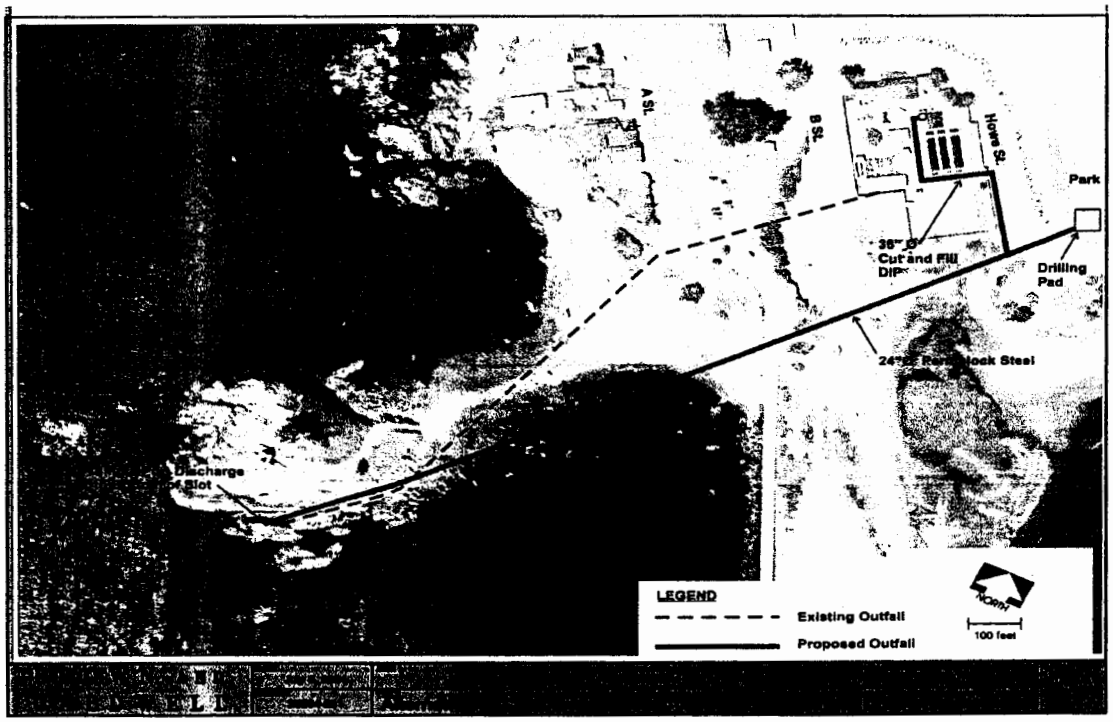


Figure 3. Project Elements - New Effient Outfall (**Source:** Technical Memorandum 12, Brown & Caldwell, 2003)



Project Description:

New Membrane Bioreactor (MBR) Treatment

A new wastewater treatment process includes full Membrane Bioreactor (MBR) treatment for all flows up to 5.5 mgd (the maximum day dry weather flow). The MBR system includes influent pumping, fine screening followed by grit removal, primary clarification, biological treatment using membrane bioreactors, and disinfection.

High-Rate Vortex Separation

During the wet weather season, peak flows in excess of the MBR peak capacity will be diverted to high-rate vortex wet weather treatment, which will include influent pumping, high-rate vortices, and disinfection.

Disinfection

Disinfection will be accomplished through liquid sodium hypochlorite or high-rate chlorination. A UV disinfection system will be built within a portion of the existing chlorine contact channels.

Influent pumping

A new influent pumping station is proposed for the 20-year planning period including three 4-mgd and two 11-mgd pumps resulting in a firm pumping station capacity of 23 mgd. For the 50-year planning period, the two 11-mgd pumps will be replaced by three 12.5-mgd pumps increasing the pumping station capacity to 37 mgd.

Preliminary and Primary Treatment

Dry weather flows will receive preliminary screening and grit removal, primary clarification, biological treatment and disinfection. Primary clarification will be accomplished using the two existing clarifiers and building a third for the 20-year planning period. To accommodate the higher hydraulic profile of the new plant, the walls on the exiting primary clarifiers will need to be raised approximately 2.5 feet. The footprint of each clarifier will remain the same. The primary clarifiers will be further improved to automate grease removal to assure that most of the grease entering the facility will be removed prior to the MBR process.

Effluent Outfall

The new effluent outfall will be constructed using a combination of conventional and directional drilling technology. The construction would commence from the existing WWTP, where a segment of 500 feet of 36-inch-diameter ductile iron pipe would be cut and covered to the directionally drilled outfall located to the southeast of the WWTP (Figure 1).

The directionally drilled section would start at Howe Drive Park. The line would be roughly 1,700 feet in length and the vertical path of the line would be catenary in shape. The pipe material would be 24-inch-diameter Permalock steel with a

0.5-inch-thick wall. Construction in the Park would require sufficient space for the drill rig and for the storage of equipment and materials.

The drilling operation would include a 4-inch diameter pilot hole followed by forward reaming with an interior diameter of about 32 inches. Drilling mud would fill the hole until the pipe was inserted. Once the hole is open, the contractor would insert the 24-inch Permalock steel from the park end. After pipe insertion, the contractor would insert inflatable plugs into the offshore and onshore ends and pressure test to at least 25 pounds per square inch gage pressure. The outlet would discharge at a slight angle into the bottom of the Slot. Around the discharge point, minimal surveying and layout for a wire grid to generate the targeting signal for the drilling operation will occur. Ten to fifteen feet short of the Slot, a manhole will be constructed to connect the new 24" pipeline to the Slot.

The geotechnical investigation prepared for the effluent outfall project concluded that the HDD borehole would encounter siltstone and sandstone of the Battery Formation between borehole Station 1+40 at elevation -7 feet and Station 2+80 at elevation -25 feet. The Battery Formation rock is moderately to slightly fractured with an RQD ranging from 25 to 60 percent. The fractured zones of the Battery Formation may cause problems with the HDD drilling and loss of drilling fluids (*Report of Geotechnical Engineering Services, Crescent City Waste Water Treatment Plant, Crescent City, California,* Geodesign, Inc., December 3, 2004).

Between borehole Station 2+80 at elevation -25 feet to the outfall Station of 13+65, geotechnical investigation concluded that the HDD borehole will encounter siltstone, sandstone, and mudstone of the Franciscan Complex. Faults and shear zones were encountered in the Franciscan Complex. The Franciscan Complex within the shear zones is classified as medium dense to dense, clayey sand and gravel. Slickensides were also encountered in the Franciscan Complex rock. The shear and fault zones and the slickensided rock may cause problems with HDD drilling and loss of drilling fluids (*Report of Geotechnical Engineering Services,* Geodesign, Inc., December 3, 2004).

The geotechnical study concluded that the presence of fractured rock at the location of the pipeline outfall could create a potential for hydrofracture of the borehole. Hydrofracture would cause the release of drilling fluids into the coastal waters (*Report of Geotechnical Engineering Services, Crescent City Waste Water Treatment Plant, Crescent City, California,* Geodesign, Inc., December 3, 2004).

The Supplemental Draft EIR addressed the potential for hydrofracture and proposed mitigation in the form of a Contingency Plan for addressing the potential for hydrofracture. The Contingency Plan would be part of the Coastal Development Permit applications to the City and California Coastal Commission.

To mitigate the potential release of drilling fluids, the Geotechnical Study recommended injection grouting be performed at the location of the outfall to prevent the hydrofracture. The grout zone would extend to a depth of at least 5 feet below the bottom of the pipeline at the location of the outfall. The Geotechnical Study concluded that injection grouting throughout the grout zone would prevent hydrofracture and resulting loss of drilling fluids and impacts to water quality. The Contingency Plan proposed in the Supplemental Draft EIR is no longer necessary.

Table 1. Estimated Construction Costs, Crescent City Wastewater Project (Source: 50% Design Report, Brown & Caldwell, 2004)

Contract	Estimated Stage 1 Construction Cost, $
A: Primary Clarifier	410,000
B: Solids Thickening	1,130,000
C: Effluent Outfall	1,500,000
D: Anaerobic Digesters	550,000
E: MBR/ Buildings	10,500,000
F: Headworks	760,000
G: RBC Disc Replacement	420,000
Total	15,270,000

Tables 2 & 3. See following pages in landscape format.

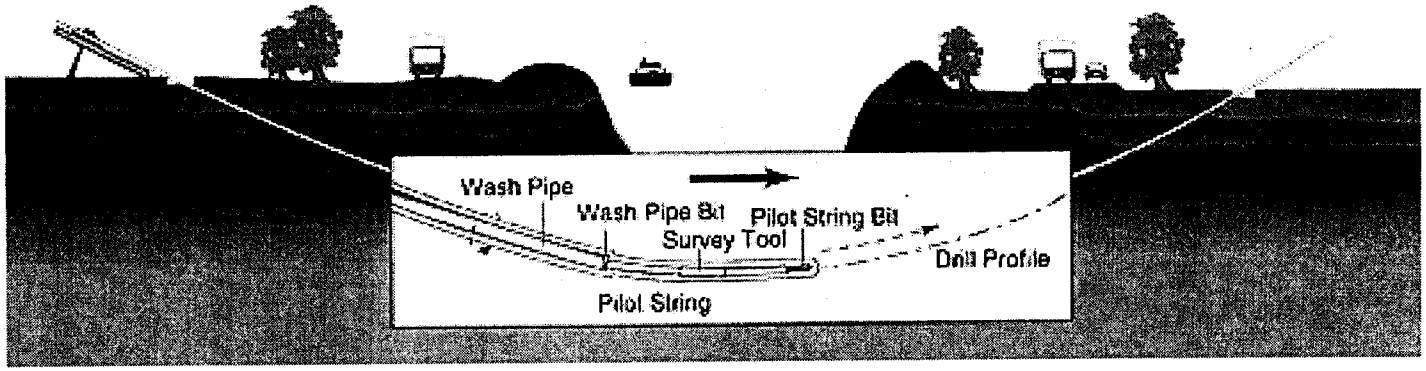
Table 4. Gross Floor Area: sum of building footprints x number of floors:

	Existing	Proposed
Buildings (Operations, Effluent Pumping, Dewatering, and MBR)	5,400	17,400
Parking	0	0
Accessory/Process Structures	21,400	22,400
Total	26,800	39,900

Table 5. Lot Coverage:

	Existing	Proposed
Buildings	24,700	33,400
Landscaping	29,000	20,700
Paved	40,600	40,200
Total	94,300	94,300

I.D.1. Pilot Hole



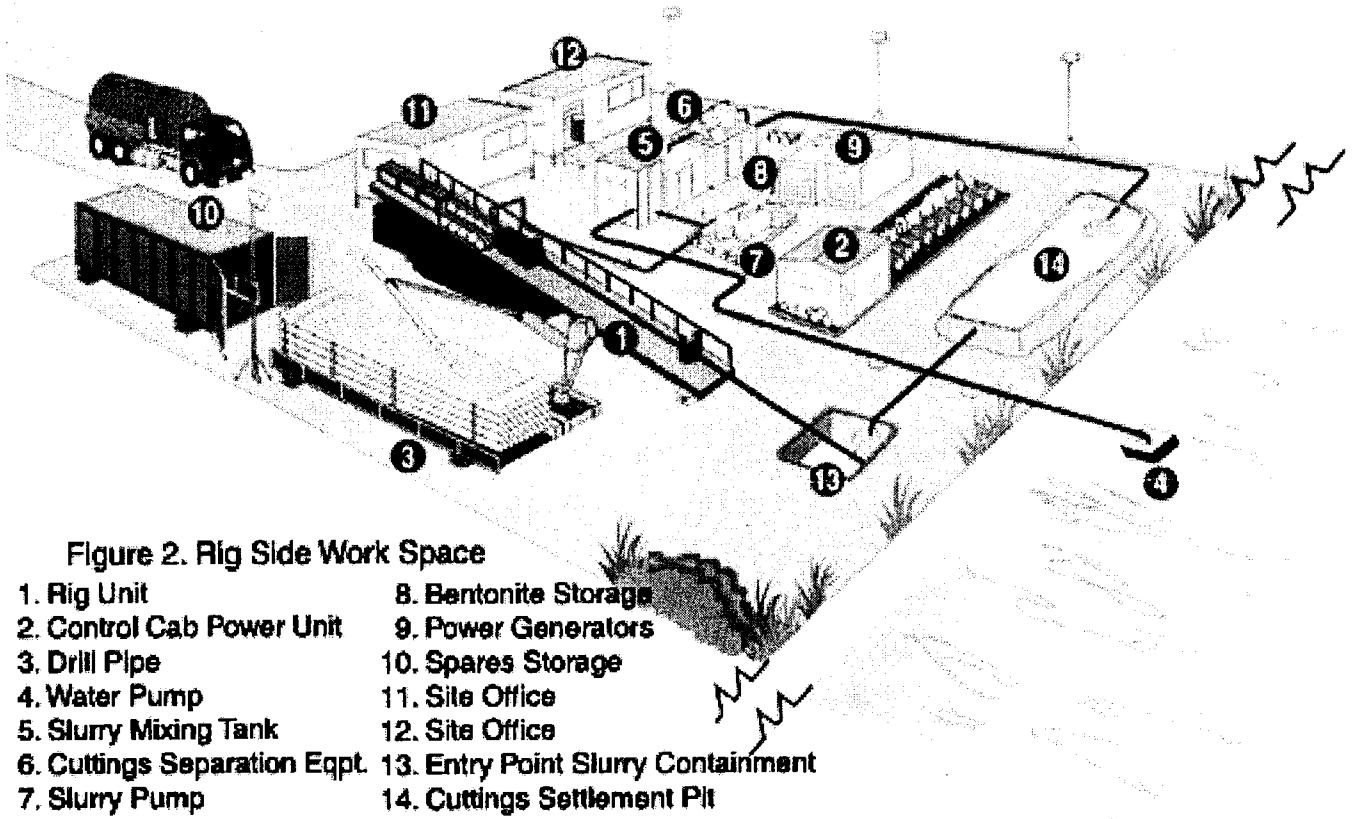


Figure 2. Rig Side Work Space

1. Rig Unit
2. Control Cab Power Unit
3. Drill Pipe
4. Water Pump
5. Slurry Mixing Tank
6. Cuttings Separation Eqpt.
7. Slurry Pump
8. Bentonite Storage
9. Power Generators
10. Spares Storage
11. Site Office
12. Site Office
13. Entry Point Slurry Containment
14. Cuttings Settlement Pit

DRAFT

SECTION 01014

WORK SEQUENCE

1.0 CONTINUITY OF PLANT OPERATIONS

A. GENERAL:

The existing wastewater treatment plant is currently and continuously receiving, treating, and discharging sewage. Those functions shall not be interrupted except as specified herein. The Contractor shall coordinate the work to avoid any interference with normal operation of plant equipment and processes.

B. NOT USED

C. SUBMITTAL:

In accordance with Section 01300, the Contractor shall submit a detailed plan and time schedule for operations to install a new outfall pipeline via HDD and tie it into an existing outfall pipe through the installation of a new stainless steel pressurized vessel. The schedule shall be coordinated with the construction schedule specified in paragraph 00710-6.02 B and shall meet the restrictions and conditions specified in this section. The detailed plan shall describe the Contractor's method for installing the pipeline and pressure vessel and the length of time required to complete said operation.

D. GENERAL REQUIREMENTS:

The Contractor shall observe the following general requirements:

1. The Contractor shall provide all necessary temporary pumps, piping, power, electrical wiring, controls, and labor during and subsequent to activities as required.

2. By following the suggested sequence for any procedure described in this section, the Contractor assumes full responsibility for its use.

2.0 SEQUENCE AND SCHEDULE OF CONSTRUCTION

To permit continuous discharge of wastewater and compliance with effluent quality requirements, the construction schedule required in paragraph 00710-6.02 B shall provide for the following specific conditions:

1. Mobilize in the park area and set up temporary security fencing.

2. Mobilize on Lighthouse Island and set up temporary security fencing. Mobilize equipment for exposing existing ductile iron pipeline and pressure grouting in area of pressure vessel.

3. Locate existing ductile iron pipe on side of Light House Island.

4. As permitted by tidal levels, drill holes for and pressure grout along the outfall alignment as indicated on the Drawings.

4. Set up targeting system for directional drilling equipment.

5. Working from the park, construct pilot hole and forward ream hole for the new outfall pipe.

6. Assemble and push new pipe through reamed hole.

7. Excavate around existing ductile iron pipe outfall and take field measurements to verify existing locations and geometry.

8. Assemble temporary outfall at low tide, open manhole "D" on existing outfall, insert removable plug on downstream side of manhole into existing 12-inch-diameter ductile iron pipe. Contractor shall, at his own discretion, either 1) utilize the gravity head in the existing pipeline and connect temporary outfall pipe to top of manhole "D," or 2) utilize a sump pump, to route water eastward through temporary piping to the water's edge. If a sump pump is used, a protective screen shall be installed to prevent debris and large rocks from entering manhole structure "D." During insertion of outfall plug and installation of temporary outfall, Owner's staff will post warnings along the beach and stop discharge through the outfall for up to six hours,. The Contractor shall give advance notice to the Owner of at least 10 working days prior to the need to stop flow through the existing outfall.

9. Complete excavation in vicinity of stainless steel pressure vessel.

10. Provide stable bedding material wrapped in filter fabric for pressure vessel, install pressure vessel and appurtenances as necessary, and connect to adjacent piping.

11. Encase the pressure vessel and adjacent piping in concrete to secure in place.

12. Install air vent pipe at designated point as determined in the field. Grout vent to surrounding rock and install gooseneck above the anticipated hydraulic grade of the pipeline.

13. Remove plug and temporary outfall pipe.

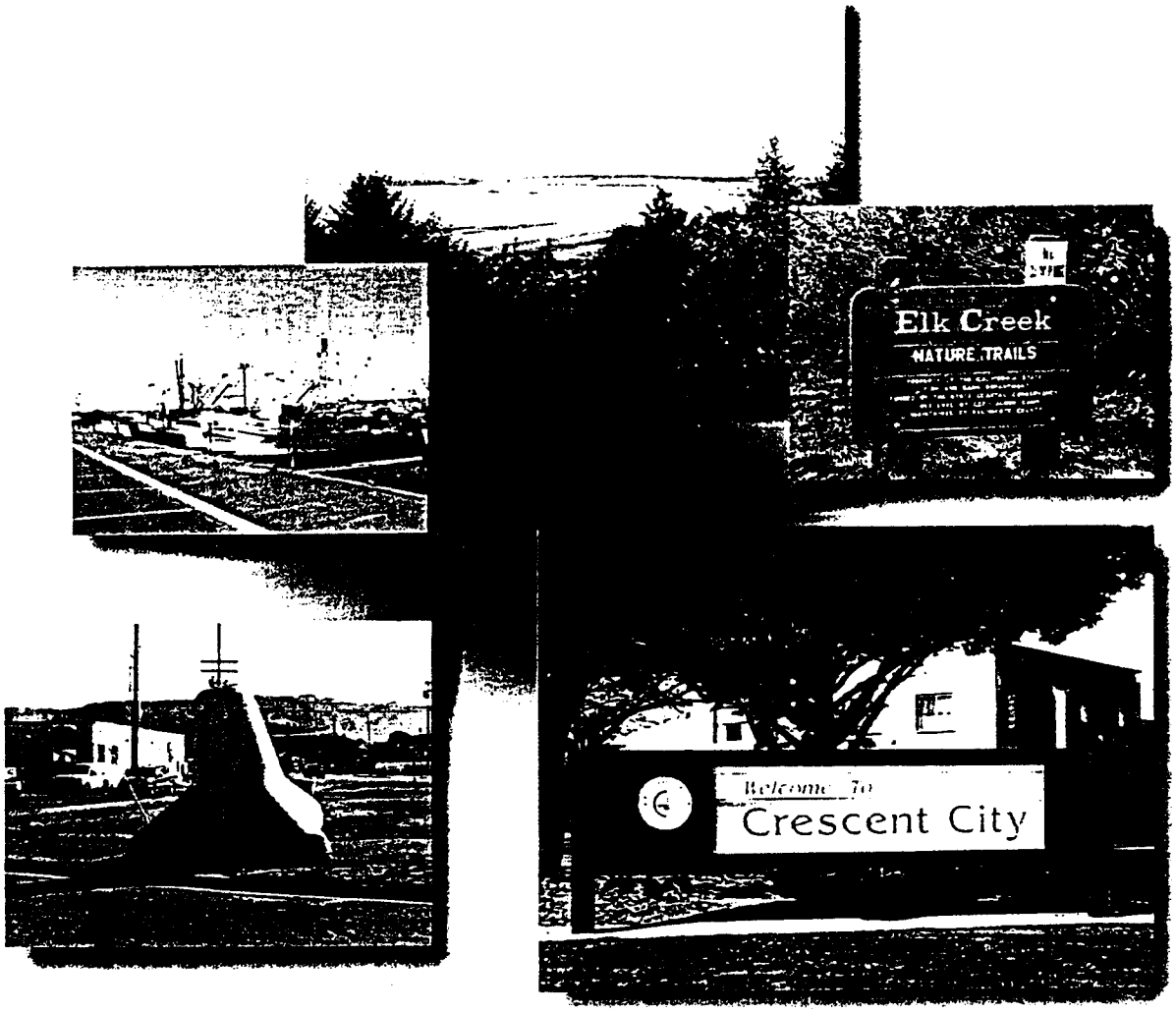
14. Demobilize from the park and lighthouse areas.

END OF SECTION

Water Pollution Control Facilities Outfall Project

Bid Set
March 2005

Project Manual
Drawings

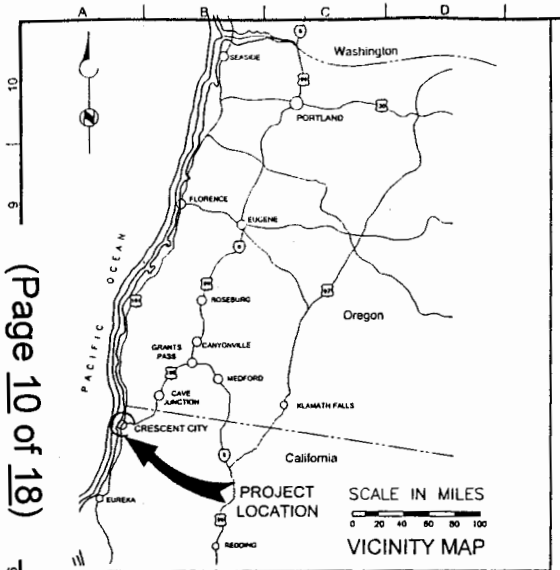


BROWN AND CALDWELL

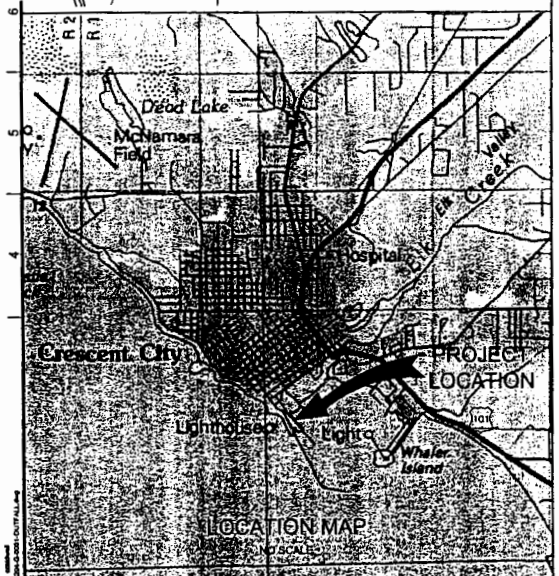
In Association with:
Stover Engineering
Reed Smith LLP
Michael Willis Architects
Separation Process, Inc.

GeoDesign, Inc.
Greenworks, P.C.
Environmental Planning & Project Development

#2



VICINITY MAP



LOCATION MAP
NO SCALE

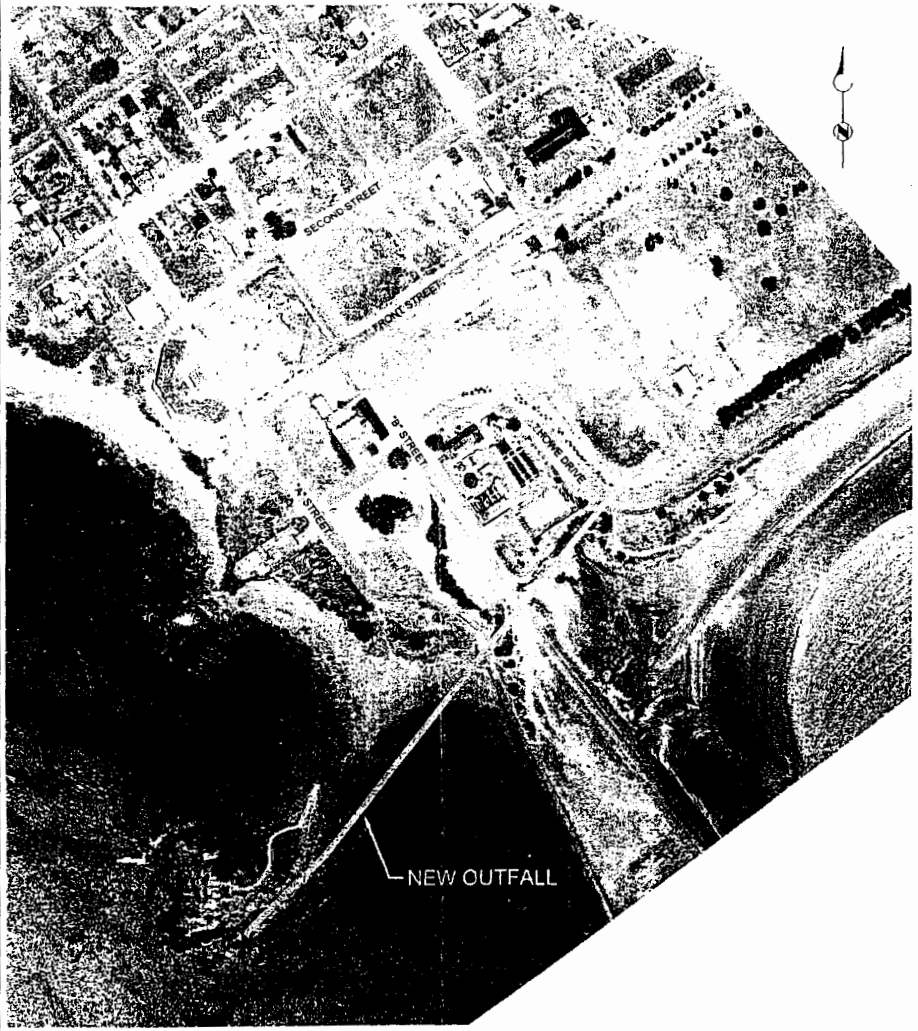
INDEX OF DRAWINGS:

GENERAL

CIVIL

CONTROL POINTS

POINT NUMBER	NORTHING	EASTING	ELEVATION	FULL DESCRIPTION
CP1	2526970.3700	5961030.0300	29.44	TIDAL 8: BENCHMARK IS ON THE SE SIDE OF MAIN PARKING LOT, 25 FEET SW OF PAVED TRAVELED WAY TO THE HARBOR BREAKWATER JETTY. CONCRETE BLOCK CONTAINING BENCHMARK SERVES AS A GUY WIRE ANCHOR FOR THE S'LY LANDSLIDE UTILITY POLE THAT SUPPORTS THE NE ENDS OF THE TWO UTILITY LINE SERVICES TO THE LIGHT HOUSE. THE CONCRETE IS 6'X2' AND PROJECTS 1' ABOVE GROUND
CP2	2526956.0800	5961167.9100	29.16	P1089: BENCHMARK IS ON A LARGE ROCK OUTCROP 200 FEET SE OF THE PARKING LOT AND ON THE NE SIDE OF ACCESS ROAD TO THE PRIMARY BREAKWATER JETTY
CP101	2526901.2753	5961127.2290	34.10	R 1089: ABOUT 200 FEET SSE OF THE PARKING LOT AND ON THE SW SIDE OF A LARGE ROCK OUTCROP THAT IS ON THE SW SIDE
CP103	2526320.2521	5960528.0310	61.70	BM19: ABOUT ¼ MILE SOUTH OF BATTERY POINT AND ON A SMALL ROCKY ISLAND THAT IS CONNECTED TO THE MAINLAND AT THE LOW TIDE.



PROJECT MAP
NO SCALE

BROWN AND CALDWELL
EUGENE, OREGON

SUBMITTED: DATE 2/5/05
APPROVED: DATE 2-04-05

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: WMH
DRAWN: GAS
CHECKED:
CHECKED:
APPROVED:

EXTERNAL REFERENCE FILES: 25401-000-S-1000-OUTFALL.dwg

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

CRESCENT CITY, CA

WATER POLLUTION CONTROL FACILITIES OUTFALL

GENERAL

VICINITY MAP, LOCATION MAP AND INDEX OF DRAWINGS

FILENAME	25204-G-0001-OUTFALL.DWG
BC PROJECT NUMBER	25204
CLIENT PROJECT NUMBER	
DRAWING NUMBER	G1

GENERAL

	EXISTING EQUIPMENT OR MATERIALS TO BE REMOVED	@	AT
	TO BE BUILT FOR FUTURE REMOVAL	& OR ‡	AND
	NEW FACILITIES (SOLID)	Ø	ROUND OR DIAMETER
	EXISTING NEW BACKGROUND	∠	ANGLE
	PROPERTY LINE, PHANTOM LINE OR MATCH LINE	℄	CENTER LINE
	CENTERLINE	ℙ	PLATE OR PROPERTY LINE
	HIDDEN LINE OR FUTURE IMPROVEMENTS	(2)	KEY NOTE DESIGNATION
	WATER SURFACE	W/	WITH
		W/O	WITHOUT

CIVIL

	NATURAL GROUND OR GRADE		EDGE OF WATER; FLOWLINE WITH DIRECTIONAL ARROW
	GRANULAR MATERIAL SUCH AS CRUSHED ROCK OR GRAVEL	3:1	SLOPE (3 HOR. TO 1 VERT.)
	AC PAVEMENT IN SECTION		CUT OR FILL SLOPE; ARROWS POINT DOWN SLOPE
	EXISTING PAVEMENT IN PLAN	B9	SOIL BORING AND DESIGNATION
	PAVEMENT IN PLAN		HYDRANT
	EXISTING CONCRETE IN PLAN		BURIED VALVE
	CONCRETE IN PLAN	MH	MANHOLE
	GRAVEL IN PLAN	CB	CATCH BASIN OR INLET
	FENCE		UTILITY POLE
110	EXISTING GRADE CONTOURS		SURVEY MONUMENT
	EXISTING CONTOURS DEMO		SURVEY CONTROL POINT
110	FINISH GRADE CONTOURS		TREES, SHRUBS OR HEDGE
+120.0	EXISTING SPOT ELEVATION		TREES, SHRUBS OR HEDGE DEMO
+110.50	FINISH GRADE SPOT ELEVATION	N E	NORTHING EASTING COORDINATE
112.50	TOP OF PAVEMENT ELEVATION		
	SWALE OR DEPRESSION		

ARCHITECTURAL / STRUCTURAL

	CONCRETE		NEOPRENE, RUBBER OR PLASTIC
	REINFORCEMENT IN SECTION		OPENING OR DEPRESSION IN SLAB OR WALL
	PRECAST CONCRETE		GRATING SPAN
	MORTAR, GROUT OR PLASTER		CHECKER PLATE
	CONCRETE BLOCK		OPENING WITH GRATING COVER
	BRICK OR CAST IRON		OPENING WITH CHECKER PLATE COVER
	STEEL OR STAINLESS STEEL		FRP GRATING WITH COVER PLATE
	ALUMINUM		JOINT FILLER
	WOOD		WATER STOP
	RIGID INSULATION		HANDRAIL
	BATT INSULATION		HOISTING HOOK
	GRAVEL, ROCK RIP-RAP		

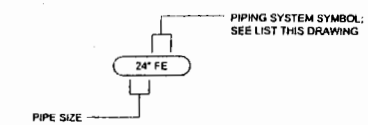
MECHANICAL

PIPE AND FITTINGS

SINGLE LINE	DOUBLE LINE		SINGLE LINE	DOUBLE LINE	
		FLANGED JOINT			ELASTOMER AND FABRIC EXPANSION JOINT
		PLAIN OR GROOVED END MECHANICAL COUPLING			EXPANSION JOINT (SEE SPECS FOR TYPE)
		PUSH ON, MECHANICAL OR BALL AND SOCKET JOINT			FLEXIBLE METAL HOSE
		WELDED JOINT			ELBOW UP
		SLEEVE TYPE MECHANICAL COUPLING			ELBOW DOWN
		RESTRAINED SLEEVE TYPE MECHANICAL COUPLING			TEE UP
		FLANGED COUPLING ADAPTER			TEE DOWN
		RESTRAINED FLANGED COUPLING ADAPTER			LATERAL UP
		GROOVED END ADAPTER FLANGE			LATERAL DOWN
		UNION			CONCENTRIC REDUCER
					ECCENTRIC REDUCER

PIPING DESIGNATIONS

NEW PIPING



EXISTING PIPING [2] — 36" STD

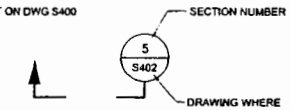
FUTURE PIPING — 36" STD

PIPING SYSTEM SYMBOLS [3]

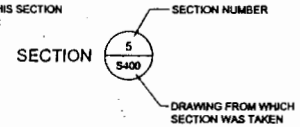
FE	FINAL EFFLUENT
FL	FISH LINE
SS	SANITARY SEWER
STD	STORM DRAIN

SECTION AND DETAIL DESIGNATIONS

(1) SECTION CUT ON DWG S400



(2) ON DWG S402 THIS SECTION IS IDENTIFIED AS:



(3) DETAILS ARE CROSS REFERENCED IN A SIMILAR MANNER, EXCEPT THAT DETAILS ARE IDENTIFIED BY LETTER RATHER THAN NUMBER

NOTES:

1. THIS DRAWING IS GENERAL IN NATURE. SOME SYMBOLS AND DESIGNATIONS SHOWN HEREON MAY NOT BE USED ON THE CONTRACT DRAWINGS.
2. EXISTING PIPING IS DESIGNATED BY SERVICE WITHOUT IMPLICATION AS TO PIPING MATERIAL. EXISTING PIPING MATERIAL, IF KNOWN, IS INDICATED SEPARATELY, AND MAY NOT BE THE SAME MATERIAL AS SPECIFIED FOR NEW PIPING FOR THE SAME SERVICE.
3. SEE PIPING SPECIFICATION SHEETS (PIPE SPECS) IN SPECIFICATION SECTION 15050 FOR PIPING SYSTEM REQUIREMENTS.
4. SEE DRAWING G3 FOR ABBREVIATIONS.
5. SYMBOLS ARE ARRANGED ON SPECIFIC DRAWINGS AND IN CATEGORIES FOR CONVENIENCE ONLY; SYMBOLS MAY BE USED ON ANY OF THE CONTRACT DRAWINGS.

BROWN AND CALDWELL
EUGENE, OREGON

SUBMITTED: [signature] DATE: 2/5/15
APPROVED: [signature] DATE: 2-4-15

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)
DESIGNED: WMH
DRAWN: GAS
CHECKED:
CHECKED:
APPROVED:

EXTERNAL REFERENCE FILES
25204-000-G-1000-OUTFALL.dwg

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP

CRESCENT CITY, CA

WATER POLLUTION CONTROL FACILITIES OUTFALL

GENERAL

STANDARD SYMBOLS AND DESIGNATION SYSTEMS

FILENAME: 25204-G-0002-OUTFALL.DWG
BC PROJECT NUMBER: 25204
CLIENT PROJECT NUMBER:
DRAWING NUMBER: G2

AC	ASPHALTIC CONCRETE
A/C	AIR CONDITIONING
ACS	ACOUSTIC
ADWF	AVERAGE DRY WEATHER FLOW
AG	AGITATOR
AMD	AIR MONITORING DEVICE
AMP	AMPERE
ANC	ANCHOR
BAC	BACTERIOLOGICAL
BC	BEGINNING OF CURVE
BCR	BEGINNING OF CURVE RETURN
BCOP	BARE COPPER
BF	BLIND FLANGE
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BM	BENCH MARK
BOD	BIOCHEMICAL OXYGEN DEMAND
BTUH	BRITISH THERMAL UNITS PER HOUR
CAB	DIRECT BURIAL CABLE
CAF	COMBUSTION AIR FAN
CC	COOLING COIL
C-C	CENTER TO CENTER
CCP	CONCRETE CYLINDER PIPE
CCSP	CONCRETE LINED AND COATED STEEL PIPE
CNDCT	CONDUCTOR
CDU	CONDENSING UNIT
CED	CEILING EXHAUST DIFFUSER
CER	CEILING EXHAUST REGISTER
CF	CUBIC FEET
CFH	CUBIC FEET PER HOUR
CFR	CODE OF FEDERAL REGULATIONS
CIRC	CIRCUMFERENCE
CK	CHECKER(ED)
CKPL	CHECKER PLATE
℄	CENTERLINE
CL	CLEARANCE
CL2	CHLORINE
CLR	CLEAR CONCRETE COVER
CM	MANUAL CONTROL STATION
CMA	MANUAL-AUTO CONTROL STATION
CMC	CEMENT MORTAR COATED
CML	CEMENT MORTAR LINED
CMPA	ASBESTOS PROTECTED CORRUGATED METAL PIPE
CMU	CONCRETE MASONARY UNIT
CNTL	CONTROL
CO2	CARBON DIOXIDE
COD	CHEMICAL OXYGEN DEMAND
COF	COOLING AIR FAN
CONC	CONCRETE
COND	CONDUCTIVITY
CJ	CONSTRUCTION JOINT
CO	CLEAN OUT
CONT	CONTINUED
CP	CONTROL POINT
CPVC	CHLORINATED POLYVINYL CHLORIDE
CR	CONDUIT RACK
CREJ	CORRUGATED RUBBER EXPANSION JOINT
CS	CUP SINK
CSD	CEILING SUPPLY DIFFUSER
CTR	CONTRACTOR, CONTROL UNIT
DB	DUCT BANK
DE	DENSITY METER
DF	DRINKING FOUNTAIN
DFD	DUCT FIRE DAMPER
DG	DOOR GRILLE
DM	DAMPER MOTOR
DP	DEEP
DR	DRAIN ROCK
D/S	DOWNSPOUT
DT	DRAIN TRAP
DWF	DRY WEATHER FLOW
DWL	DOWEL
EAT	ENTERING AIR TEMPERATURE
EAU	ENGINE ALTERNATOR UNIT
EC	END OF CURVE
ED	EXTRACTOR DAMPER, EQUIPMENT DRAIN
EE	EACH END
EF	EACH FACE
EFF	EFFLUENT
EG	EXHAUST GRILLE
EJ	EXPANSION JOINT
EL	ELEVATION
ELL	ELBOW
EMBD	EMBEDDED
EP	ENCLOSURE PANEL
E/P	ELECTRIC/PNEUMATIC
EPR	EVAPORATOR
EQ	EQUAL
EQUIP	EQUIPMENT
EW	EACH WAY
EWEF	EACH WAY EACH FACE
EWT	ENTERING WATER TEMPERATURE
EXG	EXHAUST GRILLE
EXIST	EXISTING
F	FAHRENHEIT, FAN, FUSE(D)
FB	FLAT BAR, FLOOR BEAM
FC	FAIL CLOSED
FCO	FLOOR CLEAN OUT
FCR	FINE CRUSHED ROCK
FD	FLOOR DRAIN
FE	FLOWMETER
FEC	FIRE EXTINGUISHER CABINET
FF	FAR FACE
F-F	FACE TO FACE
FH	FIRE HYDRANT, FLATHEAD, FUME HOOD
FIN	FINISHED
FL	FLOW LINE
FLP	FLUID POWER UNIT
FLR	FLOOR
FM	FORCE MAIN
FMH	FLEXIBLE METAL HOSE
FO	FAIL OPEN
FP	FILLER PANEL
FPC	FLEXIBLE PIPE COUPLING
FPC-T	FPC TO TAKE TENSION
FRP	FIBERGLASS REINFORCED PLASTIC
FRS	FREEZESTAT
FS	FLOW SWITCH, FIRESTAT (MECHANICAL)
FS	FAR SIDE (STRUCTURAL)
FT	FOOT
FTG	FOOTING
G	POWER ACTUATED GATE
GDR	GRINDER
GFI	GROUND FAULT INTERRUPTOR
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRT	GROUT
GSP	GALVANIZED STEEL PIPE
H/A	HAND AUTO
HB	HOSE BIB
HC	HEATING COIL
HDOT	HEAVY DUTY OILTIGHT
HG	MERCURY, HAND GRADE
HHV	HEAT HOSE VALVE
HOA	HAND-OFF-AUTO
HOR	HORIZONTAL
HP	HIGH PRESSURE, HIGH POINT, HORSEPOWER
HR	HANDRAIL, HEAT RESERVE
HSS	HIGH SIGNAL SELECT
HTV	HIGH TEMPERATURE VENT
HV	HOSE VALVE
H/V	HEATING AND VENTILATING
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HWTR	HIGH WATER
HYDT	HYDRANT
H2E	HOOK TWO ENDS
ICN	INCINERATOR
IE	INVERT ELEVATION
IF	INSIDE FACE
IL	INDICATING LAMP
INF	INFLUENT
INS	INSULATE(D)(ION)
INTER	INTERMEDIATE
INT	INTERIOR
INV	INVERT
IT	INSTRUMENT TAP
JST	JOIST
K	KIP (1000 POUNDS)
KS	KNEE SPACE
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KVAR	KILOVAR
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE, LATERAL, LATITUDE
LEL	LOWER EXPLOSIVE LIMIT
LPF	LIQUID POLYMER FEEDER
LS	LIMIT SWITCH
LVA	LOW VELOCITY ANCHORS
MBH	THOUSAND BTU'S PER HOUR
MCC	MOTOR CONTROL CENTER
MCM	THOUSAND CIRCULAR MILLS
MCU	MASTER CONTROL UNIT
MD	MOTORIZED DAMPER
MFRD	MANUFACTURED
MGD	MILLION GALLONS PER DAY
MG/l	MILLIGRAMS PER LITER
MIE	MISCELLANEOUS INSTRUMENTATION EQUIPMENT
MILSPEC	MILITARY SPECIFICATION
MIN	MINIMUM, MINUTE
MJ	MECHANICAL JOINT
MLLW	MEAN LOWER LOW WATER
MLSS	MIXED LIQUOR SUSPENDED SOLIDS
M.O.	MASONRY OPENING
MOP	MOTOR OPERATOR
MUL/DIV	MULTIPLY/DIVIDE
N	NEUTRAL
NA	NONAUTOMATIC
NAOH	SODIUM HYDROXIDE
NEG	NEGATIVE
NF	NONFUSED
NIC	NOT IN CONTRACT
NIS	NOT IN SERVICE
NOX	NITRATES AND NITRITES
NPSH	NET POSITIVE SUCTION HEAD
NRS	NONRISING STEM
NS	NEAR SIDE
NTS	NOT TO SCALE
OA	OUTSIDE AIR, OVERALL
OAI	OUTSIDE AIR INTAKE
OB	OPPOSED BLADE
OC	ON CENTER
OF	OUTSIDE FACE
O.F.O.I.	OWNER FURNISHED/OWNER INSTALLED
OIS	OPERATOR INTERFACE SYSTEM
OL	OVERLOAD
O-O	OUT TO OUT
ORF	ODOR REMOVAL FILTER
ORP	OXIDATION REDUCTION POTENTIAL
ORT	ODOR REDUCTION TOWER
OS	OPEN SHELVING
OSA	OUTSIDE AIR
OSC	ODOR SCRUBBER
P	PUMP
PC	PIPE COUPLING
PCC	PLANT CONTROL CENTER
PCP	PLAIN CONCRETE PIPE
PC-T	PIPE COUPLING TO TAKE TENSION
PCU	PHOTOELECTRIC CONTROL UNIT
P/E	PNEUMATIC/ELECTRIC
PF	POWER FACTOR
PI	PROPORTIONAL PLUS INTEGRAL CONTROL
PID	PROPORTIONAL PLUS INTEGRAL PLUS DERIVATIVE CONTROL
PIVC	POINT OF INTERSECTION ON VERTICAL CURVE
PL	PROPERTY LINE, PLATE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLYWD	PLYWOOD
PNL	PANEL, PANELBOARD
PO4	PHOSPHATE
POP	PNEUMATIC OPERATOR
PP	POWER POLE
PPD	POUNDS PER DAY
PRES	PRESSURE
PRD	PRESSURE RELIEF DAMPER
PRL	PARALLEL
PRV	PRESSURE REGULATING (REDUCING/RELIEF) VALVE
PRS	PRESSURE REDUCING STATION
PSIA	POUND PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAGE
PT	PRESSURE TREATED
PVL	PRESSURE VESSEL
PVT	PAVEMENT
PWWF	PEAK WET WEATHER FLOW
Q	RATE OF FLOW
QCPLG	QUICK COUPLING
R	RADIUS
RAF	ROLL TYPE AIR FILTER
RCR	RECORDER
REC	RECEIVER
RECD	RECEIVED
RECP	RECEPTACLE
RED	REDUCE(R)
REG	REGULATOR
REINF	REINFORCEMENT
REL	RELAY
RT	RIGHT
RTP	REINFORCED THERMOSET PLASTIC
RTU	REMOTE TERMINAL UNIT
RGS	RIGID GALVANIZED STEEL
RL	REDUCED LEVEL
RWL	RAINWATER LEADER
R/W	REINFORCED WITH
S	SOUTH, SILENCER
SB	SIGNAL BOX
SCFM	STANDARD CUBIC FEET PER MINUTE
SCFH	STANDARD CUBIC FEET PER HOUR
SD	SHOWER DRAIN
SEL	SELECTOR
SG	SUPPLY GRILLE, SLUICE GATE
SI	SPEED INCREASER
SIM	SIMILAR
SK	SLIDING KEYBOARD TRAY
SL	SLOPE
SP	SPACE, SET POINT, STATIC PRESSURE
SPG	SPACING
SPT	SOUND POWERED TELEPHONE
SO2	SULFUR DIOXIDE
SPL	SPLICE
SPRT	SUPPORT
SR	SPEED REDUCER
SRG	SPLIT-RANGING
SS	STAINLESS STEEL
STD	STORM DRAIN, STANDARD
STGA	STARTING AIR
SUB	SUBSTITUTE
SWB	SWITCHBOARD
SYM	SYMMETRICAL
TB	TERMINAL BOX
T/B	TOP OF BANK
T&B	TOP AND BOTTOM
TBN	TURBINE
T/C	TOP OF CURB
TCL	TOTALLY CLOSED
TCP	TEMPERATURE CONTROL PANEL
THK	THICK
TOA	TEST-OFF-AUTO
TOC	TOTAL ORGANIC CARBON (MECHANICAL)
TOC	TOP OF CONCRETE (STRUCTURAL)
TOW	TOP OF WALL
TP	TANGENT POINT
TPG	TOPPING
TPLX	TRIPLEXED
TSS	TOTAL SUSENDED SOLIDS
TYP	TYPICAL
UL	ULTIMATE LOAD
UN	UNION
UNO	UNLESS NOTED OTHERWISE
UP	UTILITY POLE
UPS	UNINTERRUPTIBLE POWER SUPPLY
US	UTILITY STATION
USS	UNIT SUBSTATION
UV	ULTRAVIOLET
V	VOLTS
VAC	VOLTS ALTERNATING CURRENT
VAR	VARIES, VARIABLE
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VD	VOLUME DAMPER
VDC	VOLTS DIRECT CURRENT
VP	VAPOR PRESSURE, VACUUM PUMP
VSC	VARIABLE SPEED COUPLING
VTR	VENT THROUCH ROOF
VV	VARIABLE VOLUME BOX
WC	WATER CLOSET, WATER COLUMN
WEG	WALL EXHAUST GRILLE
WER	WALL EXHAUST REGISTER
WF	WIDE FLANGE
WG	WASTE CAS
WH	WATER HYDRANT
WS	WATER SURFACE
WSE	WATER SURFACE ELEVATION
WSR	WALL SUPPLY REGISTER, WASHER
WSTP	WATERSTOP
WT	WATERTIGHT
WWF	WELDED WIRE FABRIC, WET WEATHER FLOW
X	SPARE CONDUIT
XDCR	TRANSDUCER
XFMR	TRANSFORMER
XMTR	TRANSMITTER
XLP	CROSS LINKED POLYETHYLENE
XP	EXPLOSIONPROOF
YCO	YARD CLEANOUT
ZS	POSITION SWITCH

NOTES:

1. ADDITIONAL ABBREVIATIONS ARE DEFINED IN ANSI Y1.1-1989.
2. ABBREVIATIONS FOR PIPING SYSTEMS ARE SPECIFIED IN SECTION 15050.

(Page 12 of 18)

BROWN AND CALDWELL
EUGENE, OREGON

SUBMITTED: DATE: 2/5/05
APPROVED: DATE: 2-4-05

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)
DESIGNED: WMH
DRAWN: GAS
CHECKED:
CHECKED:
APPROVED:

EXTERNAL REFERENCE FILES: 25204-G-0003-G-1000-OUTFALL.dwg

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP

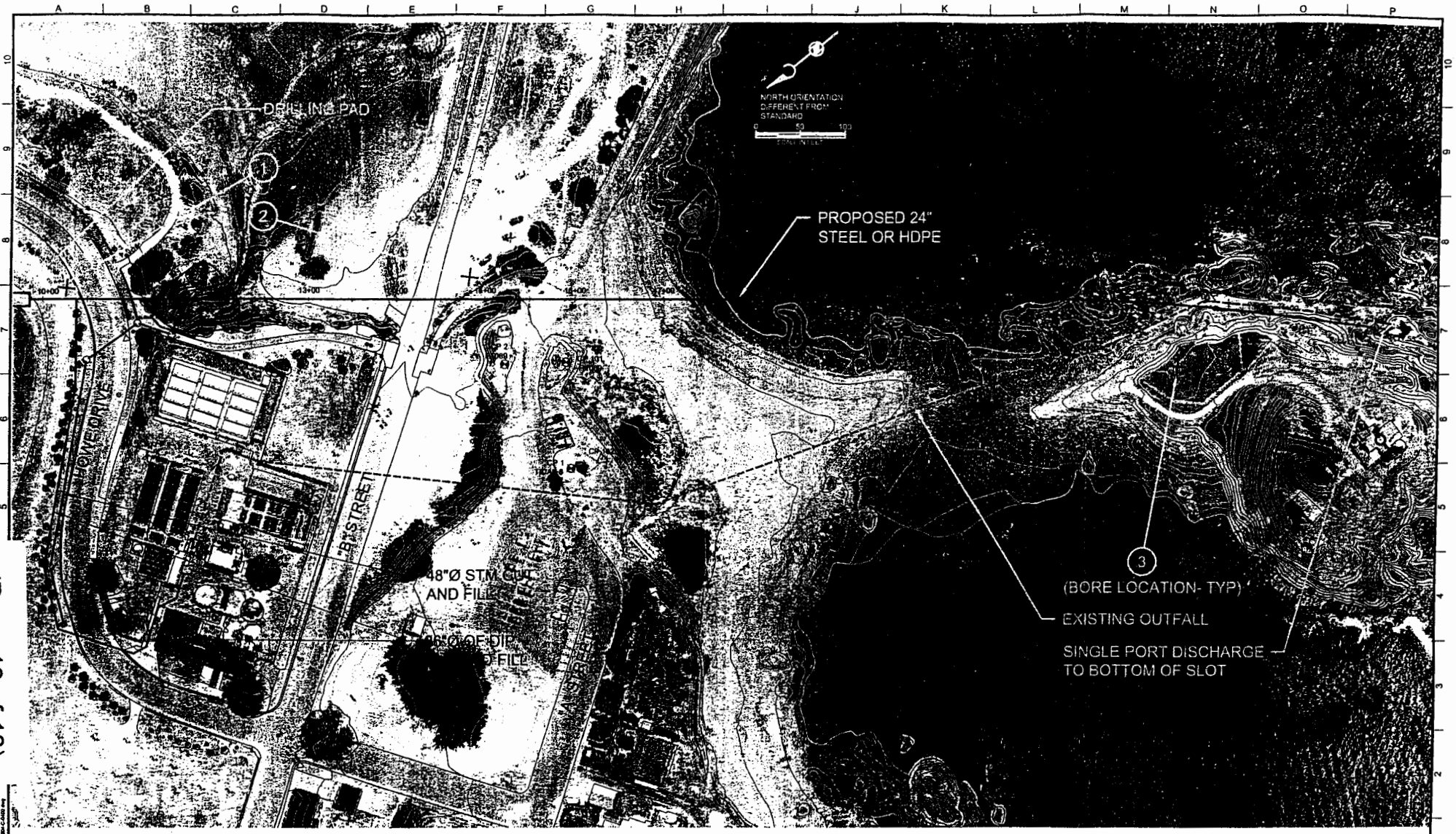
CRESCENT CITY, CA

WATER POLLUTION CONTROL FACILITIES OUTFALL

GENERAL

ABBREVIATIONS

FILENAME: 25204-G-0003-OUTFALL.DWG
BC PROJECT NUMBER: 25204
CLIENT PROJECT NUMBER:
DRAWING NUMBER: G3



BROWN AND CALDWELL

EUGENE, OREGON

SUBMITTED: DATE 2/15/05

APPROVED: DATE 2-4-05

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2", SCALE ACCORDINGLY)

DESIGNED: RWW
DRAWN: GAS
CHECKED
CHECKED
APPROVED

EXTERNAL REFERENCE FILES

REGISTERED PROFESSIONAL ENGINEER WILLIAM MARK PATTEN No. 20146 Exp 03-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED CIVIL ENGINEER DAVID B. CALDWELL No. 15982 Exp 03-31-06 CIVIL STATE OF CALIFORNIA 2/4/05

ZONE	REV.	REVISIONS DESCRIPTION	BY	DATE	APP

CRESCENT CITY, CA

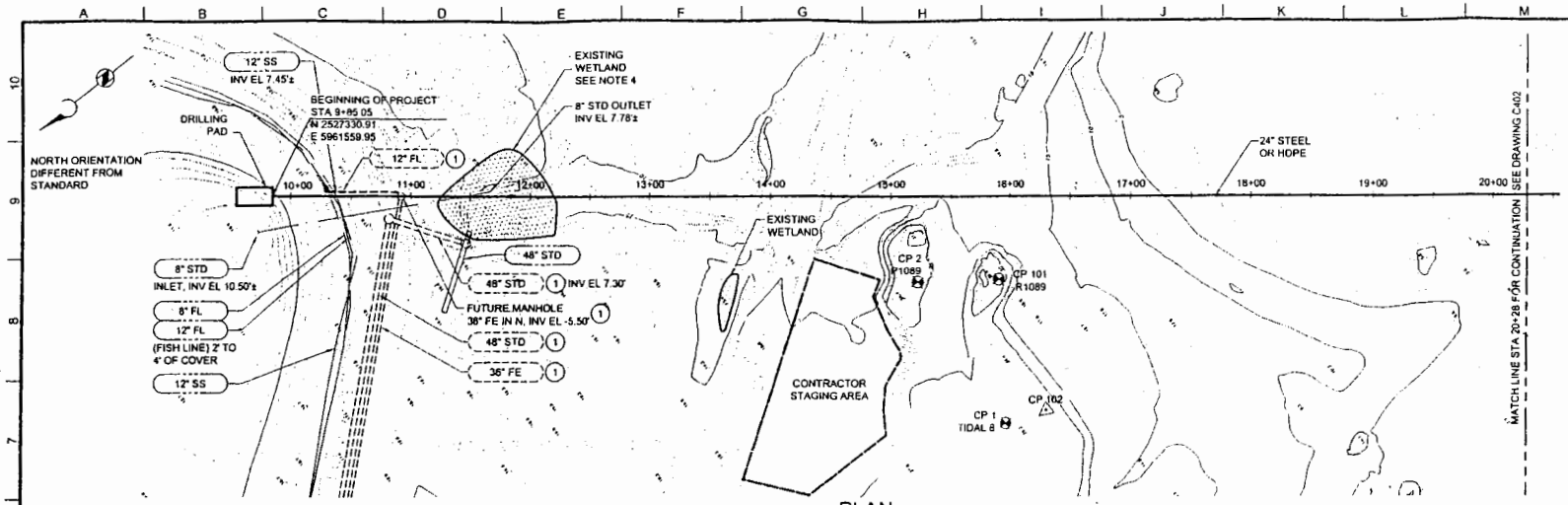
CITY OF CRESCENT CITY CALIFORNIA

WATER POLLUTION CONTROL FACILITIES OUTFALL

CIVIL

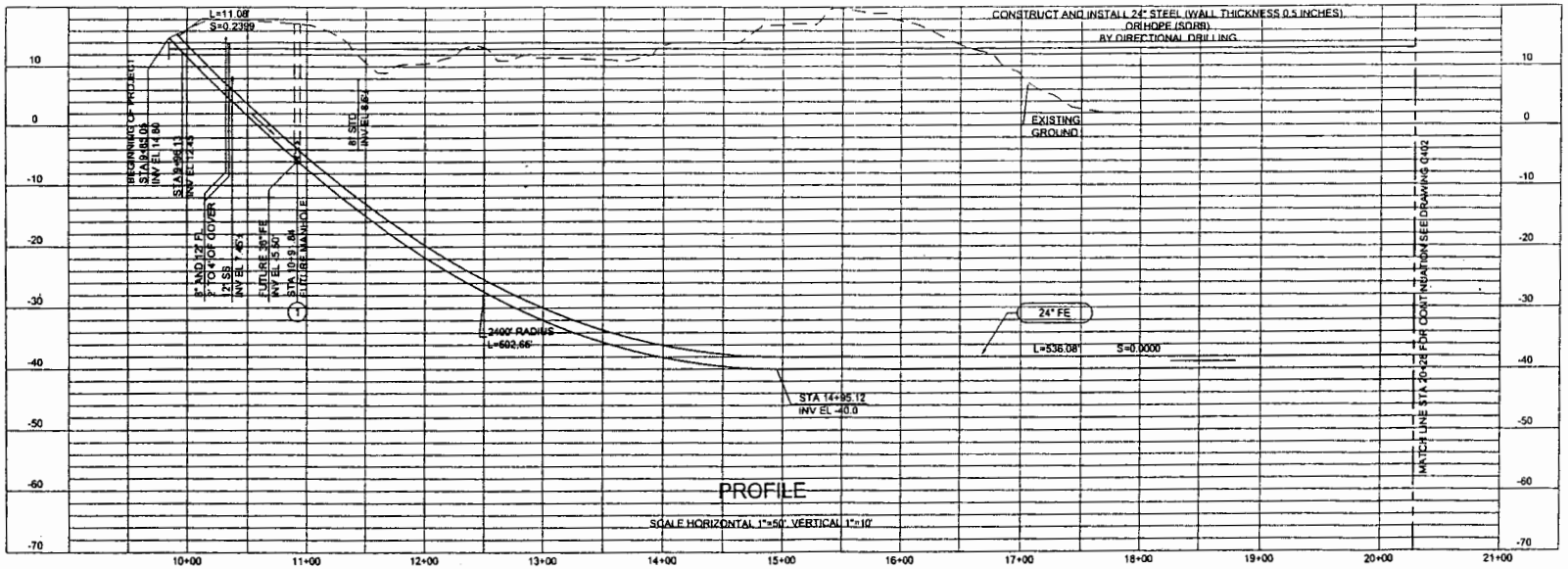
OUTFALL BORE HOLE LOCATION PLAN

FILENAME 25204-C-400-OF.DWG
BC PROJECT NUMBER 25204
CLIENT PROJECT NUMBER
DRAWING NUMBER C400



PLAN

SCALE 1"=50'



PROFILE

SCALE HORIZONTAL 1"=50', VERTICAL 1"=10'

GENERAL NOTES:

1. ALL ELEVATIONS AND COORDINATE VALUES SHOWN ARE BASED ON NAVD 88 AND CALIFORNIA COORDINATE SYSTEM. COORDINATES SHOWN ARE LOCATED AT THE CENTER OR CORNER POINT ON STRUCTURES AND AT THE CENTERLINE OF PIPES.

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   REPORTED TIDAL VARIATIONS ARE AS FOLLOWS:

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EXTREME HIGH WATER (EHW)	10.7
MEAN HIGHER HIGH WATER (MHHW)	6.9
MEAN LOWER LOW WATER (MLLW)	0.0

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10. PROVIDE TEMPORARY SECURITY FENCE AT BOTH THE ENTRY AND EXIT PITS.

KEY NOTES:

(1) FUTURE PIPE BY OTHERS.

BROWN AND CALDWELL
EUGENE, OREGON

SUBMITTED: [signature] DATE: 2/5/05
APPROVED: [signature] DATE: 2-9-05

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:
DRAWN: AW
CHECKED: CK
CHECKED:
APPROVED: RF

EXTERNAL REFERENCE FILES

REGISTERED PROFESSIONAL ENGINEER — WILLIAM KARL HAUSER — No. 29146 — Exp. 03-31-07 — STATE OF CALIFORNIA — CIVIL

REGISTERED PROFESSIONAL ENGINEER — R. COLEMAN CALDWELL — No. C57983 — Exp. 06-30-06 — STATE OF CALIFORNIA — CIVIL — 2/1/05

REVISIONS				
ZONE	REV.	DESCRIPTION	BY	DATE	APP

CRESCENT CITY, CA

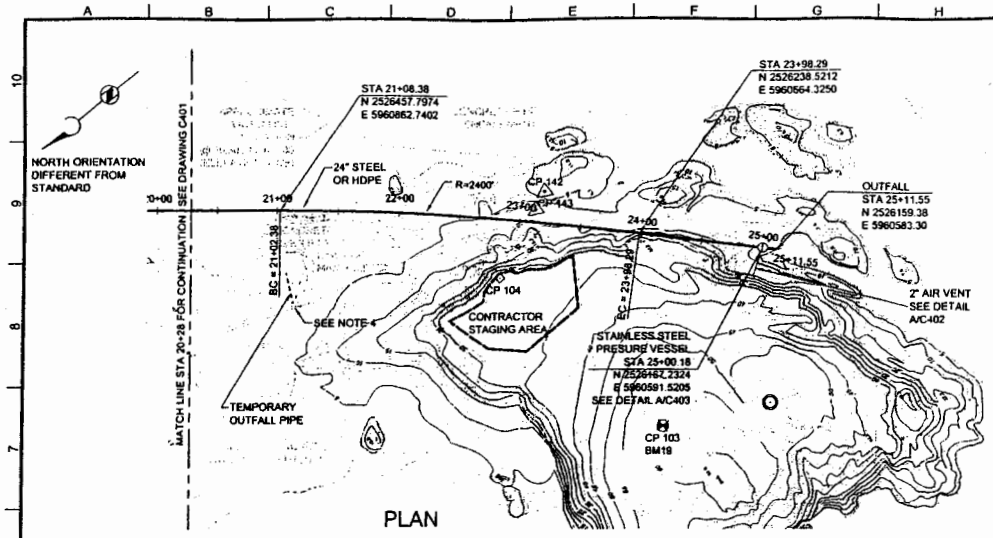
CITY OF CRESCENT CITY — CALIFORNIA

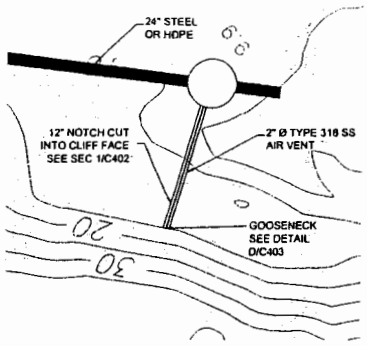
WATER POLLUTION CONTROL FACILITIES
OUTFALL

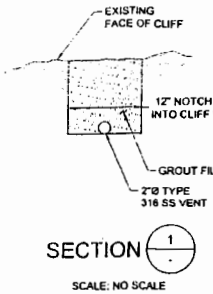
CIVIL
OUTFALL
PLAN AND PROFILE

STATION 0+9.85 TO STATION 20+28

FILENAME: 25204-C-2401.DWG
BC PROJECT NUMBER: 25204
CLIENT PROJECT NUMBER:
DRAWING NUMBER: C401







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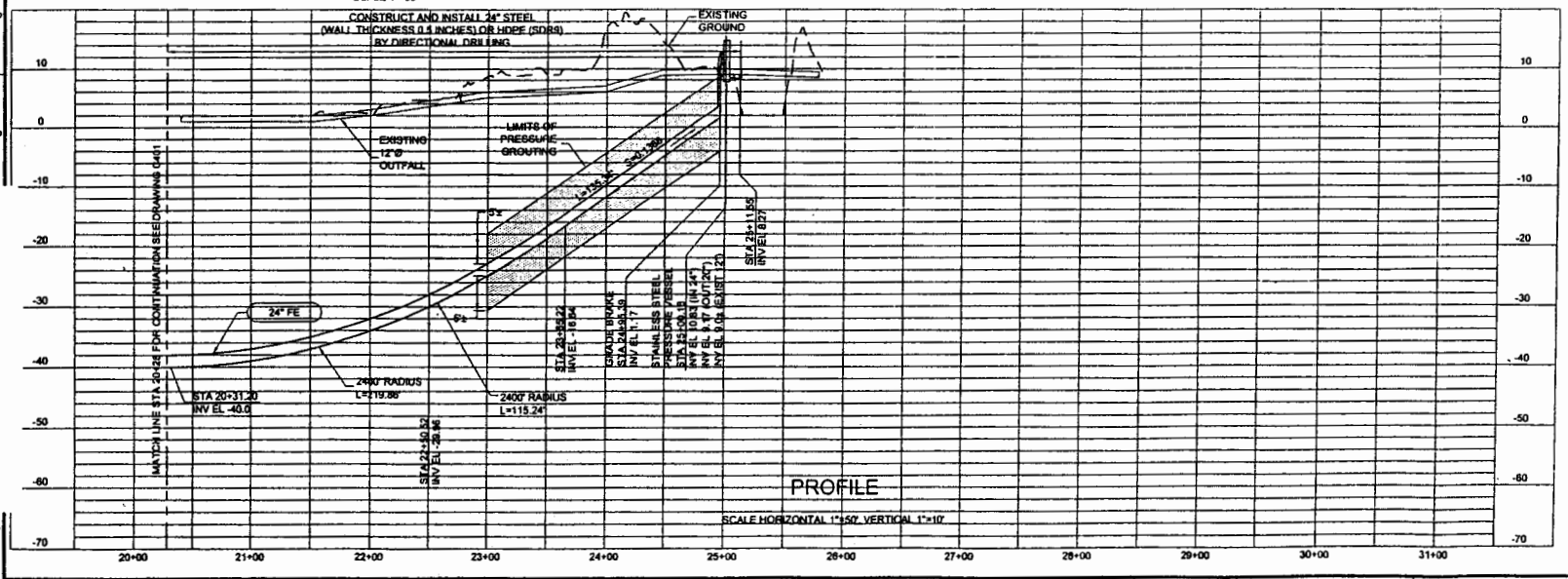
10. PROVIDE TEMPORARY SECURITY FENCE AT BOTH THE ENTRY AND EXIT PITS.

SCALE 1"=50'



LEGEND:

PRESSURE GROUTING

(Page 15 of 18)

BROWN AND CALDWELL
EUGENE, OREGON

SUBMITTED: DATE: 2-3-05
APPROVED: DATE: 2-4-05

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:
DRAWN: MW
CHECKED: CK
CHECKED:
APPROVED: BP

EXTERNAL REFERENCE FILES

REVISIONS

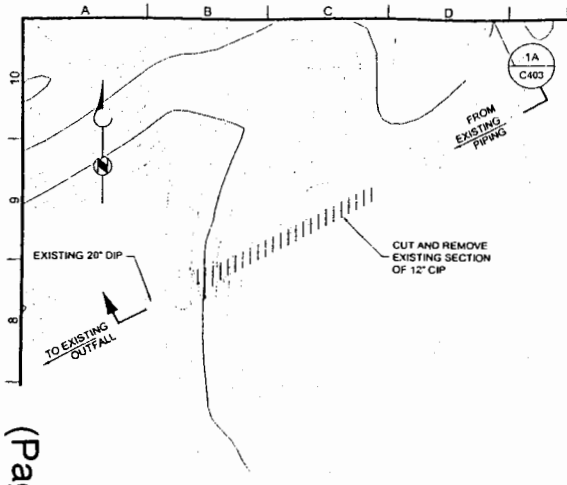
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

CRESCENT CITY, CA

WATER POLLUTION CONTROL FACILITIES
OUTFALL

CIVIL
OUTFALL
PLAN AND PROFILE
STATION 20+28 TO END

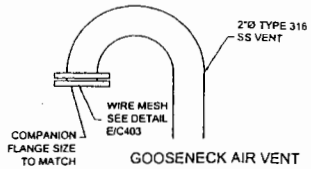
FILENAME	25204-C-2402.DWG
BC PROJECT NUMBER	25204
CLIENT PROJECT NUMBER	
DRAWING NUMBER	C402



DEMOLITION OF EXISTING 20" DIP OUTFALL

DETAIL B / C402

SCALE: 1/4"=1'-0"



GOOSENECK AIR VENT

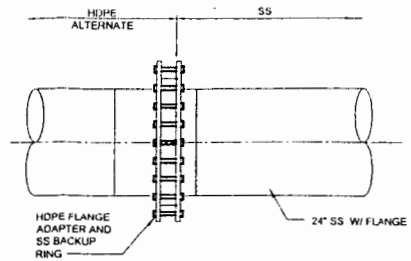
DETAIL D / C402

SCALE: NO SCALE

WIRE MESH

DETAIL E / C403

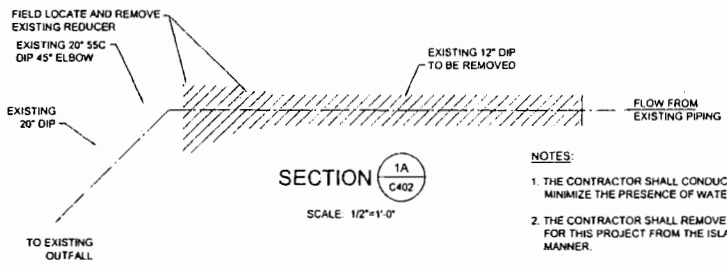
SCALE: NO SCALE



TRANSITION FROM HDPE TO STEEL

DETAIL C / C403

SCALE: NO SCALE

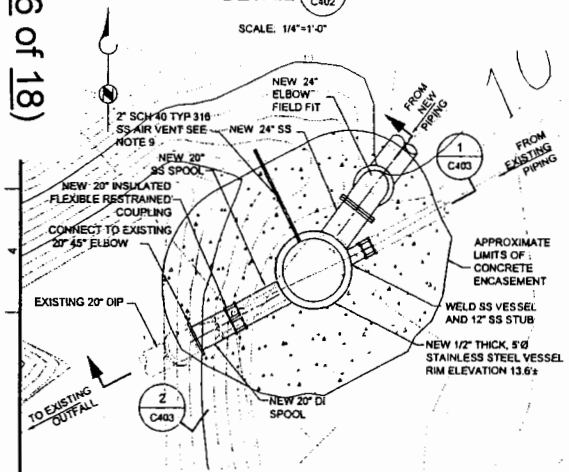


SECTION 1A / C402

SCALE: 1/2"=1'-0"

NOTES:

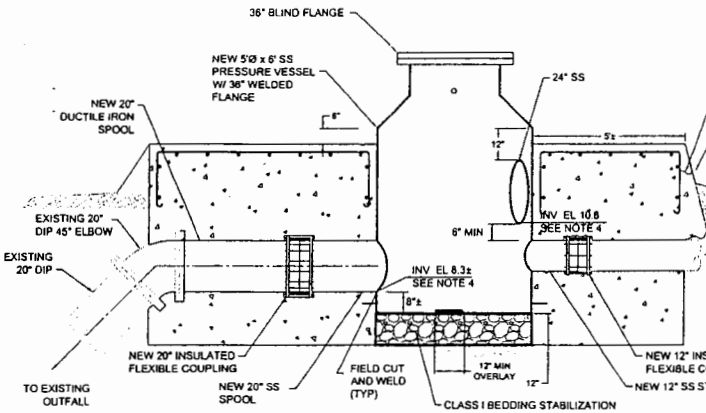
1. THE CONTRACTOR SHALL CONDUCT ALL WORK DURING LOW TIDE TO MINIMIZE THE PRESENCE OF WATER IN THE WORK AREA.
2. THE CONTRACTOR SHALL REMOVE ALL CONCRETE DEBRIS EXCAVATED FOR THIS PROJECT FROM THE ISLAND AND DISPOSE OF IT IN A LEGAL MANNER.
3. THE CONTRACTOR MAY SIDE-CAST EXCAVATED NATIVE ROCK INTO THE OCEAN ADJACENT TO THE ISLAND.
4. THE CONTRACTOR SHALL EXPOSE ALL EXISTING PIPE AND FIELD VERIFY LENGTHS AND ELEVATIONS FOR CONNECTING SYSTEM COMPONENTS.
5. THE CONTRACTOR SHALL BACKFILL THE MANHOLE EXCAVATION ALL AROUND MANHOLE BASE, AND INLET AND OUTLET PIPING WITH CONCRETE.
6. THE CONTRACTOR SHALL INSTALL CONCRETE BACKFILL IN A MANNER TO MINIMIZE THE LOSS OF CONCRETE INTO THE OCEAN.
7. FLEXIBLE COUPLINGS ARE SHOWN FOR FIELD CLOSURES FOR STEEL PIPE INSTALLATION. IF HDPE IS USED, HDPE FLANGE ADAPTERS SHALL BE USED AS SHOWN IN DETAIL C/C403
8. ALL BOLTS ON EXPOSED FLANGES SHALL BE STAINLESS STEEL W/ PLASTIC BOLT SCREWS AND WASHERS BETWEEN BOLT AND FLANGE PLATE. ALL NUTS SHALL BE SILICA BRONZE.
9. AIR VENT SHALL BE ROUTED AND GROUTED TO SIDE CLIFF. LOCATE SCREEN GOOSENECK ABOVE ELEVATION 20.



STAINLESS STEEL PRESSURE VESSEL

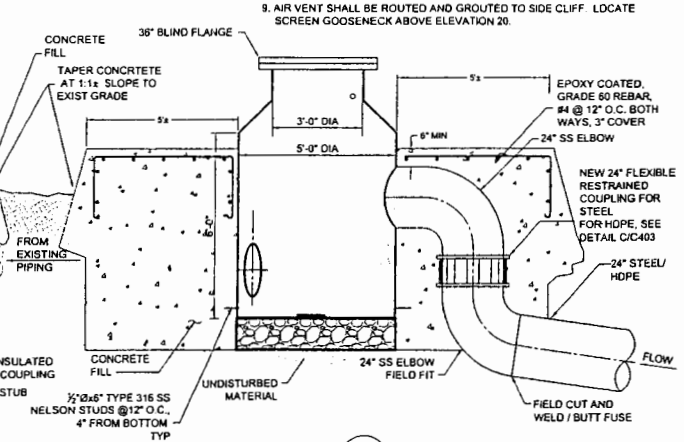
DETAIL A / C402

SCALE: 1/4"=1'-0"



SECTION 1 / C403

SCALE: 1/2"=1'-0"



SECTION 2 / C403

SCALE: 1/2"=1'-0"

BROWN AND CALDWELL

EUGENE, OREGON

SUBMITTED: DATE 2/5/05

APPROVED: DATE 2-4-05

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: BH
DRAWN: AW
CHECKED:
CHECKED:
APPROVED:

EXTERNAL REFERENCE FILES

25204-000-G-1000-OUTFALL.dwg

REGISTERED PROFESSIONAL ENGINEER WILLIAM KARL FASTER No. 28148 Exp 03-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER D. CALDWELL No. C27662 Exp 06-30-06 CIVIL STATE OF CALIFORNIA 2/4/05

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP

CRESCENT CITY, CA

CITY OF CRESCENT CITY CALIFORNIA

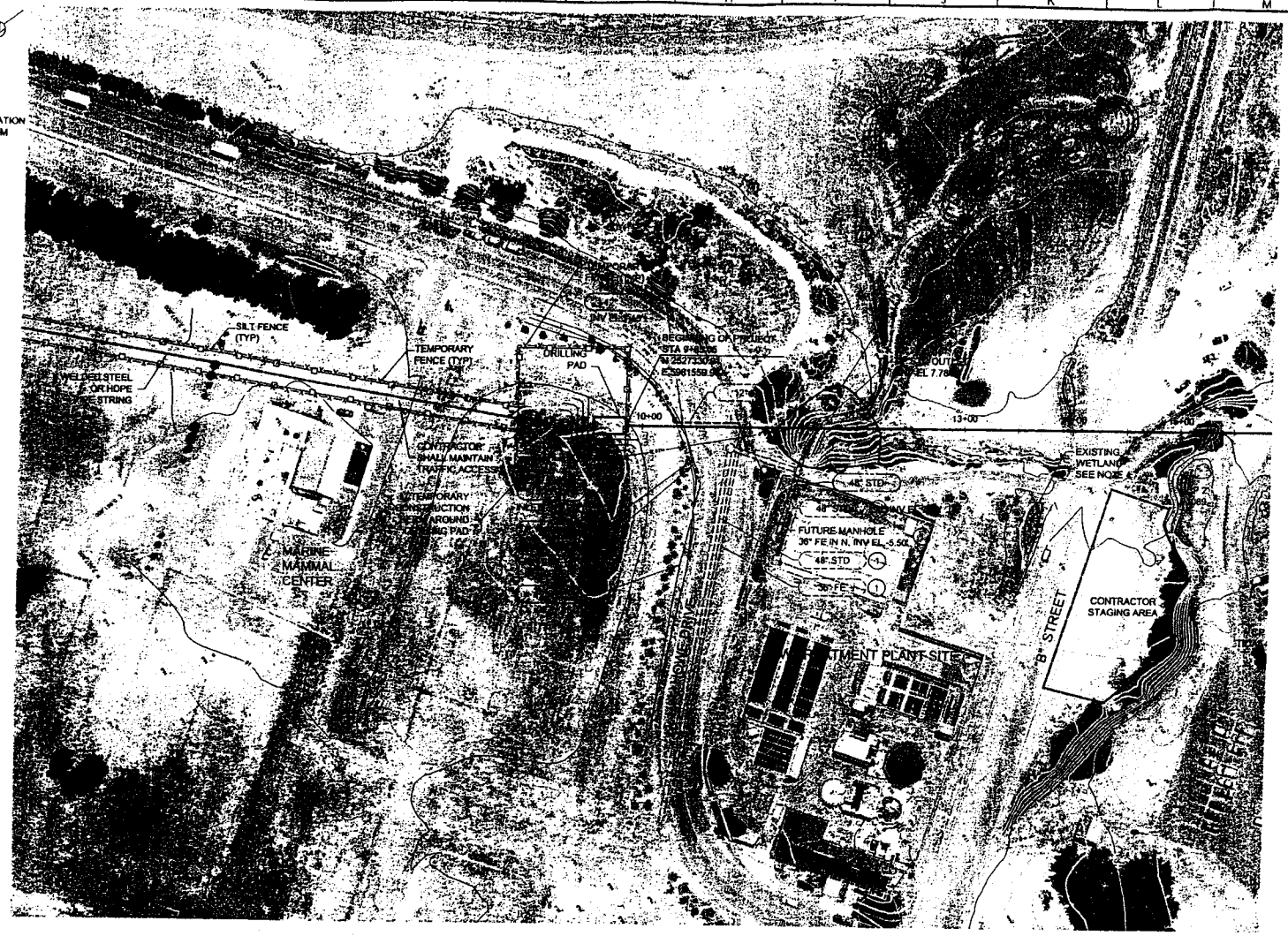
WATER POLLUTION CONTROL FACILITIES OUTFALL

CIVIL

OUTFALL DETAILS

FILENAME: 25204-C-2403.DWG
BC PROJECT NUMBER: 25204
CLIENT PROJECT NUMBER:
DRAWING NUMBER: C403

1206/04



PLAN

SCALE 1"=50'

GENERAL NOTES:

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KEY NOTES:

(1) FUTURE PIPE BY OTHERS.

BROWN AND CALDWELL
EUGENE, OREGON

SUBMITTED: DATE: 2/5/05
APPROVED: DATE: 2-9-05

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED:
DRAWN: AW
CHECKED: CK
CHECKED:
APPROVED: BF

EXTERNAL REFERENCE FILES

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP

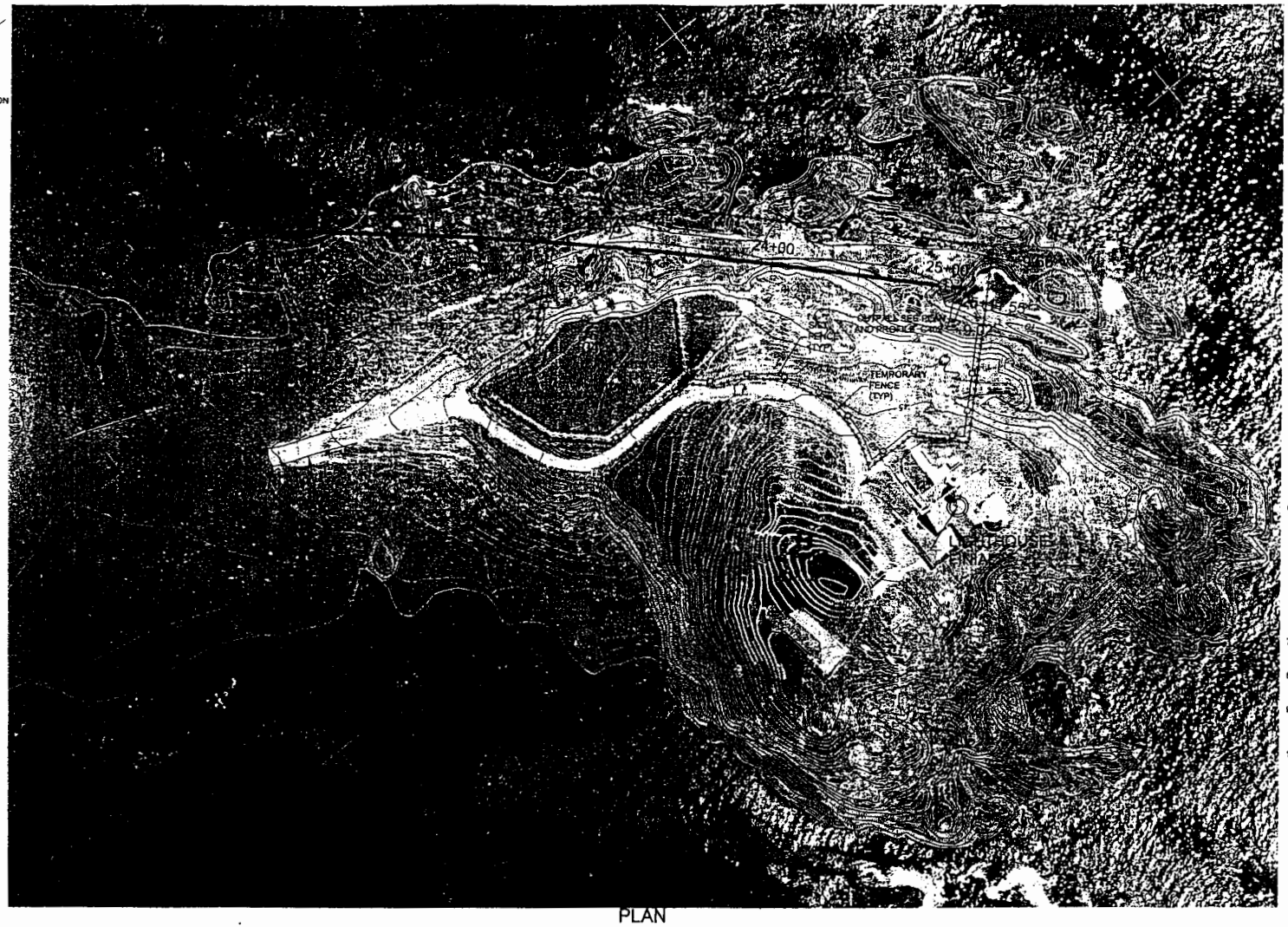
CRESCENT CITY, CA

WATER POLLUTION CONTROL FACILITIES OUTFALL

CIVIL

OUTFALL CONSTRUCTION STAGING AREA 1 OF 2

FILENAME 25204-C-2404.DWG
BC PROJECT NUMBER 25204
CLIENT PROJECT NUMBER
DRAWING NUMBER C404



PLAN

SCALE 1"=30'

GENERAL NOTES:

1. ALL ELEVATIONS AND COORDINATE VALUES SHOWN ARE BASED ON NAVD 88 AND CALIFORNIA COORDINATE SYSTEM. COORDINATES SHOWN ARE LOCATED AT THE CENTER OR CORNER POINT ON STRUCTURES AND AT THE CENTERLINE OF PIPES.

   CONTROL IS BASED ON THE FOLLOWING CONTROL STATIONS. LV0122 ("TIDAL 8"), LV0120 ("P 1089"), LV0119 ("Q 1089"), LV0121 ("R 1089"), LV0123 ("V 1089"), LV0124 ("BM19"), AND LV1105 ("CRESCENT CITY LIGHTHOUSE"). THE REFERENCE BENCHMARKS FOR THIS PROJECT ARE LISTED ON SHEET G1.

   REPORTED TIDAL VARIATIONS ARE AS FOLLOWS:

CONDITION	HEIGHT, FEET
EXTREME HIGH WATER (EHW)	10.7
MEAN HIGHER HIGH WATER (MHHW)	6.9
MEAN LOWER LOW WATER (MLLW)	0.0

2. THE LOCATION OF EXISTING UNDERGROUND PIPES AND ELECTRICAL CONDUITS ARE SHOWN BASED ON THE BEST INFORMATION AVAILABLE. NO EXPLORATORY EXCAVATION HAS BEEN DONE TO VERIFY THE EXACT LOCATIONS. EXCAVATE AND LOCATE EXISTING PIPES AND ELECTRICAL CONDUITS PRIOR TO BEGINNING WORK IN AN AREA AND VERIFY THEIR LOCATION RELATIVE TO THE PLANS. THIS SHALL BE DONE IN ADVANCE OF THE WORK TO PROVIDE ADEQUATE TIME TO MAKE CHANGES TO THE WORK IF NECESSARY.
3. WORK HOURS SHALL BE LIMITED TO DAYTIME WEEKDAY HOURS OF 7:30 AM TO 5:30 PM AND SATURDAY HOURS OF 8:00 AM TO 4:00 PM. ANY CONSTRUCTION ACTIVITIES BEYOND THESE HOURS SHALL BE FIRST APPROVED BY THE CITY.
4. CONTRACTOR SHALL PROTECT WETLAND AND WETLAND HABITAT DURING CONSTRUCTION.
5. OWNER HAS AGREED TO PROVIDE WATER TO WITHIN 100 FEET OF THE STAGING AREA ON THE ISLAND. CONTRACTOR SHALL BE RESPONSIBLE FOR TYING INTO THE SOURCE WITH PROPER BACKFLOW PREVENTION TO PREVENT CONTAMINATION. OWNER SHALL REGULATE THE WATER ALLOWED TO THE CONTRACTOR AT HIS OWN DISCRETION.
6. CONTRACTOR SHALL MINIMIZE TRAFFIC TO THE ISLAND TO PREVENT EROSION OF THE SUBMERGED PATHWAY. THE STAGING AREA ON THE ISLAND SHALL BE LIMITED TO STORAGE OF PRESSURE GROUTING EQUIPMENT, STAINLESS STEEL PRESSURE VESSEL, TEMPORARY TANK FOR STORAGE OF CONSTRUCTION WATER, AGGREGATE AND BAGGED CEMENT, EPOXY-COATED REBAR, CONCRETE MIXER FOR ON-SITE MIXING OF CONCRETE FOR PRESSURE VESSEL ENCASEMENT, AND APPURTENANCES RELATED TO THE OUTFALL TIE-IN. NO PIPE SHALL BE STORED AT THE ISLAND STAGING AREA WITHOUT PRIOR APPROVAL BY THE CONSTRUCTION MANAGER.
7. CONTRACTOR SHALL REFER TO SPECIFICATIONS FOR PERMIT REQUIREMENTS.
8. THE CONTRACTOR DOES NOT HAVE SOLE USE OF THE WORK AREAS SHOWN AT THE ENTRANCE AND EXIT PITS.
9. FINAL LOCATION AND CONFIGURATION OF WORK AREAS AND PITS SHALL BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE OWNER.
10. PROVIDE TEMPORARY SECURITY FENCE AT BOTH THE ENTRY AND EXIT PITS

BROWN AND CALDWELL
EUGENE, OREGON

SUBMITTED: DATE 2/5/05
APPROVED: DATE 2-8-05

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2", SCALE ACCORDINGLY)

DESIGNED:
DRAWN: AW
CHECKED: CK
CHECKED:
APPROVED: RF

EXTERNAL REFERENCE FILES

REGISTERED PROFESSIONAL ENGINEER WILLIAM KARL FAHEY No. 29146 Exp 03-31-07 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER D. CHRISTOPHER CLARK No. C57682 Exp 06-30-06 CIVIL STATE OF CALIFORNIA 4/4/05

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP

CRESCENT CITY, CA

CITY OF CRESCENT CITY CALIFORNIA

WATER POLLUTION CONTROL FACILITIES
OUTFALL

CIVIL
OUTFALL
OUTFALL STAGING AREA
2 OF 2

FILENAME	25204-C 2405.DWG
BC PROJECT NUMBER	25204
CLIENT PROJECT NUMBER	
DRAWING NUMBER	C405

SECTION 03601

PERMEATION GROUTING

EXHIBIT NO. 5
APPLICATION NO.
1-05-003
Excerpt, Drilling Muds Pollution Prevention & Horizontal Directional Drilling Environmental Controls Plan
(Page 1 of 13)

PART 1--GENERAL

1.01 SUMMARY

A. This Section specifies the installation of the pressure grouting to be installed along the pipeline alignment. The pressure grouting shall be completed before the directional drilling specified in Section 02400 begins.

B. Prior to grouting, holes to be grouted shall be drilled along the alignment of the pipeline at the location shown on the drawings.

C. Contractor shall make a "best effort" attempt to grout a 10-foot diameter around the anticipated pipeline alignment at the pipe depths stated in the drawings to prevent hydrofracture.

D. Contractor's work shall not damage the existing pipeline with grouting operations.

1.02 SUBMITTALS

A. Contractor shall submit a permeation grouting plan detailing the means and methods of how the existing soil will be stabilized (i.e., a detailed plan and procedure including permeation grout mix design, permeation grout injection layout and staging, permeation grout injection pressures and permeation grout injection termination criteria), grout admixtures, cleaning and recycling equipment, estimated flow rates and pressure, estimated grout quantities, methods for containing grout escape, and procedures for minimizing grout escape.

PART 2—PRODUCTS

2.01 MATERIALS

A. CEMENT:

Portland cement shall be ASTM C150, Type II or Type V, low alkali, containing less than 0.60 percent alkalies.

B. ADMIXTURES:

1. GENERAL: Admixtures shall be compatible with the grout. Calcium chloride or admixtures containing calcium chloride are not acceptable. Admixtures shall be used in accordance with the manufacturer's recommendations and shall be added separately to the grout mix.

2. WATER REDUCING RETARDER: Water reducing retarder shall be ASTM C494 Type D and shall be Master Builders Pozzolith 300-R, Sika Corporation Plastiment, or equal.

3. LUBRICANT FOR CEMENT PRESSURE GROUTING: Lubricant additive for cement pressure grouting shall be Intrusion Prepakt Intrusion Aid, Sika Intraplast N, or equal.

C. WATER:

Water for mixing shall be free from oil and deleterious amounts of acids, alkalies, and organic materials; shall not contain more than 1000 mg/1 of chlorides as Cl, nor more than 1300 mg/1 of sulfates as SO_4; and shall not contain an amount of impurities that may cause a change of more than 25 percent in the setting time of the cement nor a reduction of more than 5 percent in the compressive strength of the grout at 14 days when compared with the result obtained with distilled water.

2.02 GROUT

A. CEMENT GROUT:

Cement grout shall be a mixture of one part cement, two parts sand, proportioned by volume, admixtures for pressure grouting, and sufficient water to form a workable mix.

2.03 PRESSURE GROUTING EQUIPMENT

Pressure grouting equipment shall include a mixer and holdover agitator tanks and shall be designed to place grout at pressures up to 50 psi. Gages shall be provided to indicate pressure used. The mixer shall be provided with a meter capable of indicating to one-tenth of a cubic foot the volume of grout used.

2.04 PRODUCT DATA

The following information shall be provided in accordance with Section 01300.

A. MANUFACTURER'S DATA:

Manufacturer's data shall be provided for the following:

1. Cement grout

B. LABORATORY TEST REPORTS:

Test reports on previously tested materials shall be accompanied by the manufacturer's statement that the previously tested material is the same type, quality, manufacture, and make as that proposed for use in this project. Test reports are required for the following:

1. Cement

PART 3--EXECUTION

3.01 GENERAL

A. Grouting, once commenced, shall be completed without stoppage. In case of breakdown of equipment, Contractor shall wash out the grouting system sufficiently to ensure fresh grout and adequate bond and penetration will occur upon restarting the grouting operation.

B. Grout pressure shall be maintained until grout has set.

C. Contractor shall inject fast setting grout and Portland cement grout into the existing soil along the new pipeline alignment to provide a stable work area that prevents hydrofracture of the horizontal directionally drilled (HDD) drilling fluid. As much as possible given site topographic limitations, injection shall be installed in rows offset from the HDD centerline, previously established by Contractor, so that the injection points are along of the future pipeline route. Where space permits, a minimum of two (2) injections per row is required. Depth of these injections shall be equal to or less than 1 foot from the bottom of the zone to be grouted. Injection points shall be no more than ten (10) feet apart. Split spacing of the injection points may be used by the Contractor to achieve an even grout installation.

D. Installation of injection casings of a minimum 1-inch diameter shall be installed by pneumatic means. Drilling mud shall not be used to install injection casings. Staging of the grout injection shall be in an ascending direction (bottom to top) at 6- to 12-inch intervals. Grout volume pumped at each stage must be calculated in advance by the Contractor to reflect the staging interval and porosity of the grouted area.

E. Contractor will utilize drilling tools and grout procedures which will minimize the unintentional discharge of any drill fluids and grout. Contractor will comply with all mitigation measures listed in the required permits and elsewhere in these Specifications.

F. Contractor will regulate the pressure and flow of grout and conduct his drilling and grouting operations in such a manner that grout is not forced to the ground surface or surface waters.

3.02 COMPLETION REPORT

A. Grout quantities shall be recorded and provided to Construction Manager upon completion of the grouting.

3.03 PAYMENT

A. All costs for permeation grouting and monitoring shall be deemed included in the various other items of work, and no additional compensation will be allowed therefor.

END OF SECTION

SECTION 01560

ENVIRONMENTAL CONTROLS FOR HORIZONTAL DIRECTIONAL DRILLING

PART 1--GENERAL

1.01 SUMMARY

This section specifies environmental mitigation and temporary environmental controls required to be maintained during all outfall construction.

1.02 SUBMITTALS

A. Procedures: Section 01300.

B. Environmental Mitigation Plan:

1. Develop and maintain for the duration of Work an Environmental Mitigation Plan which will effectively incorporate and implement all required environmental protection precautions.

2. Appoint an employee who is qualified and authorized to supervise and enforce compliance with the Environmental Mitigation Plan. Ensure that all necessary pollution control equipment, supplies, or materials are available to implement the Plan.

C. Inadvertent Drilling Fluid Returns Plan.

D. Inadvertent Drilling Fluid Return After-Action Summary Report.

1.03 INADVERTENT DRILLING FLUID RETURN HANDLING, CLEANUP, AND DISPOSAL

A. Contractor and its subcontractors shall perform all handling, control, containment, and removal of inadvertent drilling fluid returns.

B. Contractor and subcontractors shall have and maintain current identification numbers, licenses, permits, and other governmental approvals or authorizations required by all applicable environmental law, implementing regulations, and governmental orders, permits, licenses, approvals, and authorizations.

C. The setup and all return handling, control, containment, and removal shall meet all applicable regulatory permit requirements.

D. All waste associated with the containment, control, and removal shall be disposed of in conformance with State and Federal regulations.

E. An example "Drilling Fluid Release Monitoring Plan" is included as an Appendix to the Contract Manual. The plan outlines the expected level of detail required for the Contractor's plan including: training, monitoring of HDD operations, monitoring equipment, release monitoring, HDD drilled fluid clean-up, bore operations and procedures, response equipment, field response to bentonite release occurrence, response to closeout procedures, bore abandonment, and MSDS sheets for lost circulation materials.

F. Submit a plan for control and monitoring of the drilling fluid, and containment, and removal of inadvertent drilling fluid returns during drilling, cleanup, and disposal (the Plan) conforming to the level of detail outlined in the example "Drilling Fluid Release Monitoring Plan". The submitted plan shall present the Contractor's approach to the HDD operations, drilling fluid monitoring, containment, and control, and procedures for minimizing inadvertent drilling fluid returns during drilling, and procedures for inadvertent drilling fluid cleanup and disposal, proposed equipment, and MSDS sheets for proposed drilling fluid materials.

1. Develop and maintain for the duration of the HDD operations a plan to control, monitor, contain, remove, and dispose of inadvertent drilling fluid returns.

2. The Plan shall specifically address each requirement of Paragraph 01560-3.05, and shall include as a minimum:

   a. Summary of applicable cleanup standards and requirements.

   b. Summary of applicable reporting and regulatory permit requirements.

   c. List of materials, including quantity of each material, to be used to contain, control, and remove inadvertent drilling fluid returns.

   d. Strategy and options for achieving cleanup and disposal standards and requirements.

   e. Strategy and options for containment, control, and removal of inadvertent returns during drilling.

F. Inadvertent Drilling Fluid Return After-Action Summary Report:

1. Within 24 hours of start of inadvertent drilling fluid return, prepare and submit detailing the following:

   a. The nature of the incident.
   b. The control and containment measures taken.
   c. The cleanup and inadvertent return removal actions taken.
   d. Data documenting the effectiveness of the cleanup.
   e. Summary of the quantity of fluids required to be removed.

PART 2--PRODUCTS

NOT USED

PART 3--EXECUTION

3.01 SITE MAINTENANCE

A. Keep the work site, including staging areas and Contractors' facilities, clean, neat, and free from rubbish and debris. Remove materials and equipment from the site when they are no longer necessary. Upon completion of the work and before request for inspection, clear the work site of equipment, unused materials, and rubbish to present a clean and neat appearance.

B. Do not allow waste material to remain on the site of the work or on adjacent streets. Collect, carry off the site, and legally dispose of such materials daily, weekly, or as otherwise directed by the Owner's Representative. Be responsible for obtaining necessary permits or approval for Contractor's legal disposal sites.

C. All discarded and unused pipe materials shall be disposed in conformance with State and Federal regulations.

C. In the event that waste material, refuse, debris, and rubbish are not removed from the work site, Owner reserves the right to have the waste material, refuse, debris, and rubbish removed. The cost of removal and disposal will be withheld from the Contractor Application for Payment.

D. Handle paints, solvents, and other construction materials with care to prevent entry of contaminants into storm drains, surface waters, or soils.

E. Do not allow drilling fluid spillage into soils outside entrance and exit pits of borehole. Drilling fluid containment pits shall be lined and shall be removed after pipeline installation is complete. All drilling fluid shall be removed and disposed of at a legal disposal site after drilling work is completed.

F. Unless specified otherwise, restore ground surface to its pre-construction condition.

3.02 STREET CLEANING

A. Use sealed trucks for the removal of all contaminated or flowing, running spoils from the construction site.

B. Prevent dirt and dust from escaping trucks departing the work site by covering dusty loads, washing truck tires before leaving the site, using crushed rock at entrances, or other reasonable methods.

C. When working dump trucks and other equipment on paved streets and roadways, clean the streets no later than at the end of each day's operations and at such interim periods as required. Clean the area using a power washing truck or vacuum broom. Cleaning equipment shall be available 24 hours per day, while hauling is being done.

D. All streets in the construction area used by Contractor's trucks or any other equipment hauling material to and from the work area, whether within the Contract limits or adjacent thereto, shall be kept clean and shall be continuously serviced by Contractor using sprinkling trucks to control dust.

E. Contractors' violations of the above requirements are sufficient grounds for the Owner's Representative to order the streets in question to be cleaned by others with all cost of cleaning, removal, and disposal withheld from the Contractor Application for Payment.

F. No solid material or soils shall be flushed into catch basins.

3.03 NOT USED

3.04 MONITORING OF DRILLING AND DRILLING FLUID

A. Employ best efforts to monitor drilling operations and contain and monitor drilling fluids.

B. Contractor shall provide a boat and crew to the Construction Manager for the monitoring operation. The boat and crew shall be as described in the example plan in the Appendix.

3.05 CONTROL OF INADVERTENT DRILLING FLUID RETURNS

A. Employ best efforts to maintain full annular circulation of drilling fluids.

B. Drilling fluid returns at locations other than the borehole entry and exit points shall be minimized.

C. In the event that annular circulation is lost, all steps shall be taken to restore circulation and prevent inadvertent drilling fluid returns.

D. If inadvertent drilling fluid returns occur, immediately collect the drilling fluid to prevent the flow of any drilling fluid from reaching streams, wetlands, the ocean, or any waterway.

E. Not Used

F. Implementation of control and containment of inadvertent returns shall be immediate after discovery. Additional personnel shall be required to monitor and maintain all containment control and removal of inadvertent returns while other Contractor personnel continue to search for additional locations of inadvertent drilling fluid returns.

G. Drilling may be suspended by the Owner or the permitting agency if:

1. Drilling fluid has surfaced within a waterway along the drilling route.

2. Drilling fluid that has surfaced outside a waterway upstream or downstream of the diverted stream flow and cannot be contained or controlled and drilling fluid may enter the waterway.

H. If drilling is suspended by Owner or the permitting agency, drilling shall not resume until adequate measures to contain and control drilling fluid are in place to prevent the entrance of drilling fluids in any waterway or wetland.

I. Owner's Representative shall be informed immediately by radio and confirmed in writing if any inadvertent returns are discovered.

J. Notify Owner's Representative immediately if annular circulation of drilling fluids is lost.

K. At the completion of all HDD operations, all inadvertent returns shall be removed from the site and disposed of at a legal disposal site.

3.06 AIR POLLUTION CONTROL

A. Do not discharge smoke, dust, and other contaminants into the atmosphere that violate the regulations of legally constituted authorities.

B. Do not allow internal combustion engines to idle for prolonged periods of time.

C. Maintain construction vehicles and equipment in good repair. When exhaust emissions are determined to be excessive, repair or replace equipment.

D. Use electrically-powered equipment where practical.

E. Minimize dust nuisance by cleaning, sweeping, and sprinkling with water, or other means. The use of water, in amounts which result in mud on public streets or run-off to adjacent surface water, is prohibited as a substitute for sweeping or other methods. Make equipment for this operation available at all times.

3.07 NOISE CONTROL

A. Noisy operations shall be scheduled to minimize their duration.

B. Not Used

C. Each internal combustion engine shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated without said muffler.

D. Use electric or hydraulic tools whenever practical to reduce noise.

E. Contractor has access to construction site 24 hours per day. Except as otherwise allowed herein, Contractor is required to limit all noise associated with this work to daytime, weekday (non-holiday) hours of 7:30 am and 5:30 pm, and Saturday hours of 8:00 am to 4:00 pm.

3.08 LIGHTING CONTROL

A. Minimize the quantity of illumination outside construction areas between the hours of 9:00 p.m. and 7:00 a.m.

B. Provide focused lighting for the construction site.

3.09 VIBRATION CONTROL AND SETTLEMENT CONTROL

A. Coordinate construction activities with business and school operations within the work corridor to minimize the affect of the construction activities and resulting vibrations.

3.10 NOT USED

3.11 DEWATERING AND WATER CONTROL

A. Do not divert storm drainage or sewer flow through any portion of the new outfall.

B. Maintain excavations free from water while construction is in progress. Keep trenches and other areas free from water as required to permit continuous progress of, or to prevent damage to the work or the work of others.

3.12 WATER QUALITY PROTECTION AND STORMWATER CONTROL

A. Conform to the regulations and requirements of legally authorized surface water management agencies.

B. If permit conditions are violated, shut down work causing the violation until protection and remediation is completed. Be responsible for all associated impacts.

C. Be responsible for the overflow of any storm drains resulting from the addition of flow from Contractor's activities and any damages associated with such overflow.

D. Conduct operations in such a manner as to prevent sediment, drilling fluids, construction equipment wash water, and other pollutants from reaching existing sewers, storm drains, wetlands, and surface waters.

E. Not Used

F. Erosion and sedimentation control measures shall be in place prior to any clearing or grading activity.

G. Disturbed areas and spoil piles shall be covered, bermed, or otherwise secured when runoff from rain is or would likely cause turbid water to enter local water bodies.

H. Work shall be suspended if it cannot be performed without causing turbid runoff to leave the construction area or enter local water bodies.

I. Inspect, maintain, and repair all BMPs on a regular basis to assure continued performance of their intended function.

J. Inspect all on-site erosion and sediment control measures at least once every seven days and within 24 hours after any storm event of greater than 0.5 inches of rain per 24 hour period.

K. Prevent additional construction wastes (e.g., paper, wood, garbage, sanitary wastes, fertilizer) from leaving the site and entering waterways.

L. Dispose of all debris on land in such a manner that it cannot enter a waterway or cause water quality degradation and in accordance with applicable local, state, and federal regulations.

3.13 OIL SPILL PREVENTION AND CONTROL

A. Prevent, contain, and clean the spilling of oil, fuel, and other petroleum products used. Discharge of oil from equipment or facilities into state waters or onto adjacent land is not permitted and violates state water quality regulations.

B. At a minimum, perform the following measures regarding oil spill prevention, containment, and clean-up:

1. Inspect fuel hoses, lubrication equipment, hydraulically-operated equipment, oil drums, and other equipment and facilities regularly for drips, leaks, or signs of damage, and maintain and store properly to prevent spills.

2. Dike or locate all land-based oil, fuel, and product storage tanks so as to prevent spills from escaping into the water. Line dikes and subsoils with impervious material to prevent oil from seeping through the ground and dikes.

3. Immediately contain all visible floating oils with booms, dikes, or other appropriate means and remove the oil from the water prior to discharge into state waters. Immediately contain all visible oils on land using dikes, straw bales, or other appropriate means and remove using sand, ground clay, sawdust, or other absorbent material, and properly dispose of waste materials. Temporarily store waste materials in drums or other leak-proof containers after clean-up and during transport to disposal. Dispose of waste materials off property at a legal site.

4. In the event of any oil or product discharges into public waters, or onto land with a potential for entry into public waters, immediately notify the following agencies at their listed 24-hour response numbers:
   a. USCG Marine Safety Office: 415/399-3547

5. As a minimum, maintain at each work site, and restock as necessary to ensure an adequate and continuous supply, the following materials:
   a. Oil-absorbent booms: 4 each, 5 feet long
   b. Oil-absorbent pads or bulk material, adequate for coverage of 200 square feet of surface area
   c. Oil-skimming system, if appropriate
   d. Hay bales
   e. Oil dryall, gloves and plastic bags
   f. Oil absorbent material, such as kitty litter or sawdust, for material spills on land

6. Maintain proper security to discourage vandalism.

C. Refuel and maintain construction equipment and vehicles a minimum of 100 feet from all waterways, creeks, and wetlands. Service and maintain equipment in designated areas where stormwater runoff can be prevented from entering the storm drainage system and ocean.

3.14 FINES

A. Be responsible for all fines incurred from non-compliance in accordance with applicable local, state and federal regulations.

3.15 WETLAND PROTECTION

A. Limit extent of disturbance near surface waters and wetlands.

B. Use BMPs (Best Management Practice) to protect the wetlands from sedimentation or storm water impacts associated with construction activities.

C. Do not deposit excavated materials into any waterways, creeks, or wetland areas.

D. If stockpiled, store and cover excavated materials at least 100 feet from any creek or wetland to avoid the likelihood of sedimentation.

E. No construction equipment is to enter the waterways, wetlands or oceans.

END OF SECTION

CRESCENT CITY WASTEWATER OUTFALL BIOLOGICAL MONITORING PROGRAM

CRESCENT CITY, CALIFORNIA

FINAL REPORT
OCTOBER 2003

Prepared for:

BROWN AND CALDWELL

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EXHIBIT NO. 6
APPLICATION NO.
1-04-042
Excerpt, Outfall Biological Monitoring Program
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EXECUTIVE SUMMARY

From September 2002 through August 2003, three sampling events occurred to assess the overall community structure and species composition of the study and control sites. The site of primary interest is located at Crescent City Battery Point Lighthouse, where treated wastewater is discharged following secondary treatment through an outfall into a surge channel that traverses the rocky intertidal zone. Enderts Beach control site was chosen because it is in the same geographic proximity and is similar in elevation and topography to the discharge site.

The number of samples obtained (30 at each site) during the three sampling episodes was sufficient to capture about 90% of the plant and animal species likely to be obtained at the outfall site. Similarly, 88% of species likely to be encountered were identified at the control site. Visual inspection of the field sites did not indicate the presence of species (mostly marine algae) known to flourish under nutrient enriched conditions. An examination of data using ordination and clustering techniques indicated that the two sites exhibit some differences. Dissimilarity appeared to increase between sites when abundance of species was taken into account using transformed data. Statistical analyses indicated that the two sites are significantly different. It is not clear from the data collected why they are different.

BACKGROUND

The wastewater treatment facility that serves the Crescent City community currently discharges a daily average of between 1.5 and 1.7 million gallons per day of secondary treated sewage effluent into the rocky intertidal region at Battery Point Lighthouse, on the west side of the city.

Since 1994, the wastewater treatment facility has been operated at capacity, particularly during the winter months with the influx of winter storm runoff. The city is in the process of completing plans to build a new treatment facility that can better serve the community (Zabinsky 2002). A new facility will continue to use the existing outfall and possibly increase the amount of effluent as growth occurs in the community.

The purpose of this study is to determine how the rocky intertidal biota near the discharge pipe is being influenced by treated effluent introduced into a subtidal surge channel on the south side of Battery Point Lighthouse.

The Study Area

The outfall is located at Battery Point below the lighthouse (latitude N 41° 44.632' longitude W 124° 12.162'). Effluent is discharged in a modified surge channel at approximately 10 feet below MLLW in the base of the rock. The surge channel faces the direction of prevailing wave impact, which results in intense wave activity. This allows for frequent agitation and mixing of the effluent into the receiving waters. The pipeline, which runs from the wastewater treatment plant to the outfall, is covered by concrete, resulting in an intertidal bench that is relatively flat and rough in texture. This bench is located just to the south of the surge channel.

Enderts Beach is located approximately 4.3 miles south of Battery Point Lighthouse, within Redwood National Park (latitude N 41° 42.27', longitude W 124° 08.66'). This site is similar in micro-topography to Battery Point Lighthouse, with rocky benches present at approximately the same intertidal elevation. Horizontal surfaces support an intertidal community similar to Battery Point Lighthouse, a necessary condition at the control site for comparison purposes.

Three sampling episodes took place over the study period. Both sites were examined twice in late summer/early fall (September 2002, August 2003) and once in the spring (April 2003). The sampling procedures described below were followed during each sampling event.

FIELD AND LABORATORY METHODS

The total sampling area at each site encompassed 25 m^2. Using a random number table and an established grid of 0.25 m^2 squares, thirty sampling points were selected and examined at each site. A 0.25 m^2 sampling quadrat was placed on the rock and populations of invertebrates and algae were identified and enumerated within the area of each sampling quadrat.

Any organisms that were unidentifiable in the field were returned to the lab at Humboldt State University for identification. Samples were kept in seawater and identified immediately so that preservation was not necessary.

Identifications of invertebrate specimens were made with the use of *Light's Manual: Intertidal Invertebrates of the Central California Coast* (Smith and Carlton 1975) and *Marine Invertebrates of the Pacific Northwest* (Kozloff 1987). Algae specimens were identified using *Keys to the Benthic Marine Algae and Seagrasses of British Columbia, Southeast Alaska, Washington and Oregon* (Gabrielson *et al.* 2000) and *Marine Algae of California* (Abbott and Hollenberg 1976).

Quadrat data were entered into a spreadsheet software program, and then converted to Lotus123 format. Spreadsheets were imported in to the statistical software package PC-Ord. Data were examined using a Bray-Curtis ordination technique, which utilized the Relative Sorenson's distance measure. This analytical method has been widely used to compare and contrast different terrestrial and marine benthic communities. A clustering procedure, which developed dendrogram graphs, was used as an alternative approach to this type of analysis.

A Multi-response Permutation Procedures (MRPP) comparison was applied to the data from the two sites to determine if differences or similarities detected using the ordination and cluster analysis were statistically significant. This is a non-parametric procedure that examines the probability that the data collected from the two sites is similar or dissimilar.

An analysis of each technique described above was conducted for the original, raw data collected. They were then applied to data indicating presence-absence only, to examine similarities or differences of species occurrence, without taking abundance into account. Finally, these analyses were performed on transformed [log (x +1)] data to reduce the influence of very abundant species, such as *Semibalanus cariosus,* on less abundant species, such as those with single individual.

RESULTS

Descriptive Analysis

At Battery Point Lighthouse, the first sampling event (September 2002) included 21 species and 45,390 individuals. Twenty-three species and 78,921 individuals were enumerated at this site during the second sampling event (April 2003). During the third sampling event (August 2003), 24 species and 74,030 individuals were observed. Overall, 32 different species were identified at this location and a combined total of 198,344 individuals were encountered.

At the Enderts Beach rock benches, 12 species and 79,220 individuals were sampled during the first event. The second sampling event resulted in the observation of 23 species and 149,051 individuals. Eighteen species and 95,460 individuals were found during the third sampling event. The total number of species identified during the entire sampling interval was 30 and a total of 323,730 individuals were encountered. Figure 2 and Figure 2 show the patterns of occurrence and abundance at each site over all three sampling periods.

Each sampling event at both sites exhibited slight variations in species abundance (Table 1). At both sites and in all sampling events, the most abundant species was the barnacle *S. cariosus*.

At Battery Point Lighthouse, the mussel, *Mytilus californianus*, was replaced as the second most abundant species, only in the spring, by the red alga *Endocladia muricata*. Other highly abundant species at this location included the anemone *Anthopleura xanthogrammica*, the goose barnacle *Pollicipes polymerus*, and the red algae *Neorhodomela larix* and *Microcladia borealis*.

At the Enderts Beach control site, *M. californianus* was replaced as the second most abundant species in the summer of 2003, by the limpet *Collisella digitalis*. *P. polymerus* was also consistently found to be one of the five most abundant species. Other highly abundant species at this site included the limpet *Notoacmea fenestrata*, the anemones *A. xanthogrammica*, *Anthopleura elegantissima*, and the carnivorous snail *Nucella emarginata*.

An examination of lognormal distribution of abundance for individual species was conducted to determine whether the number of quadrat samples taken at each site was adequate to obtain an accurate representation of the community structure. The results (Figure 3 and Figure 4) encompass all three sampling episodes and show trendlines that, if extended to intersect with the y-axis, indicate the likely percentage of species not detected during the survey (Gray 1981). This information suggests that at the outfall site, about 90% of the species likely to be encountered were found during sampling. This percentage was very similar at the control site at about 88%.

Data Analysis

The advantage to using ordination graphs is pictorial. This technique made it possible to graphically represent how similar or dissimilar the two sites were based on species occurrence and abundance, in a 2-dimensional representation. This method was also employed to view how comparable the two sites were in terms of species presence or absence. Samples from both sites appear in the graph in relation to each other. Those samples that are similar to each other, according to the distance measure used, are clustered closer together than those that are dissimilar to one another.

The clustering technique used to create dendrogram graphs also provides a graphical representation of relatedness of the sampling units taken at each site. Those samples most similar to each other appear closer together than those that are dissimilar to each other. The advantage of this analysis is that a numerical value can be attached to the level of similarity. In the case of this study, specific groupings were analyzed that exhibited a value of higher than 50% similarity.

Ordination and dendrogram graphs for raw data, presence-absence data, and transformed data all showed definitive clusters indicating a degree of dissimilarity between the two sites. However, it was apparent that as the influence of abundance was decreased by transforming data [i.e., log (x+1)], specific clusters on the graphs became less discernable. Therefore, analysis of the transformed data was of high importance to the comparison of the two sites.

Figures 5 through 8 show ordination graphs for transformed data for each sampling event, and then for the sum of all sampling events. The ordination of sampling event 1 identifies an imposing cluster of the control site samples on the right, in comparison with the outfall samples, predominantly on the left, with some slight overlapping. Sampling episodes 2 and 3 exhibit less clustering of the sites in relation to each other, however distinctions can still be identified. When all sampling events are combined and compared, there are conspicuous clusters of samples at each site, indicating some degree of dissimilarity.

Figures 9 through 12 are dendrogram graphs for transformed data collected during each sampling event, and for a combination of all sampling events. It is quite clear from these figures that groups with more than 50% similarity, exist at one site or the other, with very little overlapping. The clustering technique then, also indicates that the sites are dissimilar.

Multi-response Permutation Procedures analyses suggest that the differences detected in the graphical representations, are statistically significant. This analysis was applied to all sampling events, and a combination of all sampling events with raw data, presence-absence data, and transformed data. In all cases, this test resulted in an indication that the two sites are different ($p<0.0001$). This result suggests that based on data collected at each site, the null hypothesis that these two sites are similar in species composition and abundance should be rejected.

DISCUSSION

While these results show that the species composition at each site differs, they do not provide a specific reason for the differences. Ecological differences are apparent, however, these cannot be attributed to the outfall alone. There are a number of confounding factors to consider.

The control site was selected as a comparison to the outfall site because it is similar in elevation, wave exposure, and micro-topography. This does not necessarily mean that they are precisely comparable in all these attributes. The differences found may be a result of the fact that the sites are simply different in any or all of these characteristics.

Another possibility is the difference in substrate that exists between the two sites. There is a large section of the sampling area at Battery Point Lighthouse that includes a concrete slab near the outfall pipe. This concrete area eventually meets a rocky area to the west of the outfall. Conversely, the entire Enderts Beach control site sampling area consists of rocky substrate. This possible confounding factor was investigated by removing samples randomly selected on the concrete substrate, then reanalyzing and comparing all data sets. The results of the MRPP analysis showed a significant difference still existed between the two sites, even without the samples from the concrete substrate (Figure 13).

It may also be possible to explain the site difference by considering the species abundances at each site. The two sites shared a total of 21 species occurrences in common. Eighteen of these species are different by a large margin from one site to another (Table I). *S. cariosus* and *M. californianus* were the two most abundant species overall at both sites and are very influential on the species composition observed. Both these species exhibited higher numbers at the control site. The control site also supported *N. fenestrata*, *C. digitalis*, *A. elegantissima*, *A. xanthogrammica*, *P. polymerus*, and *N. emarginata* in much greater abundance values when compared to Battery Point Lighthouse. In addition, the outfall site had noticeably higher abundances of the barnacle *Balanus glandula*, and red algae *Bossiella cretacea* and *Prionitis lanceolata*. These were secondary in abundance relative to *S. cariosus* and *M. californianus*, but may have had an influence on the site difference.

Three of the most abundant species at the outfall site (*E. muricata*, *M. borealis*, *N. larix*) are algae species. None of these occurred at the control site. It is also of interest that probable grazers of these algae (limpets) were more abundant at the control site. In addition, while both sites exhibited some occurrences of algae, overall abundance of algae was much higher at the outfall site. This is an important observation, because these species may be more abundant where nutrients, in the form of nitrogen and phosphates, are readily available (Graham and Wilcox 2000). Water quality tests were not included as part of this survey, however, so we cannot definitively attribute higher abundances of algae near the outfall to nutrients in the effluent water.

Possible factors discussed here may indeed be influential in explaining the differences detected between the two sites, alone or in combination with one another. The subtleties of interactions of ecological assemblages with their surrounding environments can be difficult to detect. In order to obtain a better assessment of the possible influential factors, more time and additional supportive data may be required. Visual observations of the occurrence and abundance of common intertidal species at the two sites do not suggest that species indicative of the negative effects of wastewater discharge predominate at either site.

It is also important to point out that samples used for the MRPP analysis may not be independent of one another if one sampling quadrat was randomly selected more than once. The relatively small rocky intertidal platforms at both sites restricted the ability to obtain non-overlapping quadrats during the three sampling episodes.

TABLES AND FIGURES

Table 1. Species occurrence and abundance for the all sampling events at the Battery Point Lighthouse effluent discharge site and at the Enderts Beach rock benches control site within Redwood National Park.

Invertebrates								
			Battery Point Lighthouse (Discharge Site)			**Enderts Beach (Control Site)**		
Class	**Scientific Name**	**Common Name**	**September 2002**	**April 2003**	**August 2003**	**September 2002**	**April 2003**	**September 2002**
Asteroidea	*Leptasterias hexactis*	Broad Six-Rayed Sea Star					1	
	Pisaster ochraceus	Ochre Star				20	6	6
Anthozoa	*Diadumene leucolena*	White Anemone	16					
	Anthopleura elegantissima	Aggregating Anemone	3	9	6	71	974	110
	Anthopleura xanthogrammica	Giant Green Anemone	610	7	2	442	132	39
Bivalvia	*Mytilus californianus*	California Mussel	7954	6976	10932	17029	15137	15551
Crustacea	*Balanus glandula*	Acorn Barnacle	17	47	55		33	
	Idotea wosnesensii	Vosnesensky's Isopod	1	3				
	Megalorchestia californiana	California Beach Flea	30		69		1	
	Pollicipes polymerus	Goose Barnacles	115	5	202	13547	8765	14006
	Semibalanus cariosus	Thatched Barnacle	33676	48352	61463	39232	119711	41611
Gastropoda	*Collisella digitalis*	Ribbed Limpet	6		313	11	2591	23271
	Collisella pelta				2	72		
	Katharina tunicata	Black Katy Chiton		1	4			
	Littorina scutulata	Checkered Periwinkle			3			7
	Lottia strigatella	Checkered Limpet			3	76		235
	Notoacmea fenestrata	Limpet		1	3	8468	121	49
	Nucella emarginata	Dogwhelk		1	2	229	567	513
Echinoidea	*Strongylocentrotus purpuratus*	Purple Sea Urchin		4	1			
Enopla	*Amphiporus* sp.	Pale Ribbon Worm	2		18			
Gymnolaemata	*Flustrellidra corniculata*	Branched-spine Bryozoan					3	
Ophiuroidea	*Amphipolus pugetana*	Brittle Star			1			

Algae/Plants								
			Battery Point Lighthouse			Enderts Beach		
Phylum	Scientific Name	Common Name	September 2002	April 2003	August 2003	September 2002	April 2003	August 2003
Anthophyta	*Phylospadix* sp.	Surf Grass		1			31	
Chlorophyta	*Acrosiphonia arcta*	Arctic Sea Moss						3
	Cladophora columbiana	Branching Green Filament Seaweed	15		6		17	
	Ulva sp.	Sea Lettuce	46	5			189	39
Phaeophyta	*Analipus japonicus*	No Common Name	39	119				4
	Fucus gardneri	Common Brown Rock Weed	15	48	30			
	Laminaria sinclairii	Oar Weed					1	
Rhodophyta	*Ahnfeltiopsis* sp.	No Common Name					26	
	Bonnemaisonia nootkana	Delicate Red Feather						6
	Bossiella cretacea	Chalky Coral Seaweed	3	195	76		30	1
	Callithamnion pikeanum	Dark Elongate Seamoss					615	
	Endocladia muricata	Thin Dark Spiny Wires	15	14324	6			
	Halosaccion glandiforme	Fine Spray Sea Sacs		19				
	Mastocarpus papillatus	Turkish Washcloth	84	63	95		70	
	Mazzaella cornucopiae	Irridescent Horn-Of-Plenty						5
	Mazzaella splendens	Irridescent Seaweed	3	32			21	
	Microcladia borealis	One Sided Round Branched Algae		5627	700			
	Neorhodomela larix	Black Tufted Bottlebrush	2675	2498				
	Prionitis lanceolata	Rail Road Strap	65	584	38	23	8	4

Figure 1. The pattern of species occurrence and abundance at the Battery Point outfall site over three sampling periods. The logarithmic decrease in abundance by species is obvious.

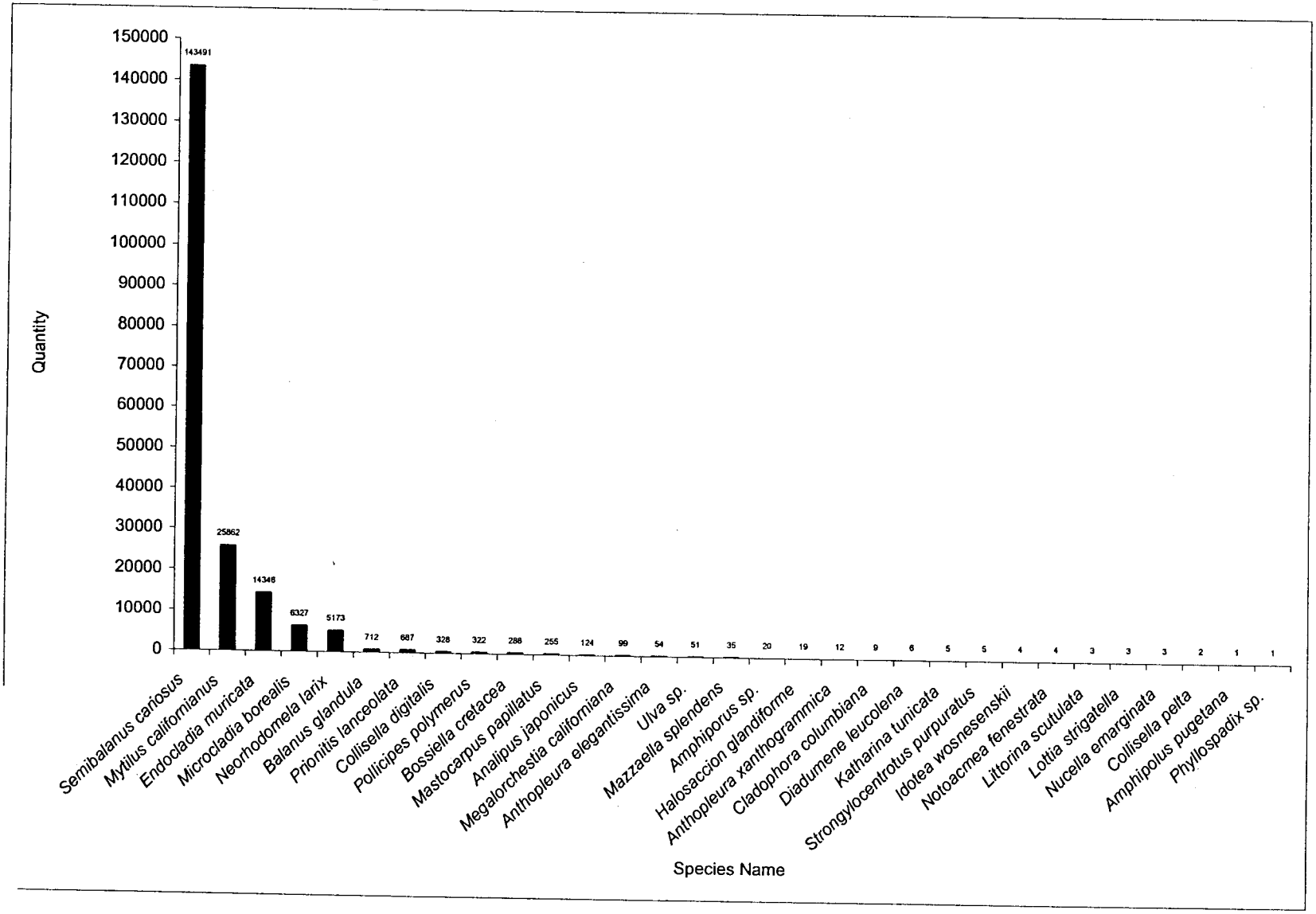


Figure 2. The pattern of species occurrence and abundance at the Enderts Beach Control site over three sampling periods. The logarithmic decrease in abundance by species is obvious.

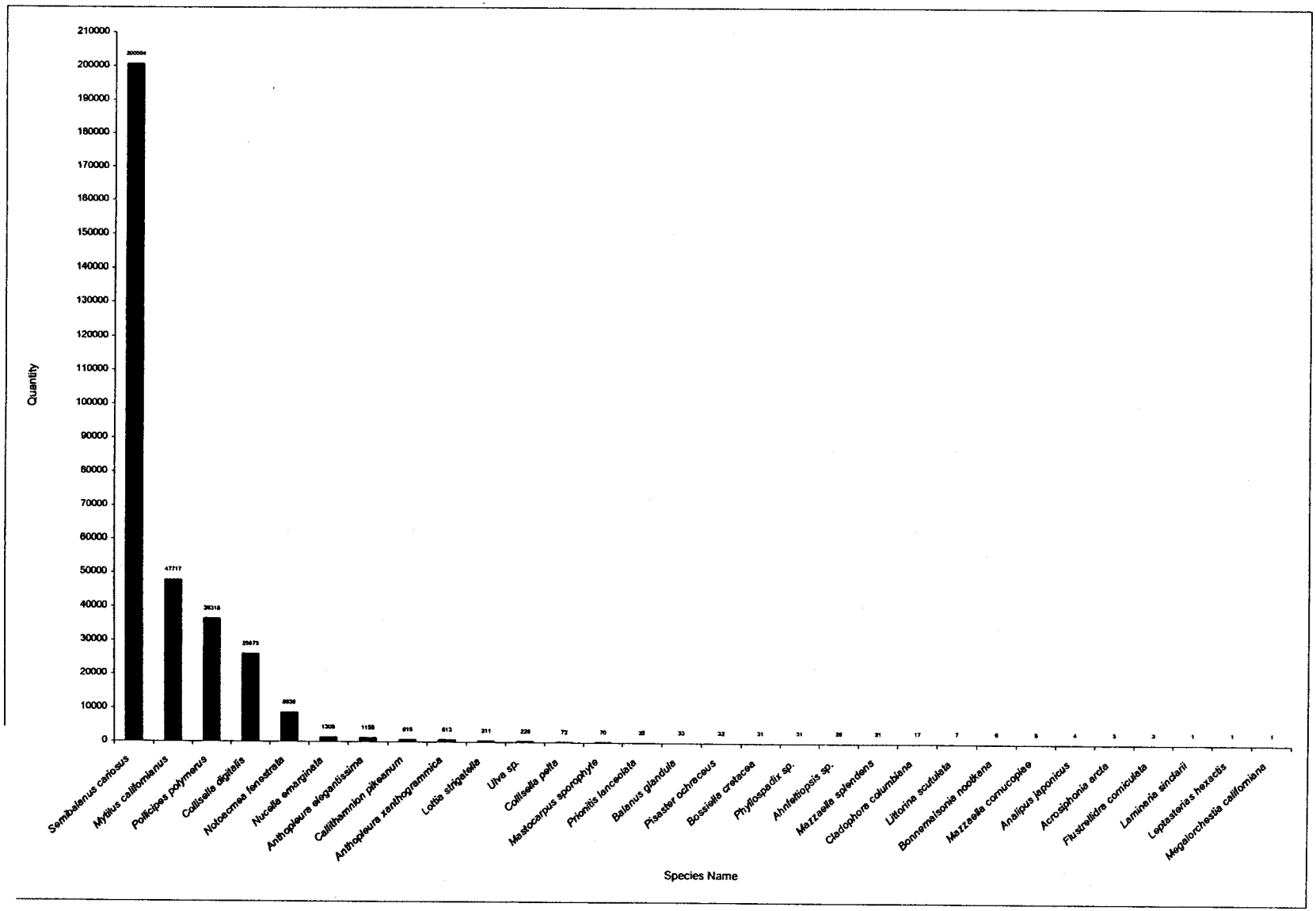


Figure 3. An examination by geometric abundance of species found at the Battery Point Lighthouse discharge site for all sampling events. The trendline of abundance by geometric class indicates that approximately 90% of the species likely to be encountered were identified.

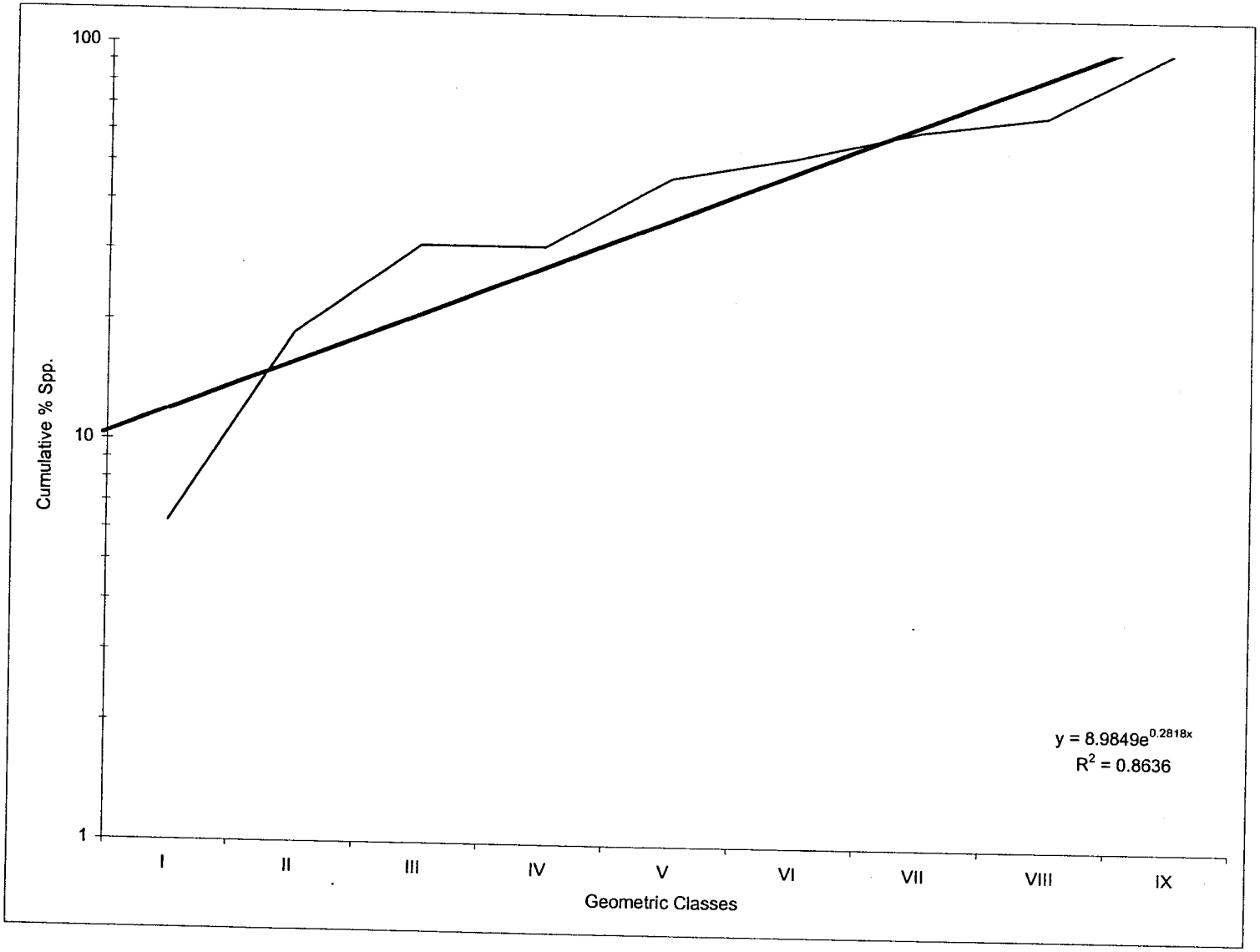
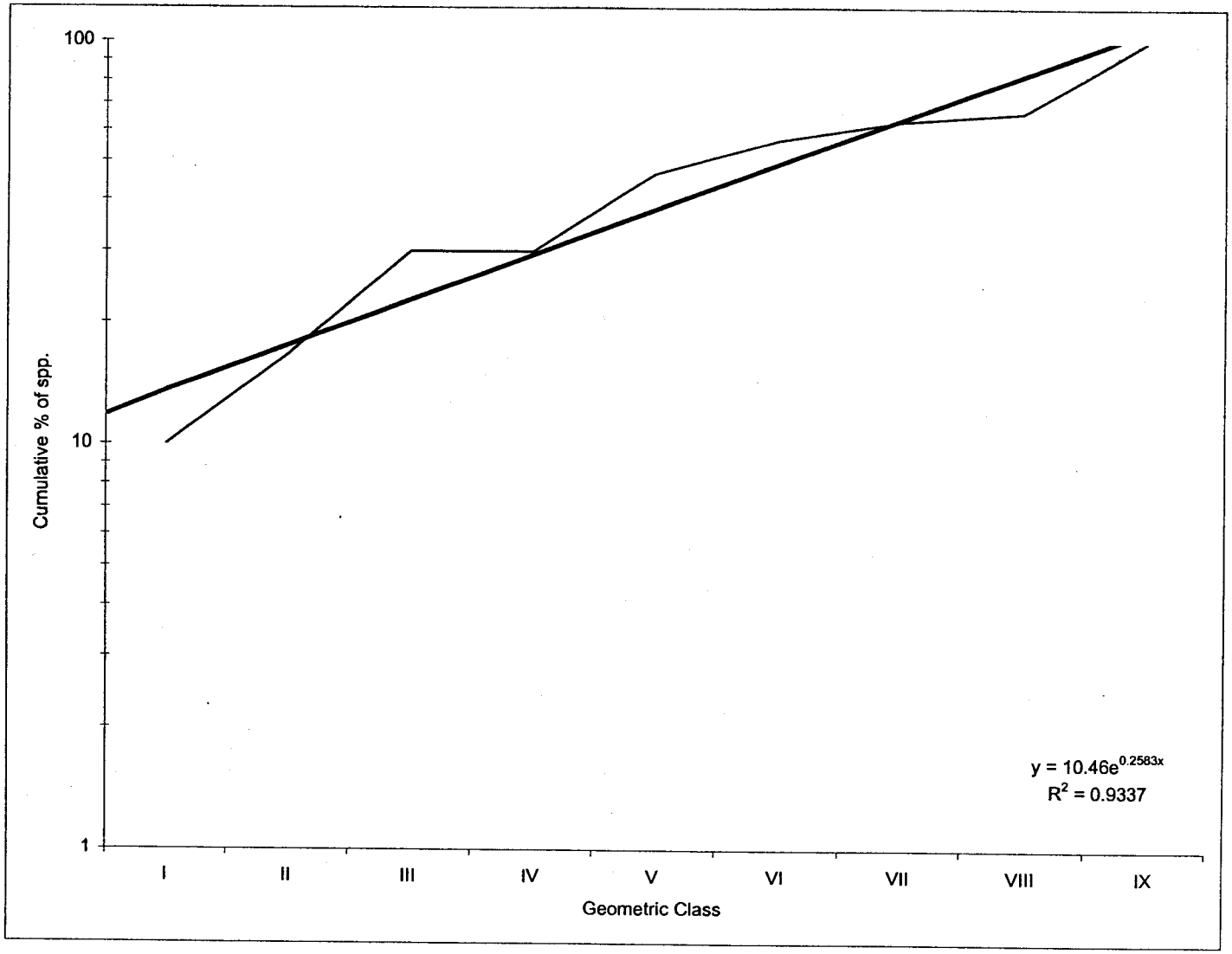


Figure 4. An examination by geometric abundance of species found at the Enderts Beach Control site for all sampling events. The trendline of abundance by geometric class indicates that approximately 88% of the species likely to be encountered were identified.



GEODESIGN INC

EXHIBIT NO. 7
APPLICATION NO.
1-05-003
Excerpt, Geo-technical Engineering Report
(Page 1 of 29)

REPORT OF GEOTECHNICAL ENGINEERING SERVICES

Crescent City Waste Water Treatment Plant

Crescent City, California

For
Brown and Caldwell
December 3, 2004

GeoDesign Project: BrownCald-15-01

GEODESIGN INC

December 3, 2004

Brown and Caldwell
1025 Willamette Street, Suite 300
Eugene, OR 97401

Attention: Mr. Ron Walz, P.E.

Report of Geotechnical Engineering Services
Crescent City Waste Water Treatment Plant
Crescent City, California
GeoDesign Project: BrownCald-15-01

This report summarizes our geotechnical study for the Crescent City Waste Water Treatment Plant Improvements project in Crescent City, California. We submitted an initial draft report of geotechnical engineering services on May 28, 2004. We understand that the new plant will be located at the existing treatment plant location and will consist of several structures completed in two phases. The preliminary design of the approximately 1,200-linear-foot outfall pipeline will also be completed as part of this work.

We trust that this information meets your present needs. Please call if you need further information.

Respectfully,

GeoDesign, Inc.

Rick Thrall, P.E.
Principal Geotechnical Engineer

AMP:RA:SVM:kt
Attachments
Five copies submitted (four bound, one unbound)
Document ID: BrownCald-15-01-120304-geor

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1.0 INTRODUCTION

GeoDesign, Inc. has prepared this report of subsurface soil conditions and geotechnical engineering recommendations for the proposed Crescent City Waste Water Treatment Plant (WWTP) Improvements. The proposed project consists of improvements to be made to the existing WWTP in Crescent City, California. We understand that the new facility will be located at the existing treatment plant location and will be constructed in two phases.

The first phase, referred to as the "interim improvements," will consist of improvements to the headwork, Digesters 1 and 2, gravity thickener, primary clarifier, and a chemical feed for the dewatering building. This phase also includes construction of an odor control facility, centrifuge, membrane tank, and MBR support buildings.

The second phase, referred to as the "Stage 1 Revised" improvements, will consist of the construction of a new outfall pipeline, dewatering building, membrane tanks, remainder of the MBR support building, operations building, underground odor control system, vortex building with slab-on-grade foundation, and influent pump station 30 feet below the existing grade.

We understand that two construction alternatives are being considered for the outfall pipeline. The primary alternate is a 24-inch-diameter pipeline that will be installed using horizontal direction drilling (HDD) techniques. The 24-inch-diameter, HDD pipeline would follow a new alignment to the existing location of the pipeline outfall. The secondary alternate for the outfall consist of conventional excavation and backfill pipeline installation.

2.0 SCOPE OF SERVICES

The purpose of our work will be to provide geotechnical conclusions and recommendations regarding design parameters and construction of the proposed wastewater treatment plant structures. Our specific scope of services is described below.

- Review available subsurface information, geologic literature, and hazard maps for the project site.
- Coordinate and manage the field investigation.
- Explore subsurface conditions at the plant location by completing six drilled borings to depths of up to approximately 51 feet below the ground surface (bgs) (borings B-1 through B-5).
- Explore subsurface conditions along the existing outfall pipeline alignment by completing three drilled borings to depths of up to 60 feet bgs (borings B-6 through B-8).
- Conduct a geologic reconnaissance along two outfall alternative alignments.
- Explore subsurface conditions along the primary alternate outfall pipeline alignment by drilling three borings to depths ranging from approximately 59 to 94 feet bgs (borings B-9 through B-11).
- Conduct a seismic refraction survey along the existing outfall pipeline adjacent to the existing outfall.
- Install 1-inch standpipe piezometers in two of the borings to measure seasonal groundwater fluctuations.

- Obtain soil samples for laboratory testing and maintain a log of encountered soil, rock, and groundwater conditions in each exploration.
- Determine the moisture content and unit weight of selected soil samples.
- Provide information as to rock depth and rock quality.
- Provide lateral and passive earth pressures, uplift pressures (as necessary), shear and friction resistance to uplift, bearing pressures, and drainage recommendations.
- Provide recommendations for excavation and backfill, including the need for dewatering, shoring, temporary slope inclinations, backfill materials, compaction, and base stabilization.
- Provide recommendations for design and construction of shallow spread foundations (both spread and strip footings), including allowable design bearing pressure, sliding coefficient, passive soil pressure, and minimum footing depth and width.
- Provide a recommended seismic coefficient per 2003 International Building Code (IBC), including near source factors, if relevant, and evaluate potential for hazards, including tsunami inundation, liquefaction, lateral spreading, seismic slope stability, and fault rupture.
- Provide recommendations for preparation of the slab subgrade.
- Provide recommendations for the construction of the outfall pipeline.
- Provide two recommended pavement sections for flexible pavement consistent with the uses intended (parking and City Street/Treatment Plant heavy truck sections).
- Provide five copies of the report summarizing explorations, laboratory testing, and recommendations.
- Provide the "Summary Geotechnical Design Parameter Table" in accordance with Brown and Caldwell format summarizing the geotechnical design parameters in both the draft and final report. This table will summarize design data as required for the project.

The results of our field explorations and laboratory testing are provided in Appendix A. Results from pH and electronic resistivity testing of selected soil samples are included in Appendix B. Our site-specific hazard report for the site is presented in Appendix C. Results from field seismic refraction and electrical resistivity surveys are included in Appendix D.

3.0 SITE AND PROJECT DESCRIPTION

The proposed project consists of improvements to the existing WWTP in Crescent City, California. The site is shown relative to its surroundings in Figure 1. We understand that the new facility will be located at the existing treatment plant location and will be constructed in two phases. Proposed site improvements are shown on Figure 2.

The first phase, referred to as the "interim improvements," will consist of the following items:

- Rehabilitation of the head works, including the installation of new pumps in the existing wet well (no new wet well is planned during this phase)
- Mechanical modifications to digesters 1 and 2
- Construction of a new odor control facility with a slab-on-grade foundation
- Construction of a new cover on the existing gravity thickener
- Construction of a new centrifuge on the existing mechanical building
- Improvements to the primary clarifier
- Construction of a new chemical feed for the existing Dewatering Building

- Construction of a new Membrane tank 20 feet bgs
- Construction of a new MBR support building approximately 10 feet bgs

The second phase, referred to as the "Stage 1 Revised" improvements, will consist of the following items:

- Construction of the new outfall pipeline
- Construction of a new dewatering building with a slab-on-grade foundation
- Construction of MBR tanks 2 and 3
- Construction of the remainder of the MBR support building
- Construction of a new operations building with a slab-on-grade foundation
- Construction of a new underground odor control system
- Construction of a new vortex building with slab-on-grade foundation
- Construction of a new influent pump station 30 feet bgs

The design of the outfall pipeline will also be completed as part of the second phase ("Stage 1 Revised"). The primary alternate for the pipeline is a 24-inch-diameter, HDD pipeline that will be located on a new alignment separate from the existing alignment. The HDD pipeline will have a maximum depth of approximately 75 feet with a total length of approximately 1,636 feet. The secondary alternate for the outfall pipeline consists of a conventional cut and cover pipeline construction constructed approximately parallel to the existing outfall pipe. Environmental constraints may prevent pipeline excavation beyond the shoreline. Therefore, the cut and cover construction method will not likely be a viable alternate for the entire pipeline. We understand that a combination of HDD and cut-and-cover pipeline construction could be considered. The existing outfall alignment and the alternative new pipeline alignment are shown on Figure 2.

4.0 SITE CONDITIONS

4.1 SURFACE CONDITIONS

The general surface conditions surrounding the WWTP are flat lying with elevations ranging from 0 to 29 feet above mean sea level (MSL), as shown on Figure 2. A majority of the ground surface surrounding the site has been developed with paved roads, walking paths, or graded flat. The WWTP site itself is situated on graded fill with elevations ranging from 18 to 20 feet above MSL. The southern boundary of the WWTP slopes steeply down to a beach located along the north side of Crescent City Bay. The bay is protected by two breakwaters, one of which extends south of the WWTP. The western boundary slopes up to a sea cliff and beach access area at elevation 29 feet above MSL.

4.2 REGIONAL GEOLOGY

The project site is located on a coastal plain between the Pacific Ocean and the northern portion of the Coast Ranges physiographic province. The coastal plain was formed from tectonic uplift and erosion by streams and sea level fluctuations during Pleistocene glacial periods (Gulick et al., 2002; Nilsen and Clarke, 1989). The Crescent City coastal plain is located on the eastern edge of the Eel River basin that collected shallow marine and non-marine deposits during Pliocene to late

Pleistocene (5 million to 10,000 years before present) time. The deposits were generally derived from the eroded basement rocks of the underlying Franciscan Complex (Gulick et al., 2002; Nilsen and Clarke, 1989).

The Eel River basin was formed from the subduction of the Gorda Plate and the northward migration of the Mendocino Triple Junction located 47 miles west and 100 miles south of the site, respectively. Tectonic stresses have formed a number of northwest to southeast trending faults and structural trends as a result of the formation and uplift of the Eel River basin during the last 30 million years (Nilsen and Clarke, 1989). Faulting and deformation observed in outcrops of the Franciscan Complex in the site vicinity are consistent with this tectonic framework.

The geologic profile in the vicinity of the site consists of a thin cover of late Quaternary (10,000 years to present) alluvium consisting of coarse sand and gravel beach deposits and unconsolidated silt and fine sand over the late Pleistocene age (100,000 to 10,000 years before present) Battery Formation. The Battery Formation is unconformably underlain by the late Jurassic to Cretaceous age (150 to 60 million years before present) Franciscan Complex (Gulick et al., 2002; Nilsen and Clarke, 1989; Wagner and Saucedo, 1987; Aalto and Harper, 1982).

The near-surface geologic unit is mapped as late Pleistocene Age Battery Formation (Qby). The unit predominantly consists of semi-consolidated, fine-grained sandstone and claystone with some fine- to coarse-grained sand and pebble lenses containing shells, wood, and leaf debris. The Battery Formation represents a near-shore, flat-lying, shallow marine depositional environment that ranges in thickness from 0 to 60 feet (Nilsen and Clarke, 1989).

The Battery Formation unconformably overlies the late Jurassic to Cretaceous Age Central Belt of the Franciscan Complex (KJf). The Central Belt consists of a tightly folded and faulted mélange of marine-deposited sandstone, shale, conglomerate, chert, serpentinite, and greenstone tectonic blocks. The Franciscan Complex has been tectonically uplifted and eroded to form a wave-cut platform near present sea level elevation. The Franciscan Complex is considered to represent the basement bedrock for this site.

4.3 SITE RECONNAISSANCE

Field reconnaissance was conducted on February 26, 2004 and consisted of a surficial reconnaissance and geologic mapping of the site and adjacent areas. The results of the reconnaissance are shown on Figure 3. The WWTP is situated on graded fill that completely covers the underlying geologic units.

Surficial geologic units were mapped in the vicinity of the outfall alignment to supplement geophysical surveys and extend subsurface investigations conducted at the site. Heavy storm and high ocean surf conditions at the time of our site visits made mapping difficult in the western portion of the outfall alignment. The surficial geologic units encountered in the vicinity of the proposed outfall alignment west of boring B-8 and south of boring B-11 consist of hard to very hard sedimentary rocks belonging to the Franciscan Complex, as shown on Figure 3. The Franciscan Complex observed at the site vicinity consists of three main rock types that include sandstone, mudstone with shale, and closely interbedded sandstone and shale. All three rock

types compose a mélange of tightly folded, overturned, and faulted sedimentary rocks with highly variable bedding orientation and stratigraphic position. Geologic mapping and geophysical surveys indicate that the contacts separating the three sedimentary rock types generally strike north 10 to 20 degrees west and dip steeply (80 to 90 degrees) northeast or southwest. The exposed contacts observed in outcrops show varying amounts of tectonic offset and shearing between units. The exposed sheared zones were observed to be healed and varied from less than 0.25 to 1 foot in thickness. Observations made along the beach located north of the existing outfall pipe indicate near-vertical bedding and healed shear zones. No evidence of recent (last 10,000 years before present) faulting or tectonic deformation was observed in the site vicinity.

The Franciscan Complex has been unconformably eroded by the ocean to form a generally flat-lying wave-cut platform. The hard sandstone unit is the most resistant to erosion and has formed sea stacks and outcrops above the surrounding platform such as at the location of the lighthouse. The higher sea stacks are covered by terrace deposits consisting of semi-consolidated fine sand and silt. Remnants of isolated terrace deposits are located on higher elevations indicating a past depositional surface that has been removed by sea-level rise.

The surficial geologic unit mapped east of borings B-8 to B-7 in the vicinity of the outfall alignment consists of coarse sand and gravel beach deposits, Figure 3. The beach deposits overlie the Franciscan Formation based on the geophysical survey profiles and on observed outcrops of hard sandstone located within the beach deposits.

The higher area east of the beach and west of the treatment plant, in the area of the outfall pipe alignment, has been developed into a park and public beach access. Based on personal communication with Ms. Janet Eidsness (consultant in Heritage Resources Management) the area has undergone extensive development as a result of construction of the breakwater located to the south of the site. Based on position and similar topography, the elevated surface is most likely a remnant terrace corresponding to the deposits underlying the lighthouse area. The area may contain some amounts of fill from the construction of the breakwater and installation of the existing outfall pipe.

4.4 GEOPHYSICAL SURVEY

A geophysical study was conducted along the existing outfall pipe in order to supplement our field investigation and geologic reconnaissance. Three seismic refraction surveys and one electrical resistivity survey were conducted by Siemens & Associates on February 27, 2004. The locations of the investigation are included on Figure 3 and the results of the study are attached in Appendix D.

4.5 FIELD EXPLORATION

We characterized the subsurface conditions at the site by completing 11 borings (B-1 through B-11) to depths ranging from approximately 7.5 to 94 feet bgs. We also conducted geophysical studies that included three seismic refraction lines and one resistivity line. In addition, we reviewed the previous geotechnical work performed at the site, including 16 borings completed by Hallenbeck-McKay & Associates (HMA). The approximate locations of our explorations, as well as those conducted by HMA, are shown on Figure 2. Our interpretation of the surface and

subsurface conditions is presented in Figures 3, 4, and 5. Copies of our boring logs, the geophysical studies, and results of our laboratory testing are provided in the appendices.

5.0 SUBSURFACE CONDITIONS

Our interpreted subsurface conditions are based on our review of site geology, site reconnaissance, subsurface explorations, and geophysical surveys. Our interpretations are discussed below.

5.1 WASTE WATER TREATMENT PLANT

The subsurface conditions encountered in the vicinity of the existing WWTP (borings B-1 through B-6) consist of 1 to 1.5 feet of topsoil and 3 to 11 feet of sand and gravel fill, fine sand alluvium all underlain by fine-grained sedimentary bedrock of the Battery Formation or Franciscan Complex. Bedrock was encountered at depths ranging between approximately 8 to 18 feet bgs. Three sections through the WWTP are provided on Figure 4 (Cross Sections B-B', C-C', and D-D'). Boring logs are presented in Appendix A.

5.1.1 Topsoil and Fill

Topsoil consists of medium stiff, gray-brown, sandy silt with some fine roots up to 1.5 feet thick. The topsoil is underlain by fill consisting of loose to medium dense, brown to dark gray, fine sand and medium dense to dense, brown to black, coarse gravel. The fill material extends to depths ranging from 2.25 to 8.3 feet bgs. Gravel fill was encountered underlying the topsoil in approximate 1- to 2.5-foot-thick layers overlying the sand fill or relatively soft native material (borings B-2, B-5, and B-6). Laboratory testing on selected samples indicates that moisture contents vary between 14 and 34 percent in the topsoil and fill.

5.1.2 Alluvium

Fine sand alluvium was encountered underlying the fill at boring locations (borings B-1, B-4, B-5, and B-6). The sand alluvium consists of loose to medium dense, dark gray, fine sand with varying amounts of gravel, wood, and fine organic debris. The alluvium was observed to range from 6 to 12.5 feet in thickness and extends to depths of 11 to 18 feet bgs. Laboratory testing on selected samples indicates that moisture contents in this layer vary between 12 and 39 percent.

A silt layer was encountered below the gravel fill in borings B-2 and B-6. The silt consists of soft to medium stiff, dark brown, silt with varying amount of sand, clay, wood, and fine organics. The silt ranged from approximately 1 to 10 feet in thickness and extends to depths of approximately 2.3 to 13.5 feet bgs. Laboratory testing on selected samples indicates that moisture contents of the silt vary between 43 and 77 percent.

5.1.3 Bedrock

The Battery Formation bedrock was encountered underlying the alluvium and silt layers in all of the borings. The Battery Formation was observed to consist of alternating layers of very soft to soft (R1-R2), medium gray, siltstone and very soft to hard (R1-R4), light gray, fine sandstone. The siltstone and sandstone is generally moderately weathered to fresh, moderately close jointed, weak to moderately cemented, and contains trace fine organics. The Battery Formation

was encountered between approximately 8 and 18 feet bgs and extends to depths ranging from 43.5 to 46 feet bgs (borings B-1 and B-6). Laboratory testing of selected samples indicates that moisture contents in this formation vary between 13 and 32 percent.

The Franciscan Complex was encountered in the two deeper borings (B-1 and B-6) underlying the Battery Formation. The Franciscan Complex consists of very soft (R1), black shale and hard (R4), blue-gray to medium gray sandstone. The shale and sandstone is generally fresh, intensely fractured with some shear zones, and partly healed with white mineral veining. Laboratory testing of selected samples indicates that moisture contents in this formation are approximately 9.5 percent.

5.2 OUTFALL PIPE ALIGNMENTS

The general subsurface conditions encountered in the vicinity of the proposed outfall pipe alignments was characterized using a combination of borings, seismic refraction surveys, and a resistivity survey (borings B-6 through B-11, S-1 through S-3, and R-1). The subsurface consists of three main soil types that include fine sand and gravel fill overlying fine to coarse sand alluvium (beach deposits) that overlies fine-grained sedimentary bedrock (Battery Formation and Franciscan Formation). The expected subsurface conditions along the alignment of the proposed directional boring are shown on Figure 5. The corresponding stationing from Brown and Caldwell Figure C-101 and 402 is indicated on the cross section and described as follows.

The eastern portion of the outfall pipe alignment from Station 0+20 to 0+60 contains fill consisting of medium dense to loose, brown, silty sand with some gravel and concrete fragments up to 1 foot diameter. The fill underlies Howe Drive and is expected to extend to depths ranging from 0 to 10 feet bgs.

Fine sand alluvium was encountered underlying the fill from Station 0+60 to 1+40. The sand alluvium is predominantly medium dense and was observed to range from 11 to 18 feet in thickness extending to depths of 18 feet bgs.

The Battery Formation was encountered underlying the alluvium from Station 1+40 to approximately 2+80. The unit is composed of horizontally bedded very soft to medium hard (R1-R3) siltstone that overlies soft to medium hard (R2-R3) sandstone. The siltstone is moderately fractured with predominant fracture inclinations of 70 to 90 degrees. Measured unconfined compressive strengths of the siltstone range from 316 to 1,330 pounds per square inch (psi). The siltstone is underlain by sandstone that is slightly fractured and widely jointed with predominant fracture and joint inclinations of 60 degrees. Measured unconfined compressive strengths of the sandstone range from 778 to 872 psi. The fractures of the Battery Formation are generally tight and the rock quality designation (RQD) index ranged from 25 to 60 percent. The siltstone and sandstone units contain slickensides on some fracture faces with pitch angles of 10, 60, and 90 degrees. The Battery Formation is approximately 30 to 40 feet thick in the vicinity of the proposed pipe alignment and extended to a depth greater than 60 feet bgs (B-9). Laboratory testing on selected samples results in moisture contents varying between 17 and 28 percent.

The Franciscan Complex was encountered underlying the Battery Formation from Station 2+80 to 14+00 (end of pipe alignment). The Franciscan Complex consists of very soft to medium hard (R1-R3) shale/mudstone; soft to medium hard (R2-R3) interbedded shale and sandstone; and soft to hard (R2-R4), fine sandstone (greywacke). The bedrock units have been tightly folded and faulted by tectonic forces and are predominantly steeply dipping to the northwest and southeast. Shear zones have formed at contacts between bedrock units (Figure 5) resulting in soft brecciated bedrock that has been totally healed with very stiff to hard clay and calcite mineralization. The shear zones encountered in the borings generally consist of very dense, coarse, clayey sand and gravel and may result in difficult drilling conditions.

The bedrock from Stations 2+80 to 4+90 consists of very soft to medium hard (R1-R3) shale/mudstone. Bedding inclinations were observed to range from 55 to 60 degrees (B-10). The shale/mudstone is very intensely fractured and mostly healed with predominant fractures inclined 70 to 90 degrees. The fractures are generally tight and the RQD index ranged from 12 to 55 percent. Measured unconfined compressive strengths of the shale/mudstone ranged from 529 to 687 psi.

A shear zone was encountered in boring B-10 at 31.8 feet bgs and is interpreted to be a contact between the shale/mudstone and the interbedded sandstone/shale. The shear zone consists of very intensely fractured to brecciated, interbedded sandstone/shale that is totally healed with very stiff to hard clay and calcite mineralization. The predominant fracture inclinations range from 60 to 80 degrees. The fractures are generally tight and the RQD index of the healed breccia range from 15 to 60 percent. Measured unconfined compressive strengths of the brecciated shale/mudstone range from 116 to 238 psi.

The bedrock from approximate Stations 4+90 to 10+20 consists of interbedded sandstone/shale that transition to predominantly sandstone near Station 8+00. The bedrock was interpreted from seismic refraction survey lines, boring B-8, and mapped bedrock outcrops. The shear wave velocity profiles (Appendix D) indicate that hard sandstone bedrock underlies the beach deposits from Stations 8+00 to 10+20 as shown on Figures 3 and 5.

The bedrock conditions from approximate Stations 10+20 to 12+40 were interpreted from seismic refraction and resistivity survey lines and projected to the proposed outfall alignment. The bedrock from approximate Stations 10+20 to 10+80 consists of steeply dipping to vertical shale/mudstone. The bedrock from approximate Stations 10+80 to 11+10 consists of near-vertical sandstone. The bedrock from approximate Stations 11+10 to 12+40 consists of near vertical shale/mudstone. The resistivity survey shows the contacts separating these units are primarily vertical and have a lower resistivity indicating softer bedrock zones (more clay content). These zones are interpreted to be the result of tectonic shearing between bedrock units and may be similar to conditions found in boring B-10.

The bedrock conditions from approximate Stations 12+40 to 14+00 consists of soft to medium hard (R2-R3) interbedded sandstone/shale interpreted from boring B-11 and supplemented by surficial geologic mapping, Figure 3. Bedding inclinations range from 30 to 40 degrees, and the bedrock is intensely to moderately fractured with predominant fractures inclined 30 to 40 and 60 degrees. The fractures are generally tight to slightly open and partly healed with clay and

calcite filling. The RQD index ranges from 0 to 50 percent. Measured unconfined compressive strengths of the shale/mudstone range from 4,580 to 11,850 psi. The interbedded sandstone/shale unit was separated from adjacent units by two faults as shown on Figure 5. The shear zones are interpreted to be relatively thin (less than 0.5 feet thick) and totally healed. Offset of the faulted bedrock was not determined.

5.3 GROUNDWATER

Groundwater was encountered at depths between 1 and 6.5 feet bgs during our explorations. Previous levels encountered during the 1971 explorations ranged between 2 and 11 feet bgs. The groundwater elevation will vary according to tidal and seasonal variations.

Standpipe piezometers were installed in borings B-1 and B-6 to monitor long-term water levels on site. Piezometer readings are included in the following table.

Piezometer Location	Date	Water Elevation (feet above MSL)	Water Depth (feet bgs)
B-1	02/24/04	12.40	6.4
	05/03/04	11.25	7.55
B-6	02/27/04	16.2	0.7
	05/03/04	piezometer clogged - reading not available	

5.4 LABORATORY TESTING

Moisture content and grain-size determinations were performed on selected samples from the exploration program. Unconfined compressive strength testing was completed on selected samples from the rock cores. Results are included in Appendix A.

Soil pH and electrical resistivity test were performed on two composite samples from boring B-6. The tests were performed by a local subcontractor. The test results are summarized below. More detailed results and the data report are included in Appendix B.

Sample Location (feet bgs)	pH		Electrical Resistivity	
	Test Method	pH	Test Method	Resistivity (ohm-cm)
5 to 10	ASTM T 289-91	8	ASTM T 288-91	600
25 to 30		4.8		170

ASTM: American Society for Testing and Materials
cm: centimeters

These results indicate a relatively high corrosive soil environment.

6.0 SEISMIC HAZARDS

This section includes a brief summary of the on-site seismic hazards. Refer to Appendix C for the site-specific seismic hazard evaluation and Section 7.3 for design recommendations.

6.1 TSUNAMI AND SEICHE INUNDATION

The site is located within the zone that was inundated by a tsunami generated by the 1964 Alaska earthquake (Kilbourne, 1981). Five historic tsunamis have occurred in the site vicinity (1946, 1952, 1957, 1960, and 1964) with damage reported during the 1960 and 1964 events. Ground surface elevations within the vicinity of the site have been raised to an elevation above the 500-year tsunami influence elevation. Based on our geologic reconnaissance, literature review, and experience, we conclude that the risk of future tsunami inundation is low.

6.2 LIQUEFACTION

Liquefaction analysis for the project site was conducted based on the information obtained from our borings, seismic refraction data, and using the procedure suggested by National Center for Earthquake Engineering Research (NCEER) (1998). The design earthquake used was moment magnitude 7.0 with a peak ground acceleration (PGA) of 0.41 g. Our analyses indicate limited liquefaction zones in the fill and alluvium. Liquefaction induced settlements were calculated using procedures suggested by Ishihara and Yoshimine (1992) and are on the order of 3 to 6 inches.

6.3 SLOPE STABILITY AND LANDSLIDES

The site vicinity is generally flat, and the WWTP site has been graded flat for plant structures and surrounding paved areas. Site soils are not susceptible to earthquake slope instability at these inclinations.

6.4 LATERAL SPREADING

Areas subject to lateral spreading are typically gently sloping or flat sites underlain by liquefiable sediments adjacent to an open face, such as riverbanks or bay fronts. Liquefied soils adjacent to open faces may flow in that direction, resulting in lateral displacement and surface cracking. The south boundary of the existing WWTP is adjacent to a moderate to steep slope with approximately 8 feet of elevation change down to the Crescent City Bay front. Based our geologic reconnaissance, literature review, experience, and on the presence of potentially liquefiable materials adjacent to an open face, we conclude that existing or proposed structure foundations on sandy fill and native, unconsolidated sands are at risk and may be damaged from lateral spreading during a seismic event (Kilbourne, 1981).

7.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

7.1 GENERAL

The subsurface conditions at the project site can be modeled as 10 to 18 feet of loose sands, gravels, and fills underlain by siltstone and sandstone bedrock of the Battery Formation. Groundwater was encountered at depths between the ground surface and 7.5 feet bgs during our exploration program. Accordingly, dewatering programs will be required to complete excavations that extend more than a couple of feet below current grades. Our dewatering and shoring recommendations are provided in Section 8.0 of this report.

As presented in our site-specific seismic hazard evaluation provided in Appendix C, the loose sands and gravels are susceptible to liquefaction and related lateral spreading and ground

Silt fences should be established and maintained throughout the construction period down slope from construction areas to protect the natural drainage channels from erosion and/or siltation. Additional silt fences may be necessary at the mid-point of long exposed soil slopes or across temporary ditches.

Mechanisms for surface drainage should be provided to route water away from exposed slopes to prevent erosion. Surface runoff and other collected surface drainage, such as water from down spouts, should be routed to a drainage collection system.

9.0 SEWER OUTFALL

The alignment of the proposed primary alternate outfall pipeline will follow the alignment shown on Figure 2. The primary method of construction for the pipeline is a 24-inch-diameter, HDD pipeline. The HDD pipeline will have a maximum depth of approximately 75 feet with a total length of approximately 1,636 feet. A secondary construction alternate of excavate and backfill may be used in combination with the HDD pipeline. Pipeline systems within the treatment plant will be constructed using the cut-and-cover method of construction.

9.1 HDD PIPELINE CONSTRUCTION

The proposed HDD pipeline will have a diameter of 24 inches and will be constructed of permalock steel with a wall thickness of 0.5 inch. The proposed pipeline will have a total length of 1,636 feet. The proposed sewer alignment will begin at the treatment plant at an elevation of 18 feet at pipeline Station 0+20. The HDD boring will initially encounter sand fill materials to an elevation of approximately 0 feet at Station 0+60. Based on our boring data, gravel and concrete fragments were encountered in the fill materials and should be considered in the HDD drilling plan. The concrete fragments could be as large as 1 foot in diameter. Between Station 0+60 at elevation 0 feet and Station 1+40 at elevation -7 feet, the pipeline HDD borehole will encounter alluvial sands. The sand is a fine-grained, water-bearing strata. Between Station 1+40 at elevation -7 feet and Station 2+80 at elevation -25 feet, the HDD borehole will encounter siltstone and sandstone of the Battery Formation. The Battery Formation rock is moderately to slightly fractured with an RQD ranging from 25 to 60 percent. The fractured zones of the Battery Formation may cause problems with HDD drilling and loss of drilling fluids. From Station 2+80 at elevation -25 feet to the outfall Station of 13+65, the HDD borehole will encounter siltstone, sandstone, and mudstone of the Franciscan Complex. Faults and shear zones were encountered in the Franciscan Complex. Based on our geologic interpretations, these zones are shown on Figure 5. The Franciscan Complex within the shear zones is classified as medium dense to dense, clayey sand and gravel. Slickensides were also encountered in the Franciscan Complex rock. The shear and fault zones and the slickensided rock may cause problems with HDD drilling and loss of drilling fluids. The compressive strength of the Battery Formation and the Franciscan Complex rock ranges from 120 to 11,830 psi. HDD drilling in soft to hard, highly fractured rock should be anticipated.

The presence of fractured rock at the location of the pipeline outfall could create a potential for hydrofracture of the borehole. Hydrofracture would cause the release of drilling fluids into the coastal waters. We recommend that injection grouting be performed at the location of the outfall

to prevent hyfrofracture of the HDD drilling fluids. We recommend that the grout zone extend to a depth of at least 5 feet below the bottom of the pipeline at the location of the outfall. The vertical and lateral limits of the injection grout zone are illustrated on Figure 7. The existing outfall pipeline is located in the general vicinity of the proposed outfall. Precautions should be taken to avoid the existing pipeline during grouting operations. An example of compaction grouting specifications is presented in Appendix F.

We conducted ground penetrating radar (GPR) surveys at 11 locations along the western end of the existing outfall alignment. The surveys were conducted on the concrete walkway surface in the tidal zone area located along the southern perimeter of the rock mass of the Battery Point Lighthouse. The survey lines run perpendicular to the outfall pipeline alignment at intervals of approximately 20 to 40 feet. Each survey line was started at the north edge of the concrete surface along the outfall alignment. The concrete surface was relatively flat in the north-south direction and is located in the tidal area south of the intersection between the main lighthouse footpath and the toe of the slope. An example of the GPR survey data from Line 0 is presented on Figure G-1 in Appendix G. Survey Line 0 is located at the east end of the concrete walkway. Other survey lines are available in our files, (Survey Lines 1 though 10 from east to west) and can be reviewed upon request. The images consist of data from the 250 MHz antenna. A description of the GPR equipment is included in Appendix G.

Several subsurface features such as the surface of the outfall pipe and horizontal limits of the pipeline excavation can be seen in several cross sections using the 250 MHz antenna. In general, observation of the cross section lines shows the location of the pipe near the centerline of the concrete walkway surface and at a relatively consistent depth of approximately 2 feet below the concrete surface.

9.2 CUT-AND-COVER PIPELINE CONSTRUCTION

Cut-and-cover excavation methods can be used to construct outfall pipe along the eastern half of the alignment. Recommendations for trench excavations and backfilling are presented in Section 8.3.

10.0 GEOTECHNICAL SERVICES DURING CONSTRUCTION

We recommend that a geotechnical engineer from GeoDesign be retained to review final plans and specifications when they become available for the development. We understand that some of the details of this project may change, as the design is refined. Review of plans and specifications will allow us to evaluate whether design changes affect our recommendations and whether our recommendations have been correctly interpreted. In order to correlate preliminary soil data with the actual soil conditions encountered during construction, and to assess construction conformance to our report, we recommend that a GeoDesign engineer be retained for construction observation of monitoring well installation, critical shoring construction, foundation subgrade preparation, compaction, and other critical geotechnical portions of this project.

11.0 LIMITATIONS

This report is prepared for the exclusive use of Brown and Caldwell and their agents for specific application to this project in accordance with generally accepted geotechnical engineering practice. This report may not contain sufficient information for purposes of other parties or other uses. We understand that the project plans are preliminary in nature at this time. The outfall pipeline alignment, depth and construction techniques are not selected at this time. Additional studies will be required depending on these factors. The construction sequencing can have a major impact on the type of temporary shoring system selected. We recommend that we be allowed to review construction sequencing and the shoring plans as they are developed.

The geotechnical recommendations provided in this report are based on site conditions as they are described herein, information gathered during our field exploration, office review of documents, and information provided by the client. If there is a substantial lapse of time between our geotechnical exploration and the start of work at this site, or if conditions have changed as a result of construction or demolition, or if the project details have been significantly modified from that described herein, we recommend that we be requested to review this report to re-evaluate our conclusions and recommendations.

Subsurface conditions encountered in the soil boring were interpreted based on subsurface information as well as a review of existing in-house and published soil and geologic literature for the project site vicinity. The soil boring logs depict subsurface conditions only for the specific boring location at the time of exploration. Subsurface conditions and water levels at other locations may differ from those where sampling was performed. The passage of time may also result in changes in the conditions interpreted to exist at the locations where sampling was performed during this investigation.

The owner and the contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including current Occupational Safety and Health Administration excavation and trench safety standards. Construction site safety is the sole responsibility of the contractor, who also be solely responsible for the means, methods, and sequencing of construction operations. GeoDesign, Inc. is providing this information solely as a service to the clients.

♦ ♦ ♦

We appreciate the opportunity to be of continued service to you. Please call if you have questions concerning this report or if we can provide additional services.

Sincerely,

GeoDesign, Inc.

Tacia C. Miller, P.E.
Senior Project Engineer

Rajiv Ali, P.E.
Associate Geotechnical Engineer

Rick Thrall, P.E.
Principal Geotechnical Engineer

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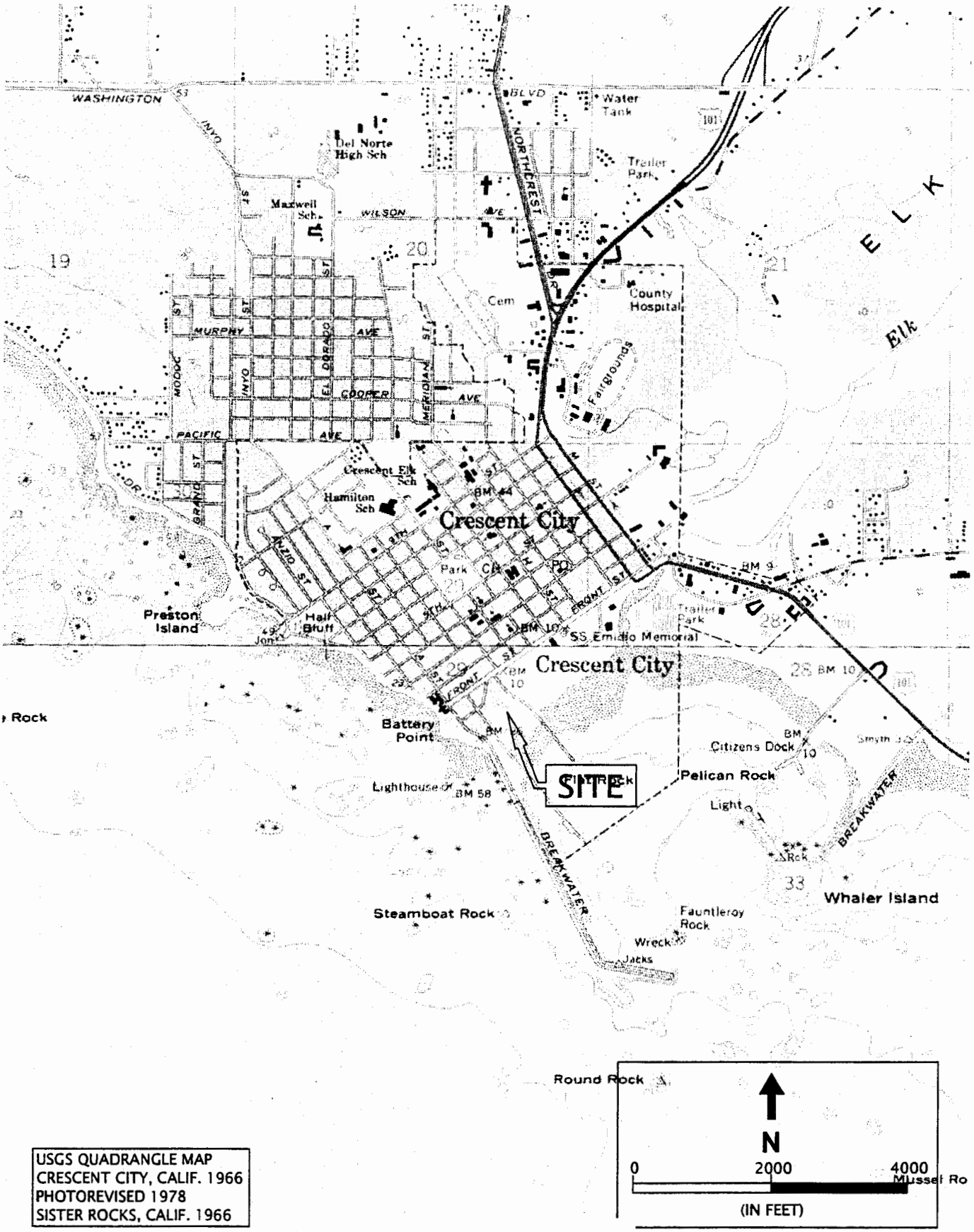
FIGURES

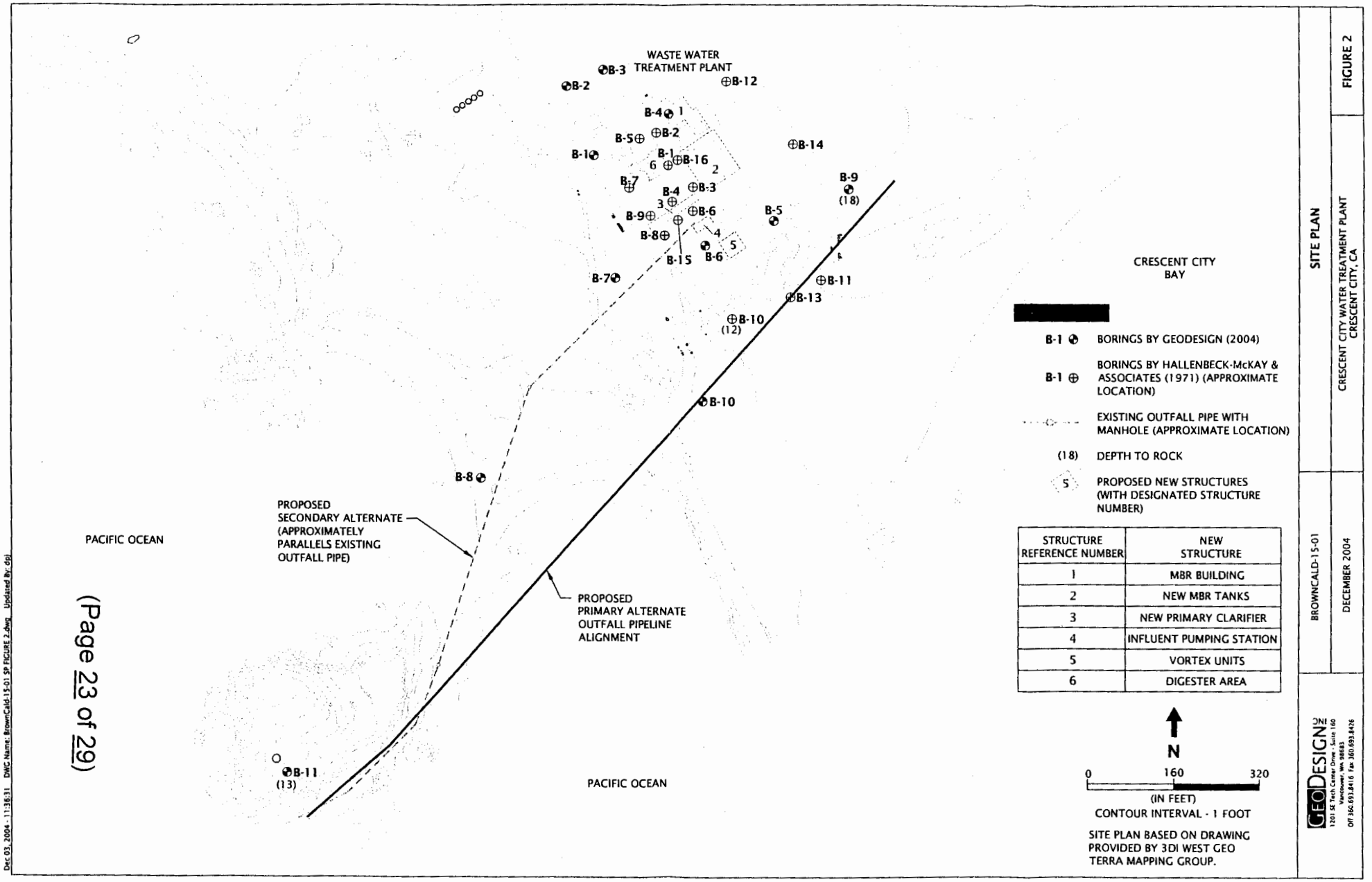


USGS QUADRANGLE MAP
CRESCENT CITY, CALIF. 1966
PHOTOREVISED 1978
SISTER ROCKS, CALIF. 1966

GEODESIGN INC
1201 SE Tech Center Drive - Suite 160
Vancouver, WA 98683
Off 360.693.8416 Fax 360.693.8426

BROWNCALD-15-01	**VICINITY MAP**	
DECEMBER 2004	CRESCENT CITY WATER TREATMENT PLANT CRESCENT CITY, CA	**FIGURE 1**

Dec 03, 2004 - 11:49:55 DWG Name: BrownCald-15-01 VM FIGURE 1.dwg Updated By: cmp



STRUCTURE REFERENCE NUMBER	NEW STRUCTURE
1	MBR BUILDING
2	NEW MBR TANKS
3	NEW PRIMARY CLARIFIER
4	INFLUENT PUMPING STATION
5	VORTEX UNITS
6	DIGESTER AREA

SITE PLAN BASED ON DRAWING PROVIDED BY 3DI WEST GEO TERRA MAPPING GROUP.

SITE PLAN

CRESCENT CITY WATER TREATMENT PLANT
CRESCENT CITY, CA

FIGURE 2

BROWNCALD-15-01

DECEMBER 2004

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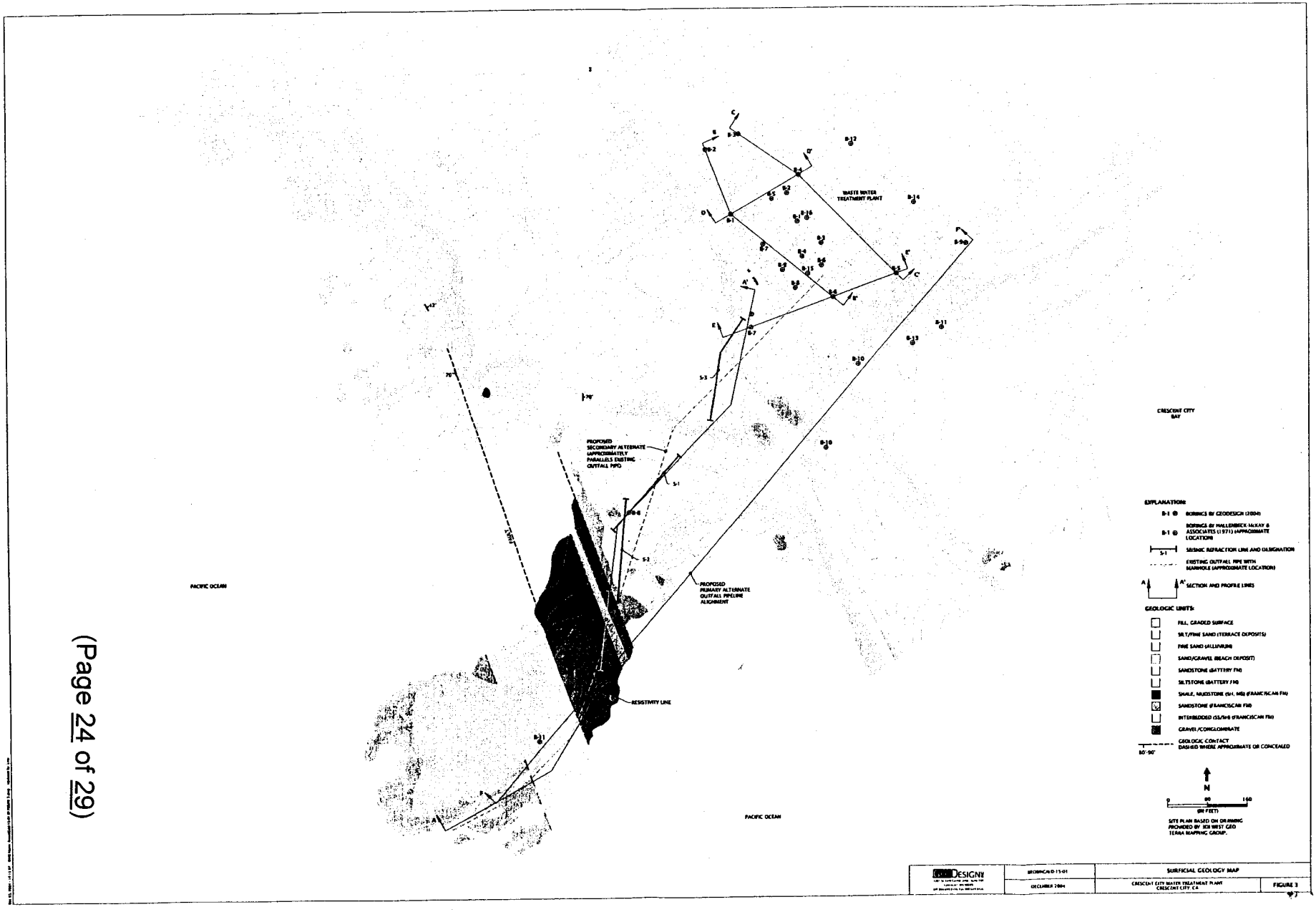
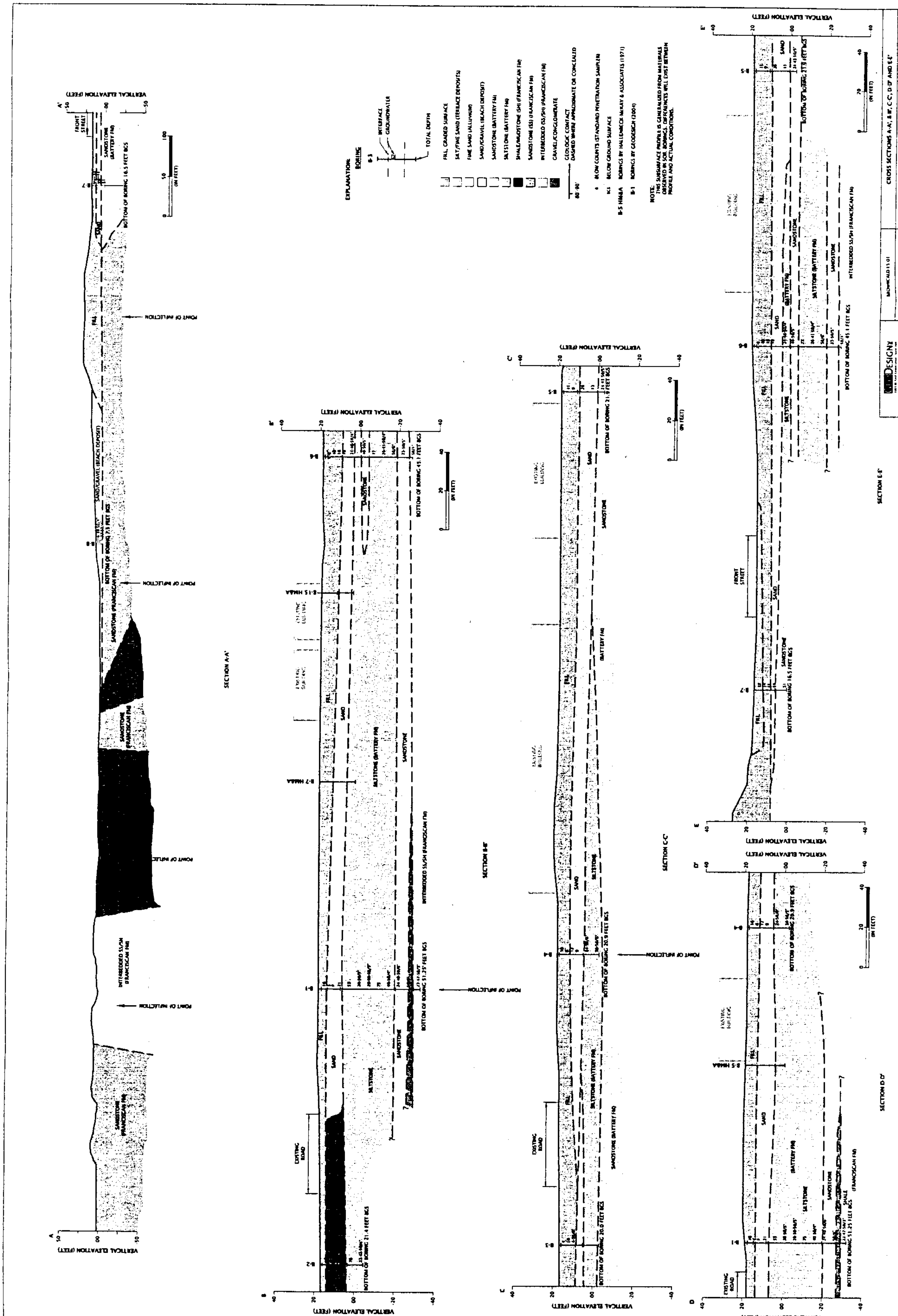
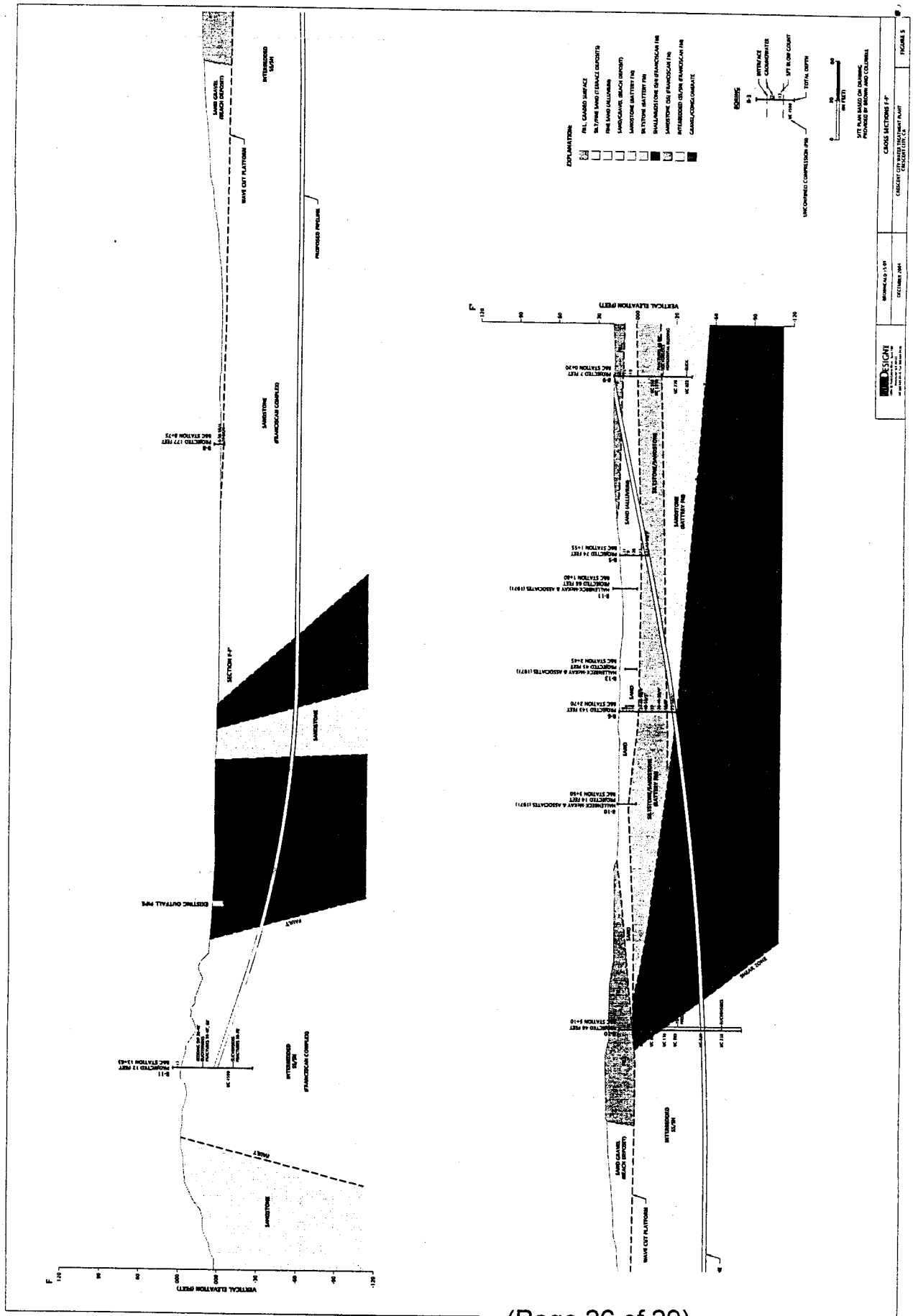
Dec 03, 2004 - 11:36:31 DWG Name: BrownCald-15-01 SP FIGURE 2.dwg Updated By: dpj

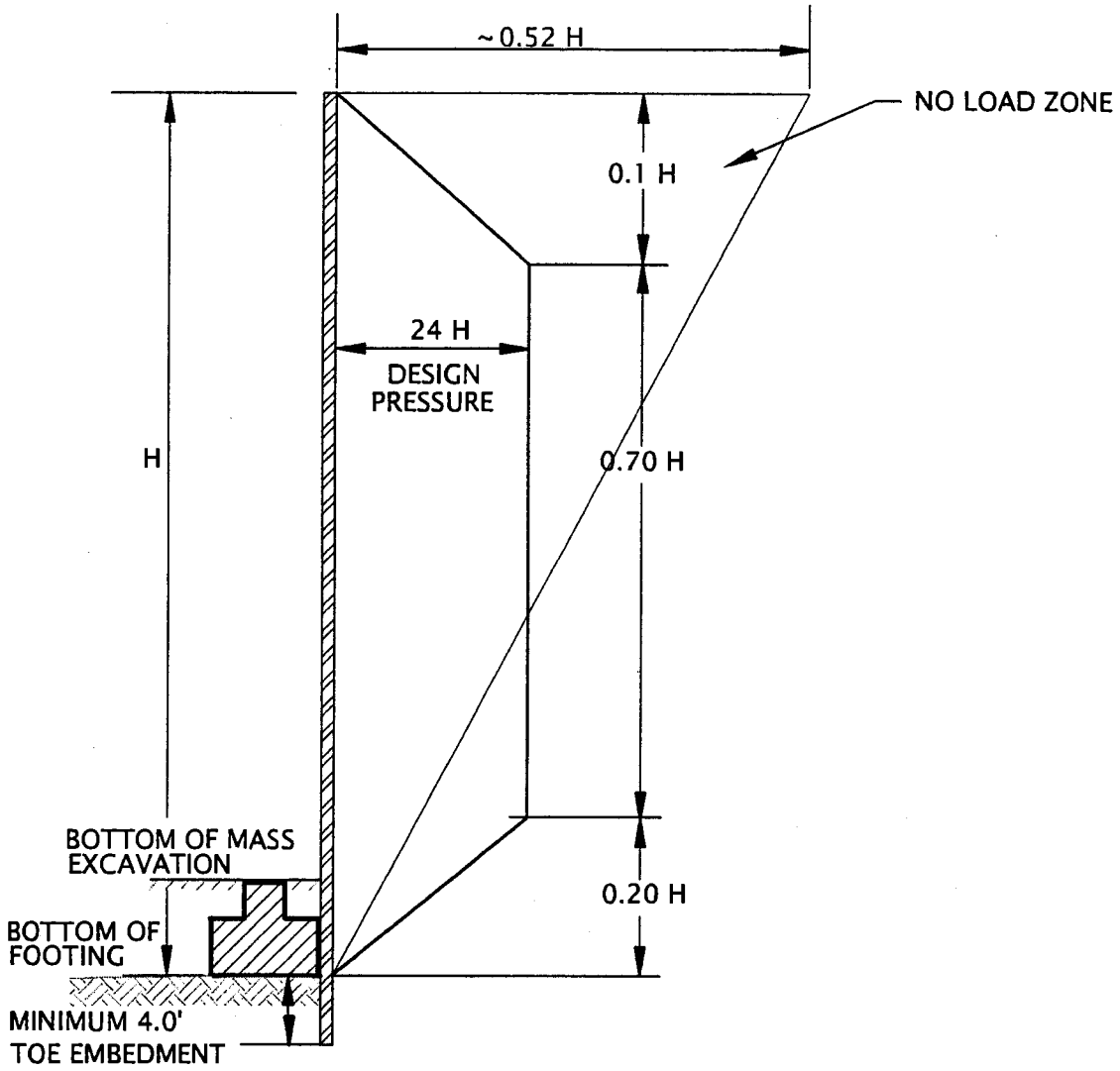

WASTE WATER TREATMENT PLANT
CRESCENT CITY BAY
PACIFIC OCEAN
PACIFIC OCEAN
PROPOSED SECONDARY ALTERNATE (APPROXIMATELY PARALLELS EXISTING OUTFALL PIPE)
PROPOSED PRIMARY ALTERNATE OUTFALL PIPELINE ALIGNMENT
RESISTIVITY LINE
EXPLANATION
BORINGS BY GEODESIGN (2004)
BORINGS BY HALLENBECK MCKAY & ASSOCIATES (1971) (APPROXIMATE LOCATION)
SEISMIC REFRACTION LINE AND DESIGNATION
EXISTING OUTFALL PIPE WITH MANHOLE (APPROXIMATE LOCATION)
SECTION AND PROFILE LINES
GEOLOGIC UNITS
FILL, GRADED SURFACE
SILT/FINE SAND (TERRACE DEPOSITS)
FINE SAND (ALLUVIUM)
SAND/GRAVEL (BEACH DEPOSIT)
SANDSTONE (BATTERY FM)
SILTSTONE (BATTERY FM)
SHALE, MUDSTONE (SH, MS) (FRANCISCAN FM)
SANDSTONE (FRANCISCAN FM)
INTERBEDDED (SS/SH) (FRANCISCAN FM)
GRAVEL/CONGLOMERATE
GEOLOGIC CONTACT DASHED WHERE APPROXIMATE OR CONCEALED
N
0
80
160
(IN FEET)
SITE PLAN BASED ON DRAWING PROVIDED BY SCS WEST GEO TERRA MAPPING GROUP.
GEODESIGN
SURFICIAL GEOLOGY MAP
DECEMBER 2004
CRESCENT CITY WATER TREATMENT PLANT CRESCENT CITY, CA
FIGURE 3


CROSS SECTIONS A-A', B-B', C-C', D-D' AND E-E'
CRESCENT CITY WATER TREATMENT PLANT
CRESCENT CITY, CA
FIGURE 4
DECEMBER 2004
SECTION A-A'
SECTION B-B'
SECTION C-C'
SECTION D-D'
SECTION E-E'
EXPLANATION:
BORING
INTERFACE
GROUNDWATER
TOTAL DEPTH
FILL, GRADED SURFACE
SILT/FINE SAND (TERRACE DEPOSITS)
FINE SAND (ALLUVIUM)
SAND/GRAVEL (BEACH DEPOSIT)
SANDSTONE (BATTERY FM)
SILTSTONE (BATTERY FM)
SHALE/MUDSTONE (SH) (FRANCISCAN FM)
SANDSTONE (SS) (FRANCISCAN FM)
INTERBEDDED (SS/SH) (FRANCISCAN FM)
GRAVEL/CONGLOMERATE
GEOLOGIC CONTACT
DASHED WHERE APPROXIMATE OR CONCEALED
BLOW COUNTS (STANDARD PENETRATION SAMPLER)
BGS BELOW GROUND SURFACE
B-5 HM&A BORINGS BY HALLENBECK McKAY & ASSOCIATES (1971)
B-1 BORINGS BY GEODESIGN (2004)
NOTE:
THIS SUBSURFACE PROFILE IS GENERALIZED FROM MATERIALS OBSERVED IN SOIL BORINGS. DIFFERENCES WILL EXIST BETWEEN PROFILE AND ACTUAL CONDITIONS.
VERTICAL ELEVATION (FEET)
POINT OF INFLECTION
EXISTING ROAD
FRONT STREET
BOTTOM OF BORING 16.5 FEET BGS
BOTTOM OF BORING 7.5 FEET BGS
BOTTOM OF BORING 45.1 FEET BGS
BOTTOM OF BORING 51.25 FEET BGS
BOTTOM OF BORING 21.4 FEET BGS
BOTTOM OF BORING 21.9 FEET BGS
BOTTOM OF BORING 20.9 FEET BGS
BOTTOM OF BORING 20.0 FEET BGS
BOTTOM OF BORING 27.9 FEET BGS
(IN FEET)


CROSS SECTIONS F-F'
CRESCENT CITY WATER TREATMENT PLANT
CRESCENT CITY, CA
FIGURE 5
DESIGN
DECEMBER 2004
SCALE AS SHOWN
SITE PLAN BASED ON DRAWING PROVIDED BY BROWN AND CALDWELL
EXPLANATION:
FILL, GRADED SURFACE
SILTY/FINE SAND (TERRACE DEPOSITS)
FINE SAND (ALLUVIUM)
SAND/GRAVEL (BEACH DEPOSITS)
SANDSTONE (BATTERY FM)
SILTSTONE (BATTERY FM)
SHALE/MUDSTONE (ERH FRANCISCAN FM)
SANDSTONE (SU FRANCISCAN FM)
INTERBEDDED (SS/SH FRANCISCAN FM)
GRAVEL/CONGLOMERATE
BORING
INTERFACE
GROUNDWATER
SPT BLOW COUNT
TOTAL DEPTH
UNCONFINED COMPRESSION (PSI)
SECTION F-F'
SANDSTONE
SHALE
SAND GRAVEL (BEACH DEPOSITS)
WAVE CUT PLATFORM
INTERBEDDED SS/SH
SANDSTONE (FRANCISCAN COMPLEX)
PROPOSED PIPELINE
DISTRICT OUTFALL PIPE
SAND
SANDSTONE (BATTERY FM)
SILTSTONE/MUDSTONE
SAND (ALLUVIUM)
VERTICAL ELEVATION (FEET)

CROSS SECTIONS F-F'
CRESCENT CITY WATER TREATMENT PLANT
CRESCENT CITY, CA
FIGURE 5
DESIGN
BROWN AND CALDWELL
DECEMBER 2004
EXPLANATION:
FILL, GRADED SURFACE
SILT/FINE SAND (TERRACE DEPOSITS)
(FINE SAND (ALLUVIUM))
SAND/GRAVEL (BEACH DEPOSIT)
SANDSTONE (BATTERY FM)
SILTSTONE (BATTERY FM)
SHALE/MUDSTONE (DEB (FRANCISCAN FM)
SANDSTONE (SS) (FRANCISCAN FM)
INTERBEDDED (SS/SH) (FRANCISCAN FM)
GRAVEL/CONGLOMERATE
BORING
INTERFACE
GROUNDWATER
SPT BLOW COUNT
TOTAL DEPTH
UNCONFINED COMPRESSION (PSI)
SITE PLAN BASED ON DRAWING PROVIDED BY BROWN AND CALDWELL
SECTION F-F'
PROPOSED PIPELINE
WAVE CUT PLATFORM
SAND GRAVEL (BEACH DEPOSIT)
INTERBEDDED SS/SH
SANDSTONE (FRANCISCAN COMPLEX)
SANDSTONE
EXISTING OUTFALL PIPE
FAULT
VERTICAL ELEVATION (FEET)
SAND (ALLUVIUM)
SILTSTONE/MUDSTONE
SHALE ZONE

RECOMMENDED EARTH PRESSURES FOR DEEP TEMPORARY SHORING



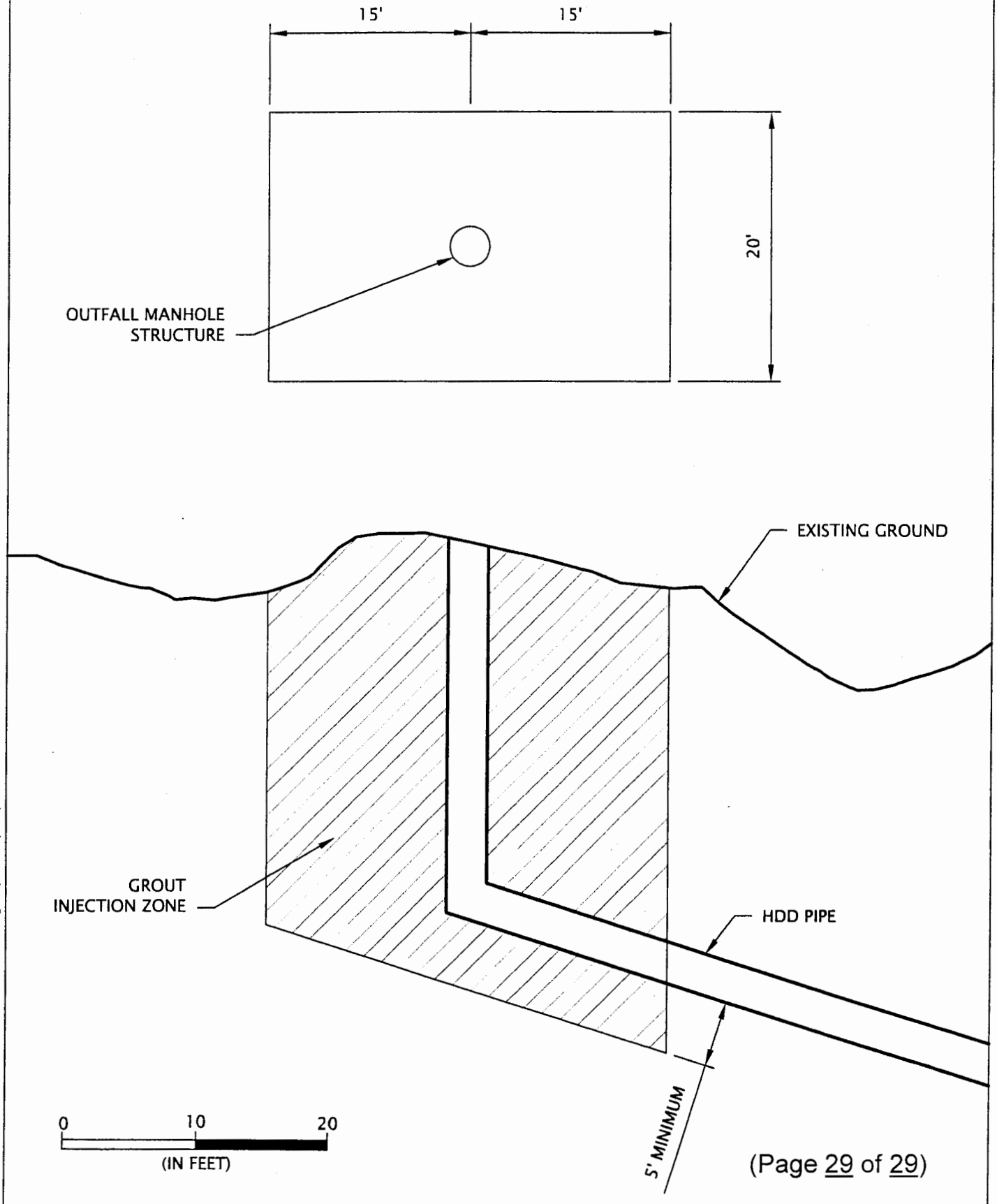
NOT TO SCALE

H = DEPTH OF EXCAVATION IN FEET
ASSUMES DRAINED CONDITIONS

GEODESIGN INC
1201 SE Tech Center Drive - Suite 160
Vancouver, WA 98683
Off 360.693.8416 Fax 360.693.8426

BROWNCALD-15-01	**LATERAL EARTH PRESSURES FOR TEMPORARY SHORING**	
DECEMBER 2004	CRESCENT CITY WATER TREATMENT PLANT CRESCENT CITY, CA	**FIGURE 6**

Dec 03, 2004 - 11:50:12 DWG Name: BrownCald-15-01 DET FIGURE 6.dwg Updated By: cmp



GEODESIGN INC 1201 SE Tech Center Drive - Suite 160 Vancouver, WA 98683 Off 360.693.8416 Fax 360.693.8426	BROWNCALD-15-01	**INJECTION GROUTING LIMITS**
	DECEMBER 2004	CRESCENT CITY WATER TREATMENT PLANT CRESCENT CITY, CA — **FIGURE 7**

Dec 03, 2004 - 11:50:18 DWG Name: BrownCald-15-01 SEC FIGURE 7.dwg Updated By: cmp

EXHIBIT NO. 8
APPLICATION NO.
1-05-003
Review Agency
Correspondence

CITY OF CRESCENT CITY

NOTICE OF FINAL ACTION
COASTAL DEVELOPMENT PERMIT

Date: April 25, 2005

The following project is located within the Crescent City Coastal Zone. A coastal development permit for this project has been acted upon.

Applicant: City of Crescent City **Agent:** City of Crescent City
Application File No.: CDP 05-01 **Filing Date:** March 30, 2005

Location: 210 Battery Drive, Crescent City 95531

Project Description: This project consists of constructing a 24"-diameter outfall pipeline adjacent and parallel to the existing 12" outfall pipeline. The new pipeline will be installed using horizontal directional drilling methods. This permit covers only the work to be performed in the local jurisdictional Coastal Zone, which, for the purposes of this project, is at or above the ten-foot contour line. The local jurisdictional work consists of the drilling pad, spoil piles, and mainland staging area.

APN: APN 118-020-31
Action Date: April 14, 2005 **Action By:** Crescent City Planning Commission
Action: ____Approved ____Denied __X__Approved With Conditions

Findings:
A. Project is consistent with the General Plan and the Zoning requirements.
B. Project is covered under the Supplemental Final Environmental Impact Report (EIR) for the Crescent City Wastewater Project (SCH #2000102115).
C. Project is consistent with the Local Coastal Plan requirements.

Conditions of Approval:
1. The project is subject to the Mitigation Measures contained in the Supplemental Final EIR (SCH #2000102115).
2. The project is subject to the Best Management practices contained in the Water pollution Control Facilities Outfall Project *Project Manual Specifications* (Brown & Caldwell, March, 2005).

____ Not Appealable to the Coastal Commission.
__X__ Appealable to the Coastal Commission pursuant to Public Resources Code, Section 30603. An aggrieved person may appeal this decision to the Coastal Commission within ten working days following Commission receipt of this notice. Appeals must be in writing to the appropriate Coastal Commission District Office.

By:
City of Crescent City
Planning Department
377 "J" Street
Crescent City, CA 95531
(707)464-9506