

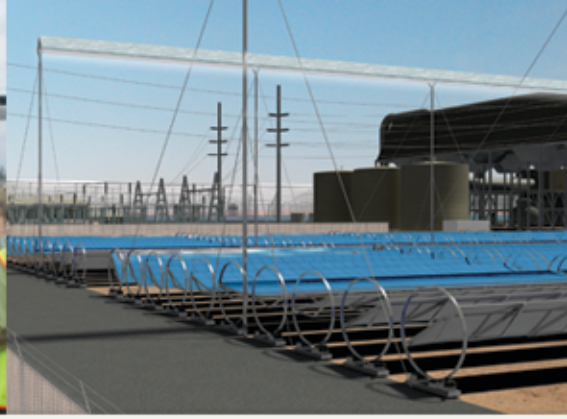

APPENDICES
SUPPLEMENT to the CARRIZO ENERGY SOLAR FARM APPLICATION for CERTIFICATION

APPLICATION FOR CERTIFICATION (07-AFC-8)
Carrizo Energy Solar Farm
Carrizo Energy, LLC

Submitted to:
California Energy Commission

Submitted by:
Carrizo Energy, LLC

With Support from:

URS

1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108

July 2008

DRAINAGE EROSION AND SEDIMENT CONTROL PLAN

DRAINAGE EROSION AND SEDIMENT CONTROL PLAN

CARRIZO ENERGY SOLAR FARM (CESF)
SAN LUIS OBISPO COUNTY

PREPARED FOR:
CARRIZO ENERGY, LLC

URS PROJECT NO. 27658060

JUNE 27, 2008

R E P O R T

DRAINAGE EROSION & SEDIMENT CONTROL PLAN FOR CARRIZO ENERGY SOLAR FARM

Prepared for

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af	acre-feet
AFC	Application for Certification
afy	acre-feet per year
BFE	Base Flood Elevation
bgs	below ground surface
BMP	Best Management Practices
CEC	California Energy Commission
CESF (or Project)	Carrizo Energy Solar Farm
cf	cubic feet
cfs	cubic feet per second
CWA	Clean Water Act
cy	cubic yard
DESCP	Drainage Erosion and Sediment Control Plan
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
ft	feet
GPS	Global Positioning System
in/hr	inch per hour
kV	kiloVolt
MSL	Mean Sea Level
NFF	National Flood Frequency
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
OWS	Oil Water Separator
PG&E	Pacific Gas & Electric
ROW	Right-of-Way
RUSLE2	Revised Universal Soil Loss Equation 2
RWQCB	Regional Water Quality Control Board
SR-58	State Route 58
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
USGS	United States Geological Survey
WDID	Waste Discharge Identification
WUS	Water of the United States
yr	year

SECTION 1 INTRODUCTION

1.1 OBJECTIVES

This Drainage Erosion & Sediment Control Plan (DESCP) was prepared in response to data requests from the California Energy Commission (CEC) and has four main objectives:

- Discuss site drainage and clearing/grading operations;
- Provide specific details pertaining to: temporary soil stabilization, temporary sediment control, wind erosion control and tracking control;
- Discuss the maintenance schedule of temporary soil stabilization, temporary sediment control, wind erosion control and tracking control; and
- Identify measures that are proposed to prevent erosion and sedimentation in the completed condition of the project.

This project involves a site disturbance of one acre or greater, so it shall comply with the requirements of the National Pollutant Discharge Elimination System (NPDES). The Applicant shall submit a Notice of Intent (NOI) to comply with the General Permit for Construction Activity with the State Water Resources Control Board (SWRCB) and complete construction and industrial phase Stormwater Pollution Prevention Plans prior to construction and operation. The Applicant shall provide the County with the Waste Discharge Identification Number (WDID No.) or with verification that an exemption has been granted by the Regional Water Quality Control Board (RWQCB).

1.1.1 CEC Data Request

Following are the data requests provided by the CEC for preparation of this DESCP:

- **Vicinity Map** – A map(s) at a minimum scale 1"=100' indicating the location of all project elements (construction site, laydown area, pipelines, etc.) with depictions of all significant geographic features including swales, storm drains, and sensitive areas.
- **Site Delineation** – All areas subject to soil disturbance (project site, laydown area, all linear facilities, landscaping areas, and any other project elements) shall be delineated showing boundary lines of all construction/demolition areas and the location of all existing and proposed structures, pipelines, roads, and drainage facilities.
- **Watercourses and Critical Areas** – The DESCP shall show the location of all nearby watercourses including swales, storm drains, and drainage ditches. Indicate the proximity of those features to the construction, laydown, and landscape areas and all transmission and pipeline construction corridors.
- **Drainage Map** – The DESCP shall provide a topographic site map(s) at a minimum scale 1"=100' showing all existing, interim and proposed drainage systems and drainage area boundaries. On the map, spot elevations are required where relatively flat conditions exist. The

spot elevations and contours shall be extended off-site for a minimum distance of 100 feet in flat terrain.

- **Drainage of Project Site Narrative -** The DESCP shall include a narrative of the drainage measures to be taken to protect the site and downstream facilities. The narrative should include the summary pages from the hydraulic analysis prepared by a professional engineer/erosion control specialist. The narrative shall state the watershed size(s) in acres that was used in the calculation of drainage measures. The hydraulic analysis should be used to support the selection of Best Management Practices (BMPs) and structural controls to divert off-site and on-site drainage around or through the construction and laydown areas.
- **Clearing and Grading Plans** – The DESCP shall provide a delineation of all areas to be cleared of vegetation and areas to be preserved. The plan shall provide elevations, slopes, locations, and extent of all proposed grading as shown by contours, cross sections or other means. The locations of any disposal areas, fills, or other special features will also be shown. Illustrate existing and proposed topography tying in proposed contours with existing topography.
- **Clearing and Grading Narrative** - The DESCP shall include a table with the quantities of material excavated or filled for the site and all project elements of the project (project site, laydown area, transmission corridors, and pipeline corridors) whether such excavations or fill is temporary or permanent, and the amount of such material to be imported or exported.
- **Best Management Practices Plan** – The DESCP shall identify on the topographic site map(s) the location of the site specific BMPs to be employed during each phase of construction (initial grading/demolition, project element excavation and construction, and final grading/stabilization). BMPs shall include measures designed to prevent wind and water erosion.
- **Best Management Practices Narrative** - The DESCP shall show the location, timing, and maintenance schedule of all erosion and sediment control BMPs to be used prior to initial grading, for all project elements (site, pipelines, etc.) related to excavations and construction, final grading/stabilization, and post-construction. Separate BMP implementation schedules shall be provided for each project element for each phase of construction. The maintenance schedule should include post-construction maintenance of structural control BMPs, or a statement provided when such information will be available. Be sure to include provisions for wet-season work.

Note that the maps provided in this plan are smaller than the requested 1"=100' scale due to the size of the project.

1.2 PROJECT DESCRIPTION

Ausra CA II, LLC (dba Carrizo Energy, LLC), hereafter referred to as the Applicant, is proposing Carrizo Energy Solar Farm (CESF or Project), which will consist of approximately one hundred and ninety-five Compact Linear Fresnel Reflector solar concentrating lines, and associated steam drums, steam turbine generators, air-cooled condensers, and infrastructure, producing up to a nominal 177 megawatts net. The proposed CESF will be owned and operated by the Applicant. The solar field will operate daily from sunrise to sunset. Typical operating hours for the CESF will be approximately 13 hours per day, or an average of 4,765 hours per year.

The CESF is located in an unincorporated area of eastern San Luis Obispo County, west of Simmler and northwest of California Valley, California. The Project is approximately five miles west of Kern County. The CESF includes the solar farm site, a minimal offsite transmission system connection, and construction laydown area. The CESF site will encompass approximately 640 acres of fenced area on Section 28, Township 29 South, Range 18 East, on the California Valley and La Panza NE United States Geological Survey (USGS) 7.5 minute quadrangle maps, adjacent to California State Route 58 (SR-58)/Carrisa Highway. The 380-acre construction laydown area would be located entirely on Section 33, Township 29 South, Range 18 East, on the California Valley USGS 7.5-minute series quadrangle map, directly south of the Project site across SR-58. A project Vicinity is provided as Figure 1.

The construction laydown area will be 380 acres and is located on the northern portion of Section 33. The construction laydown area includes areas for staging, equipment and material storage, component fabrication and assembly; construction offices and buildings; and a temporary fueling station. Construction of two permanent crossings for vehicle access will be required along the access road as shown in Figure 2. This access road will also act as a turn-around onto SR-58 for large construction vehicles during construction and operation of the CESF. Abandoned farm structures currently on Section 28 and the abandoned residence on Section 33 will be demolished prior to change of ownership.

1.3 PROJECT SCHEDULE

The Project anticipates receipt of the CEC license to construct by November 2008. Construction of the CESF, from site preparation and grading to full commercial operation, is expected to take approximately 35 months. Site construction activities will commence in the first quarter of 2009 and continue through the 35-month construction schedule. The Project is scheduled to be online and available for dispatch into the grid on or before May 31, 2010. It is currently anticipated that the entire CESF will be online and in commercial service by the first quarter of 2012.

Heavy construction will be scheduled to occur between 7:00 am and 7:00 pm, Monday through Friday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities.

Some activities will continue 24 hours per day, 7 days per week. These activities include, but are not limited to, refueling equipment, staging material for the following day's construction activities, quality assurance/control, and commissioning.

SECTION 2 DRAINAGE

2.1 DRAINAGE PATTERNS AND FLOODING

2.1.1 Existing Drainage Patterns

The project site is located on the Carrizo Plain just north of Soda Lake in San Luis Obispo County. The CESF is located within the Central Coast Hydrologic Region that covers approximately 11,300 square miles in central California (see Figure 5.5-2 in the Project Application for Certification (AFC) Document). There are no known named drainages within the CESF with beneficial uses listed within the Central Coast RWQCB Basin Plan for the Carrizo Plain Hydrologic Unit. Annual average rainfall in the vicinity of the project ranges from approximately 7 to 10 inches.

The Project site currently consists primarily of disturbed ranchland. The Project site is generally flat, sloping gently to the southwest with elevations ranging from approximately 2,064 feet to 2,014 feet above mean sea level (MSL). The portion of stormwater runoff that is not absorbed into the ground is sheet flow and follows the terrain to the south and west, is tributary to the main Carrizo Plain ephemeral drainage channel that crosses through the southern portion of the construction laydown area, and then is tributary to Soda Lake over ten miles downstream. Portions of the main Carrizo Plain drainage within the temporary construction staging area are jurisdictional Waters of the United States (WUS) but is not listed on the proposed 2006 Clean Water Act (CWA), Section 303(d) list of water quality limited segments. See Figure 4-1 for the watersheds in the vicinity of the Project.

Federal Emergency Management Agency (FEMA)'s Flood Insurance Rate Map (FIRM) Community Panel Numbers 0603040550B and 0603040575B (1982) show that the CESF and temporary construction laydown area are within FEMA designated 100-year 'Zone A' floodplain areas within Sections 28 and 33. As discussed in the project description, the CESF site is generally not subject to flooding; however, an area along Tracy Lane beginning approximately 174 m (570 ft) onto Section 28 is within the 100-year flood zone. Additionally, the main Carrizo Plain drainage feature running through the southern portion of Section 33 within the temporary construction laydown area is within a FEMA designated 'Zone A' floodplain boundary. Base Flood Elevations (BFE) and hazard factors have not been determined for these areas. The BFE will be established during final engineering design if necessary for design purposes.

2.1.2 Proposed Drainage Patterns

2.1.2.1 Onsite Drainage

Stormwater runoff for the CESF is directed from the paved (i.e., roads and parking lots) and non-paved areas to local collection swales and infiltration areas and allowed to percolate and evaporate. Area grading is used to guide the rain water into a number of localized detention/infiltration areas located throughout the Solar Farm. Given its desert nature and the very limited rainfall that occurs on the Carrizo Plain, the majority of the water from this low intensity rainfall will be absorbed into the ground. The detention/infiltration basins are integrated with the Solar farm equipment and throughout the solar field to collect any excess rainwater that is not absorbed into the ground. The infiltration areas will be used to store and infiltrate the stormwater runoff.

Rain falling in the power block area will be collected and directed to the surrounding solar field using a system of swales integrated with the site-grading plan. Rainfall from vehicle parking and paved areas in the power block will be collected and directed to an Oil Water Separator (OWS) prior to discharge to the raw water tank for recovery. Rainwater collected from active areas (i.e., potentially contaminated by oil) is routed to an OWS. Following inspection, water from the OWS is sent to the wastewater tank and then to the water treatment system for recovery.

Stormwater discharges from construction activities are subject to BMPs designed and implemented for construction activities. From a temporary construction perspective, groundwater is not expected to be encountered during construction; however, if necessary, appropriate construction phase BMPs will be used to minimize impacts to surface water and groundwater quality. Although there will be minimal changes in absorption rates, drainage patterns, or the rate or amount of surface runoff due to the surface paving and the presence of new structures, surface water runoff will be conveyed, contained, and allowed to evaporate, percolate, or drain similar to existing conditions. The site is relatively flat so there is not a significant risk for accelerated erosion after implementation of construction and post-construction phase erosion and sediment control BMPs.

2.1.2.2 Offsite Drainage

The flows generated from the off-site watershed will be directed around the site via the proposed drainage swales. The drainage swales will be constructed adjacent to the four sides of Section 28. The swales will direct the runoff in the southwesterly direction and outlet at the southwestern corner of Section 28. Ultimately, the runoff will flow across Highway-58, confluence with the existing creek, traverse Section 33 and continue on its historical flow path in the southeasterly direction.

The Project site's perimeter swale is designed to intercept upgradient storm water runoff from adjoining land and convey that stormwater around the site, directing it to the existing natural water course located at the southwest corner of the Project site. Upgradient flows that cannot be contained in the perimeter swales will sheet flow across the site (excluding the power block) and either infiltrate or sheet flow to the southwest corner as under existing conditions. The perimeter swales are not designed to convey significant runoff from the multiple onsite detention/infiltration areas.

The depths and widths of the perimeter swale vary from approximately 7 feet deep by 50 feet wide to 3 feet deep by 124 feet wide. Slopes vary from approximately one percent to less than one-tenth of one percent. As designed, the capacity and velocity control provided by the perimeter swales provide the capability of channeling typical annual upgradient storm water around the site as well as allowing that storm water to percolate into the ground.

Ultimately, the offsite runoff and any excess onsite runoff that is not infiltrated will be conveyed into the main drainage channel. The smaller perimeter swales along the northerly section of the site currently have the capacity to convey approximately the 5- to 10-year storm event flows from the two northerly offsite drainage channels. The larger swales along the westerly and easterly portions of the site have capacity for up to the 100-year storm event. Excess flows along the northerly Project boundary will sheet flow across the site (with the exception of the power production area) and be captured in the onsite detention/infiltration areas.

There are two proposed permanent drainage crossings within the construction laydown area. These culverts will be designed to convey typical seasonal flows through the drainage.

2.2 DRAINAGE CALCULATIONS

The site is located in an unincorporated area of San Luis Obispo County, therefore, San Luis Obispo County hydrology and hydraulic standards were used for onsite stormwater calculations. San Luis Obispo County standards require the 100-year design for drainage areas greater than 4 square miles, the 50-year design storm for drainage areas from 1 to 4 square miles, and the 25-year design storm for drainage areas less than 1 square mile.

USGS regression equations within the National Flood Frequency (NFF) Program were used to quantify the runoff generated from the offsite watersheds. The NFF Program includes regression equations for approximately 289 flood regions nationwide. The regression equations were developed from peak-discharge records of 10 years or longer, available as of 1975, at more than 700 gaging stations throughout the State. The project site is within the Central Coast Region. Therefore, the regression equations used were specific for that region. The total project watershed including the project site and construction laydown area comprises approximately 41.3 square miles of predominately agricultural and undeveloped land. Of the 41.3 square miles, 31.6 square miles are tributary to the western boundary of the construction laydown area. The following table illustrates the anticipated surface runoff tributary to the project site from offsite areas. Refer to the Off-Site Watershed Drainage Map, Figure 4-1.

Table 1
Offsite Flowrates

RUNOFF OUTPUT FROM THE NATIONAL FLOOD FREQUENCY PROGRAM

Basin	Area	2-Yr Storm	5-Yr Storm	10-Yr Storm	25-Yr Storm	50-Yr Storm	100-Yr Storm	500-Yr Storm
	(SQ.MI.)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)
1	31.6	22.1	134	328	784	1390	2220	5650
2	3.9	3.12	19.5	48.9	120	214	349	912
3	4.3	3.33	21	52.7	130	231	377	989
4-Proposed Project Site	1.6	1.5	9.22	23	56.5	99.9	163	427
Pre-Overall Project Site	41.3	28.2	171	417	995	1770	2810	7140

The 50-year, 24-hour storm event produces a rainfall of 0.17-in per hour (in/hr) for a total rainfall of approximately 4-inches. Calculations for this storm event frequency would produce 213 af of rainwater across the entire solar field.

The proposed site design will create numerous detention/infiltration areas that will capture the generated stormwater runoff. The retention requirement for the County of San Luis Obispo is based on holding the 50-year storm, 10-hour intensity for 10-hour duration. Calculations were performed to verify that the multiple onsite detention/infiltration areas have adequate volume to store the stormwater runoff generated from a 50-year storm per San Luis Obispo County standards. Based upon these calculations, all proposed

onsite runoff up through the 50-year storm can be stored onsite without generating runoff to the perimeter swales. The amount of surface runoff was also evaluated on an average annual basis.

Under existing conditions approximately 203 acre-feet per year (afy) of stormwater would runoff the 640 acre site assuming an average annual rainfall of 10 inches and a runoff coefficient of 0.38. Under proposed conditions, the 640 acre site would generate approximately 213 acre-feet (af) of stormwater runoff annually with a runoff coefficient of 0.40; however, there would be no surface runoff from the site under normal conditions. The detention/infiltration areas are designed to capture at least the 50-year rainfall event. Rainfall would be captured onsite in the terrace detention/infiltration areas and allowed to infiltrate and evaporate.

Per the Biology analysis there are no vernal pools or vernal pool habitat areas on the project site or construction laydown area. Additionally, there are no wetlands associated with the jurisdictional Waters of the United States delineation. The jurisdictional Waters of the U.S. delineation area is not a wetland or vernal pool that is reliant on annual flows from a biological standpoint. Therefore, the proposed hydrology condition will not adversely affect this area from a biological standpoint.

The total tributary area to the jurisdictional Waters of the United States within the construction laydown area is approximately 50 square miles. The associated total potential runoff flow volume is approximately 10,133 afy, assuming 10 inches annual rainfall and a runoff coefficient of 0.38. This is a conservative flow volume that does not consider storage and infiltration areas within the 50 square mile watershed upstream of the construction laydown area. Under the proposed condition, the onsite average annual rainfall will be collected and infiltrated/evaporated onsite, and the existing upstream flows will be routed around the site and flow to the jurisdictional Water. Under the proposed annual average condition, there will be a reduction in tributary area from 50 square miles to 49 square miles (a 2-percent decrease). Total runoff volume tributary to the jurisdictional Water under this proposed condition, would be approximately 9,930 afy, a reduction of 203 afy. This is a minor reduction and is not considered a significant amount because this area is not a wetland or vernal pool that is reliant on annual flows from a biological standpoint.

Table 2 provides the onsite proposed condition runoff values calculated using the rational method. The runoff generated onsite will be captured onsite within multiple detention/infiltration areas. These areas will allow the stormwater to infiltrate into the ground and be evaporated.

Total site area (including construction laydown area)	1020	acres
Percentage impervious area before construction	<1	%
Runoff coefficient before construction	0.38	
Percentage impervious area after construction*	<5	%
Runoff coefficient after construction	0.40	

* Percentage impervious conservatively assumes entire power block, access road, and parking areas are impervious. Areas under the reflectors are pervious.

Table 2
Onsite Stormwater Runoff Flows

STORM EVENT (YR)	INTENSITY (IN/HR)	Total Existing Onsite Flows* (CFS)	Total Proposed Onsite Flows* (CFS)
2	0.50	122	123
5	0.70	170	173
10	0.80	195	197
25	1.00	243	247
50	1.10	268	271
100	1.20	292	296

*These runoff values are based upon the Rational Method and are conservative estimates of flow for comparison purposes.

Based upon the current layout provided in the Project AFC, portions of the northeast corner of the temporary fueling station boundaries within the construction laydown area are within the FEMA delineated 100-year, Zone A floodplain limits based upon a comparison of the fueling station boundaries with the FEMA Flood Insurance Rate Map. However, the majority of the designated area, including the fuel storage tanks, is outside the 100-year floodplain. The FEMA designated 100-year floodplain widths in this area vary from approximately 400 to 600 feet in width. Based upon the 100-year flood flowrates calculated and provided in Table 1, available topography, and Manning's normal depth calculations, the 100-year flood depths in this area are approximately 4 to 6 feet deep. The temporary fueling area would be placed above this depth or could be protected by berms along the channel side of the facility. The permanent fueling facility on the power block (along with all other facilities on the power block) will be elevated above the 100-year flood level.

SECTION 3 CLEARING AND GRADING

Table 3 provides the anticipated quantities of permanent material excavated or filled for the site and project elements (project site, laydown area, transmission corridors, and pipeline corridors).

Table 3
Anticipated Grading Quantities

Cut	Fill	Import	Export
1,200,000 cy	1,200,000 cy	0 cy	0 cy

3.1 SITE PREPARATION

Site facilities and amenities will be established during the first month of the solar field build out. The majority of these will be located in the construction laydown area, Section 33. These will consist of site offices, restroom facilities, meal rooms, parking areas, vehicle marshalling areas, and construction material/equipment storage areas.

The planned location of the facility is generally flat, at an elevation of approximately 622 m (2,040 feet) above MSL. The power block will be graded to provide a level site area for the facilities at approximately 619 m (2,030 feet) above MSL. Movement of material will be limited to that required for a level site for the CESF power block equipment and facilities. No fill is anticipated, but in the event fill is required, material present onsite is expected to be adequate, subject to final geotechnical evaluation.

The topography of Section 28 is predominantly flat with a slight downward slope to the south and east. Construction of the solar field requires level ground, so the blocks will be prepared in a terraced configuration. This will best achieve the necessary leveled effects while minimizing the amount of cut and fill operations. Any material cut from the site in preparation for construction will be used to improve adjacent areas in Section 33.

Site clearing and grading will occur during the first six months of construction. Preliminary numbers based on the Grading and Drainage Plan are 1,200,000 cubic yards of cut and 1,200,000 cubic yards of fill. Field 1, blocks 1 and 2 will be prepared first, then blocks 3 and 4, followed by field 2, blocks 1 though 4 (see AFC Figure 3.4-8). This will be undertaken on a continuous rolling basis across the site. There will be some overlap in these operations.

The earth works process will be undertaken using standard contractor equipment. This will consist of dozers, elevating scrapers, hydraulic excavators, tired loaders, compacting rollers, and dump trucks.

3.2 FOUNDATIONS

Based on preliminary geotechnical investigations, it is expected that lightly loaded equipment and structures such as the solar reflectors and receivers will be supported on shallow footings. Shallow foundations will be a combination of shallow drilled shafts, continuous strip and isolated spread footings.

The solar field Receivers and Reflectors will be supported on shallow drilled shaft foundations of reinforced concrete or individual spread footings. These footings run north/south and will be grouped for a unit of 25 Receiver Lines. Each row of the Receiver Lines will be 2.2m (7.5') wide and 384 m (1,268') long. Each line requires excavation of 120 m^3 (150 yd^3) of earth for footings. Excavation will be undertaken using hydraulic excavators and drilling augers. This machinery will be laser or Global Positioning System (GPS) guided. The excavated material will be spread evenly across the array lines between the strip footings.

All concrete foundations will be reinforced concrete designed. The top of the concrete foundation will be approximately 30 cm (12 inches) above the earth surface after the site preparation.

3.3 GROUNDWATER

Ground water levels are a minimum of 4.3 m (14 feet) below ground surface (bgs) and are approximately 9.1 m (30 feet) bgs in the vicinity of excavation. The deepest CESF excavations are anticipated to be approximately 2.4 m (8 feet) bgs in the power black and 0.9 m (3 feet) bgs in the solar field. Accordingly, CESF does not anticipate encountering ground water and does not expect to have to dewater. If ground water is encountered and dewatering is required, then approved BMPs (e.g., NS-2 from the State of California Department of Transportation Construction Site Best Management Practices Manual) will be employed.

3.4 REFLECTOR/RECEIVER LINE CONSTRUCTION

During the construction, temporary site services will be in place. Power will be provided by mobile diesel generators. Water will be available at points around the site, as well as on a series of mobile equipment.

Construction will generally progress from the northern boundary towards the south through each block. As a result of this simultaneous construction, construction within the solar field, construction of linears, and associated earth moving operations will occur throughout the majority of the 35 month construction period.

3.5 TRANSMISSION FACILITIES

The CESF will be connected to the power grid through the Pacific Gas & Electric (PG&E) Midway Substation by a single circuit three-phase 230 kV transmission line. It is expected final design and construction of transmission facilities and reliability upgrades (should they be required) will be completed by PG&E.

The CESF transmission system will require construction of approximately 260 m (850 feet) of 230 kV transmission line. As depicted in Figure 3.4-4, the CESF transmission line extends from the Project site switchyard to a point along PG&E's Morro Bay–Midway right-of-way (ROW). The overhead line begins at the dead-end structure in the switchyard and continues east along the northern edge of Section 28 for approximately 213 m (700 feet), then north for 46 m (150 feet) to interconnect with the existing PG&E Morro Bay–Midway 230 kV transmission line (Line 1). The transmission line is within the Project site boundary except for a 27 m (90-foot) long segment that connects to the PG&E tower. Construction of the

line will include a dead end structure in the switchyard and two tubular steel poles with concrete foundations and new 500 MCM ACSR conductors.

The power poles will be spaced at approximately 150 m to 170 m (500 feet to 550 feet) apart (a final calculation taking into account the grading and other factors will determine the final spacing). Only two poles are expected to be required.

Construction of the CESF transmission line includes the following elements:

- Marshalling Yards: Staging areas for trailers, office personnel, equipment, material staging, and employee parking will be provided in a disturbed area along the northern boundary of the site.
- Road Work: As needed, dirt roads will be cleared for access along the transmission line route coinciding with the northern perimeter road for the site to provide access to the tower locations.
- Foundations: Each pole will have a foundation installed that will require curing prior to the pole installation. These pole foundations will be installed in locations that avoid sensitive environmental resources identified in Project environmental surveys.
- Pole Erection: Each pole, made up of two sections, will be assembled onsite and welded together, and then insulators and conductor hardware will be installed.
- Conductors: From pulling sites, the conductors will be installed, sagged, and permanently connected to the insulators.
- Pulling Sites: There are only two pulling sites required to install the conductors along this segment of the transmission line. The sites will be on existing access roads or access roads that will be installed as part of the transmission line installation.
- Communication System: The overhead ground/fiber optic communications optical ground wire (OPGW) cable will be installed using the same pulling sites as were used for the conductor installation.
- Cleanup: Although cleanup will be ongoing as the work proceeds, once construction is completed, a final cleanup of the entire Segment 1 will be performed to clear the area of any remaining construction-related debris.

SECTION 4 CONSTRUCTION BMPS

This DESCP includes erosion control measures that shall be implemented on this project and shall include source control, including protection of stockpiles, protection of slopes, protection of all disturbed areas, and protection of access roads. In addition, perimeter containment measures shall be placed prior to the commencement of grading and site disturbance activities unless the San Luis Obispo Public Works Department determines temporary measures to be unnecessary based upon location, site characteristics or time of year. The intent of erosion control measures shall be to keep all sediment from entering a swale, drainage way, watercourse, or onto adjacent properties.

Stormwater discharges from construction activities are subject to BMPs designed and implemented for construction activities. Approved BMPs appropriate to the site and specific conditions will be selected from the State of California Department of Transportation Construction Site Best Management Practices Manual. Selected BMPs may include, but are not limited to, the following, as appropriate:

- Temporary Soil Stabilization techniques such as scheduling construction sequences to minimize land disturbance during the rainy and non-rainy seasons and employing BMPs appropriate for the season; preservation of existing vegetation by marking areas of preservation with temporary orange propylene fencing; use of geotextiles, mats, plastic covers or erosion control blankets to stabilize disturbed areas and protect soils from erosion by wind or water; use of earth dikes, drainage swales and lined ditches to intercept, divert and convey surface runoff to prevent erosion; use of outlet protection devices and velocity dissipation devices at pipe outlets to prevent scour and erosion from stormwater flows.
- Sediment Control techniques including use of silt fences, straw bales, and/or fiber rolls to intercept and slow the flow of sediment laden runoff such that sediment settles before runoff leaves the site.
- Wind Erosion control by applying water or dust palliatives as required to prevent or alleviate wind blown dust.
- Tracking Control techniques to limit track-out include stabilized points of entering and exiting the site and stabilized construction roadways on the site.

4.1 IMPLEMENTATION SCHEDULE

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

The final Stormwater Pollution Prevention Plan (SWPPP) shall provide a graphical project schedule. The schedule shall clearly show how the rainy season relates to soil-disturbing and re-stabilization activities. The schedule shall contain an adequate level of detail to show major activities sequenced with implementation of construction site BMPs, including:

- Project start and finish dates.
- Rainy season dates.
- Annual certifications.
- Mobilization dates.
- Mass clearing and grubbing/roadside clearing dates.
- Major grading/excavation dates.
- Special dates named in other permits such as Fish and Game and Army Corps of Engineers Permits.
- Dates for submittal of SWPPP Amendments required by the contract documents.
- Annual submittal of rainy season implementation schedule if required by the Owner or Permittee.
- Dates for implementation of pre-rainy season temporary soil stabilization and temporary sediment control BMPs, if required by the contract documents.
- Rainy season implementation schedule.
  - Deployment of temporary soil stabilization BMPs.
  - Deployment of temporary sediment control BMPs.
  - Deployment of wind erosion control BMPs.
  - Deployment of tracking control BMPs.
  - Deployment of non-stormwater BMPs.
  - Deployment of waste management and materials pollution control BMPs.
- Non-rainy season implementation schedule.
  - Deployment of temporary soil stabilization BMPs.
  - Deployment of temporary sediment control BMPs.
  - Deployment of wind erosion control BMPs.
  - Deployment of tracking control BMPs.
  - Deployment of non-stormwater BMPs.

  - Deployment of waste management and materials pollution control BMPs.
- Paving, saw-cutting, and any other pavement related operations.
- Major planned stockpiling operations.
- Dates for other significant long-term operations or activities that may plan non-stormwater discharges.
- Final stabilization activities staged over time for each area of the project.

4.2 TEMPORARY SOIL STABILIZATION (EROSION CONTROL)

The following measures will be used in the project for erosion control.

4.2.1 Preservation of Existing Vegetation

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs, or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where local, state, and federal government require preservation, such as drainage features. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.

4.2.2 Earth Dikes/Drainage Swales & Lined Ditches

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

The project proposes to construct drainage swales to surround Section 28. The swales will redirect off-site runoff around the site to ensure off-site flows will not impact the on-site development. The swales will convey the off-site runoff in a southwesterly direction and will exit at the southwestern corner of Section 28. The flows will continue across Highway-58 and confluence with the existing creek that traverses across Section 33 in the southeasterly direction.

4.2.3 Outlet Protection/Velocity Dissipation Devices

Outlet protection is a physical device composed of rock, grouted riprap, or concrete rubble, which is placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated, high velocity flows.

Whenever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This includes temporary diversion structures to divert run-on during construction.

Velocity dissipation will be used at all culvert locations and at the southwestern corner of Section 28. There will likely be a total of 4 culvert or road crossings that will require velocity dissipation devices at: 1) the construction entrance area at the northeastern corner of Section 28; 2) the confluence location of the drainage swales, before the runoff surface flows across SR-58; 3) the two permanent culvert crossings within the construction laydown area.

4.2.4 Erosion Control Blankets and Geotextiles

The overall existing and proposed site is relatively flat. Therefore, rolled erosion control materials will be used at limited areas throughout the site. Geotextiles, mats, plastic covers or erosion control blankets will be considered for use on slopes steeper than 3 to 1 (including stockpiles) to protect soils from erosion by wind or water.

4.2.5 Streambank Stabilization

Stream channels, streambanks, and associated riparian areas are dynamic and sensitive ecosystems that respond to changes in land use activity. Streambank and channel disturbance resulting from construction activities can increase the stream's sediment load, which can cause channel erosion or sedimentation and have adverse affects on the biotic system. BMPs can reduce the discharge of sediment and other pollutants to minimize the impact of construction activities on watercourses.

Specific permit requirements or mitigation measures such as RWQCB 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game supercede the guidance in this BMP.

4.3 TEMPORARY SEDIMENT CONTROL

The following measures will be used in the project for sediment control.

4.3.1 Linear Sediment Barriers (Silt Fence, Fiber Rolls, or Straw Bales)

A linear sediment control barrier is a temporary sediment barrier consisting of silt fence, fiber rolls, or straw bales used to trap sediment by intercepting and detaining small amounts of sediment-laden runoff from disturbed areas in order to promote sedimentation behind the barrier.

Linear sediment barriers are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They should also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion. Linear sediment barriers are generally *ineffective* in locations where the flow is concentrated and are only applicable for sheet or overland flows. Linear sediment barriers are most effective when used in combination with erosion controls.

Linear sediment barriers will be used to surround Section 28 and approximately half of Section 33. The total length is approximately 37,000 feet. Linear sediment barriers will also be used within the construction laydown area along the main drainage channel.

4.3.2 Sediment Trap

A sediment trap is a temporary basin formed by excavation or by constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is discharged.

Sediment traps may be suitable for use on larger projects with sufficient space for construction. Sediment traps should be considered for use:

- Where sediment-laden water may enter the drainage system or watercourses.
- On construction projects with disturbed areas during the rainy season.
- At the outlet of disturbed watersheds up to 5 acres.
- In association with dikes, temporary channels, and pipes used to convey runoff from disturbed areas.

4.3.3 Street Sweeping and Vacuuming

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Street Sweeping will be applied to all surrounding roadways, especially near the construction entrance/exit areas. The surrounding roadways are SR-58 and Tracy Lane.

4.4 WIND EROSION CONTROL

The following measures will be used in the project for wind erosion control.

Wind erosion or dust control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with short wet seasons and long hot dry seasons, allows the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph, and controlling the number and activity of vehicles on a site at any given time.

Wind Erosion control will be applied throughout the project site, especially where areas have been regraded to expose bare soils.

4.5 TRACKING CONTROL

The following measures will be used in the project for tracking control.

4.5.1 Stabilized Construction Entrance/Exit

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust. Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

There will be total of 3 construction entrances/exits used for the project site. One will be located at the northeastern corner of Section 28 just off Tracy Lane. The other two will be used in Section 33 where the construction access road opens to SR-58 on the north and east sides.

4.5.2 Stabilized Construction Roadway

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading and frequently maintained to prevent erosion and provide dust control.

Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion and dust. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become sources of sediment that may be transported offsite on the wheels of construction vehicles. Efficient construction road stabilization not only reduces onsite erosion but also can significantly speed onsite work, avoid instances of immobilized machinery and delivery vehicles, and generally improve site efficiency and working conditions during adverse weather.

Stabilized construction roadways will be employed on the construction access road within Section 33 and will be employed on the access roads within Section 28.

4.6 MAINTENANCE OF CONSTRUCTION BMPS

The following table lists guidelines for the maintenance of the BMPs projected to be used on this project.

Table 4
Maintenance Program of Construction BMPs

BEST MANAGEMENT PRACTICES (BMPs)	INSPECTION FREQUENCY (all controls)	MAINTENANCE/REPAIR PROGRAM
TEMPORARY EROSION CONTROL BMPs		
Scheduling	Daily during construction	- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions. - Amend the schedule when changes are warranted. - Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.
Preservation of Existing Vegetation	Daily during construction	- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots. - Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.
Earth Dikes & Drainage Swales	- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season. - Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.	- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed. - Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed. - Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.
Velocity Dissipation Devices	- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season. - Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur.	- Inspect apron for displacement of the riprap and damage to the underlying fabric. Repair fabric and replace riprap that has washed away. If riprap continues to wash away, consider using larger material. - Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately. -Temporary devices should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.

Table 4
Maintenance Program of Construction BMPs
(Continued)

BEST MANAGEMENT PRACTICES (BMPs)	INSPECTION FREQUENCY (all controls)	MAINTENANCE/REPAIR PROGRAM
Streambank Stabilization	- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation. - Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.	- Reshape berms as needed and replace lost or dislodged rock, and filter fabric. - Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
TEMPORARY SEDIMENT CONTROL BMPs		
Linear Sediment Barriers (Silt Fence, Fiber Rolls, and Straw Bales)	Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.	- Repair undercut barriers. - Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months. - Sediment barriers that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed of, and replaced with new barriers. - Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location. - Sediment barriers should be left in place until the upstream area is permanently stabilized. Until then, the barrier must be inspected and maintained. - Holes, depressions, or other ground disturbance caused by the removal of the barriers should be backfilled and repaired.

Table 4
Maintenance Program of Construction BMPs
(Continued)

BEST MANAGEMENT PRACTICES (BMPs)	INSPECTION FREQUENCY (all controls)	MAINTENANCE/REPAIR PROGRAM
Sediment Trap	Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.	- Examine basin banks for seepage and structural soundness. -Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed. -Check inlet and outlet area for erosion and stabilize if required. -Check fencing for damage and repair as needed. -Sediment that accumulates in the BMP must be periodically removed in order to maintain. BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage volume. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at appropriate locations. - Remove standing water from basin within 72 hours after accumulation. -To minimize vector production: remove accumulation of live and dead floating vegetation in basins during every inspection. - Remove excessive emergent and perimeter vegetation as needed or as advised by local or state vector control agencies.

Table 4
Maintenance Program of Construction BMPs
(Continued)

BEST MANAGEMENT PRACTICES (BMPs)	INSPECTION FREQUENCY (all controls)	MAINTENANCE/REPAIR PROGRAM
Check Dam	Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.	- Replace missing rock, bags, bales, etc. Replace bags or bales that have degraded or have become damaged. - If the check dam is used as a sediment capture device, sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. - Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location. - If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade. -Remove accumulated sediment prior to permanent seeding or soil stabilization. -Remove check dam and accumulated sediment when check dams are no longer needed.
Street Sweeping and Vacuuming	-Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season. - When actively in use, points of ingress and egress must be inspected daily.	- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions. - Be careful not to sweep up any unknown substance or any object that may be potentially hazardous. - Adjust brooms frequently; maximize efficiency of sweeping operations. - After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

Table 4
Maintenance Program of Construction BMPs
(Continued)

BEST MANAGEMENT PRACTICES (BMPs)	INSPECTION FREQUENCY (all controls)	MAINTENANCE/REPAIR PROGRAM
WIND EROSION CONTROL BMPs		
Wind Erosion Control	- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. - While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.	Check areas protected to ensure coverage. Most dust control measures require frequent, often daily, or multiple times per day attention.
TRACKING CONTROL BMPs		
Stabilized Construction Entrance/Exit	- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. - While activities associated with the BMPs are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation. - Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.	- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment. - Keep all temporary roadway ditches clear. - Check for damage and repair as needed. - Replace gravel material when surface voids are visible. - Remove all sediment deposited on paved roadways within 24 hours. - Remove gravel and filter fabric at completion of construction.
Stabilized Construction Roadway	- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. - While activities associated with the BMP are under way, impact weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.	- Keep all temporary roadway ditches clear. When no longer required, remove stabilized construction roadway and re-grade and repair slopes. - Periodically apply additional aggregate on gravel roads. - Active dirt construction roads are commonly watered three or more times per day during the dry season.

4.7 SOIL AND WIND EROSION CALCULATIONS

The CEC requested a discussion of how much soil will be lost from wind and water erosion, and to quantify the values with and without the proposed BMPs, both during construction and operations. Soil erosion due to water was estimated using the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Revised Universal Soil Loss Equation 2 (RUSLE2) computer program. Wind erosion was estimated using the USDA/NRCS Wind Erosion Prediction System (WEPS) computer model. Results of the erosion calculation estimates are provided in Table 5. The proposed condition soil erosion due to water (runoff) on the operations area is 0.25 ton/ac/yr, which is less than the existing condition due to terracing within the operations area which will collect runoff into a series of distributed infiltration areas.

Table 5
Soil and Wind Erosion Results

	Existing Condition (ton/ac/yr)	Proposed Condition during Construction without BMPs (ton/ac/yr)	Proposed Condition during Construction with BMPs (ton/ac/yr)	Proposed Condition during Operation (ton/ac/yr)
Water Soil Erosion	0.9	1.0	0.5	0.5
Wind Erosion	1 to 33	39	< 1	< 1

Note: Erosion rates are listed in tons per acre per year (ton/ac/yr).

SECTION 5 POST-CONSTRUCTION BMPS

Site soil stabilization will occur following construction; however, several alternatives are being considered to determine which solution best achieves the desired effect to: minimize wind erosion, prevent water erosion, minimize weed and undesired vegetation growth, as well as providing a suitable work surface. The soil may be amended to stabilize it, or covered to achieve the desired effect.

The laydown area will be returned to its "as found" condition as practical, by cleaning and clearing all material placed there for the construction effort and then by disking and tilling the surface to restore the top soil to an aerated condition.

The best way to mitigate stormwater impacts from new developments is to use practices to treat, store, and infiltrate runoff onsite before it can affect water bodies downstream. Innovative site designs that reduce imperviousness and smaller-scale low impact development practices dispersed throughout a site are excellent ways to achieve the goals of reducing flows and improving water quality.

Post-construction stormwater runoff from new development and redevelopments typically includes developing: strategies to implement a combination of structural and non-structural BMPs; and, a program to ensure adequate long-term operation and maintenance of BMPs.

5.1.1 Infiltration Areas

An infiltration area or basin is a shallow impoundment that is designed to infiltrate stormwater. Infiltration areas use the natural filtering ability of the she soil to remove pollutants in stormwater runoff. Infiltration facilities store runoff until it gradually exfiltrates through the soil and eventually into the water table. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems.

Infiltration areas perform better in well-drained permeable soils. Infiltration basins in areas of low permeability can require more frequent inspections and maintenance. Spill response procedures and controls should be implemented to prevent spills from reaching the infiltration system.

There will be several infiltration areas within the solar field on Section 28. The solar area will be graded such that any runoff/volume generated on-site will be captured, via sump locations, and infiltrate to recharge the aquifer.

SECTION 6 REFERENCES

The following documents were used in the preparation of this DESCP:

California Department of Transportation (Caltrans) Stormwater Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual, March 2003.

Caltrans Stormwater Quality Handbooks, Stormwater Pollution Prevention Plan and Water Pollution Control Program Preparation Manual, March 2007.

California Stormwater BMP Handbook – Construction, January 2003.

Carrizo Energy Solar Farm Application for Certification.

State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ, National Pollutant Discharge Elimination System (NPDES) Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity (General Permit).

State Water Resources Control Board Resolution No. 2001- 046, Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity (General Permit).

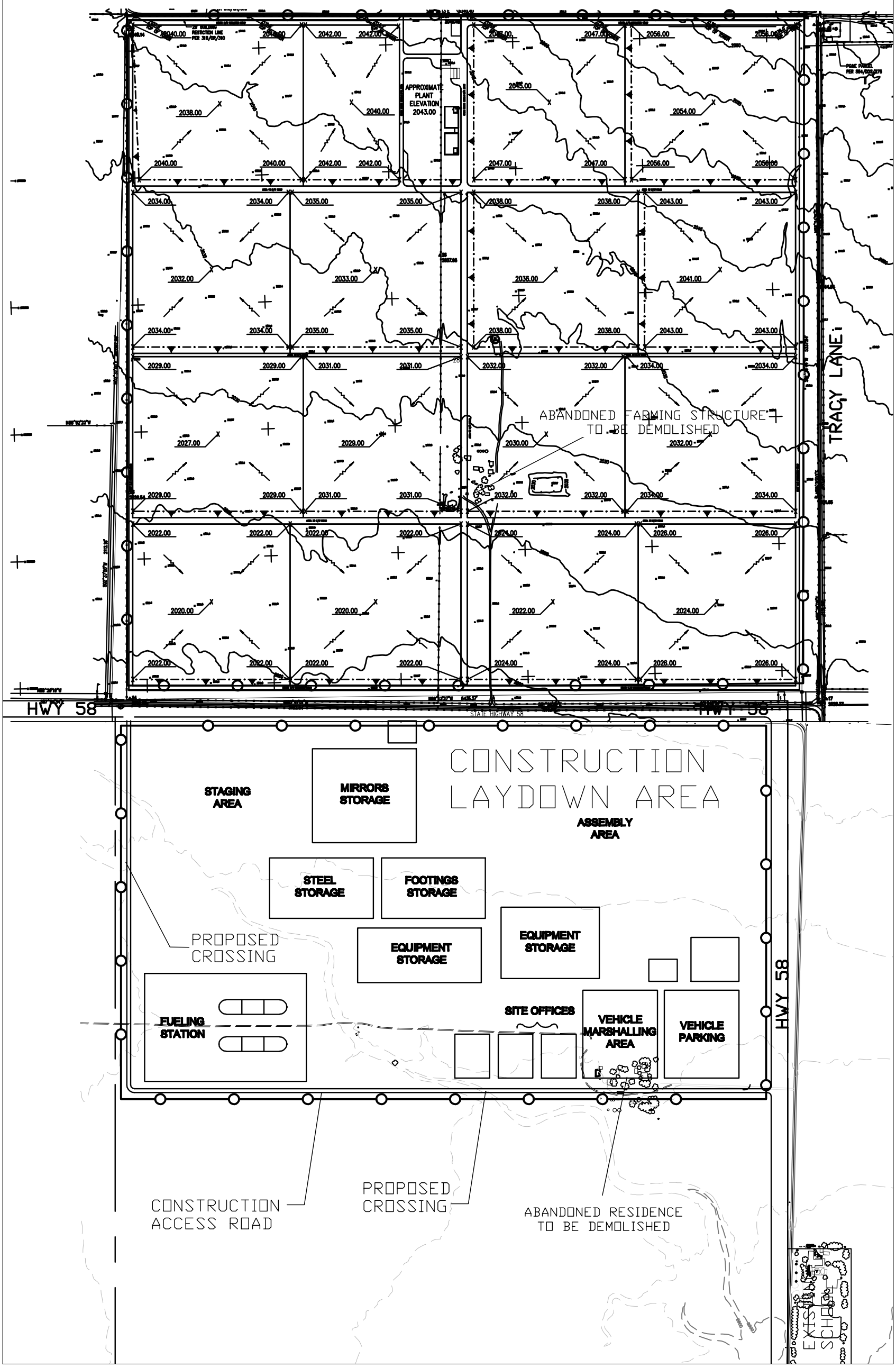
State Water Resources Control Board Resolution No. 2001-155, Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity (General Permit) to include Small Construction Activity (One to Five Acres).

State Water Resources Control Board (State Water Board) Water Quality Order No. 97-03-DWQ National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000001 (General Permit) Waste Discharge Requirements (WDRs) for Discharges of Stormwater Associated with Industrial Activities Excluding Construction Activities.

Upper Salinas-Las Tablas Resource Conservation District and the San Luis Obispo County Planning and Building Department, Erosion Control Handbook, A Practical Guide to Erosion Control and Sediment Reduction, Third Edition, July 2005.

CESF PROJECT SITE
DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
VICINITY MAP

URS	2000 0 2000 4000 Feet SCALE: 1"= 4000'	CHECKED BY: MM	DATE: 03-26-2008	FIGURE 1
		PM: AL	PROJ. NO: 22239472.01800	



NOTE: CONSTRUCTION AREA LAYOUT SUBJECT TO REVISION BASED UPON SITE AND CONSTRUCTION CONDITIONS.

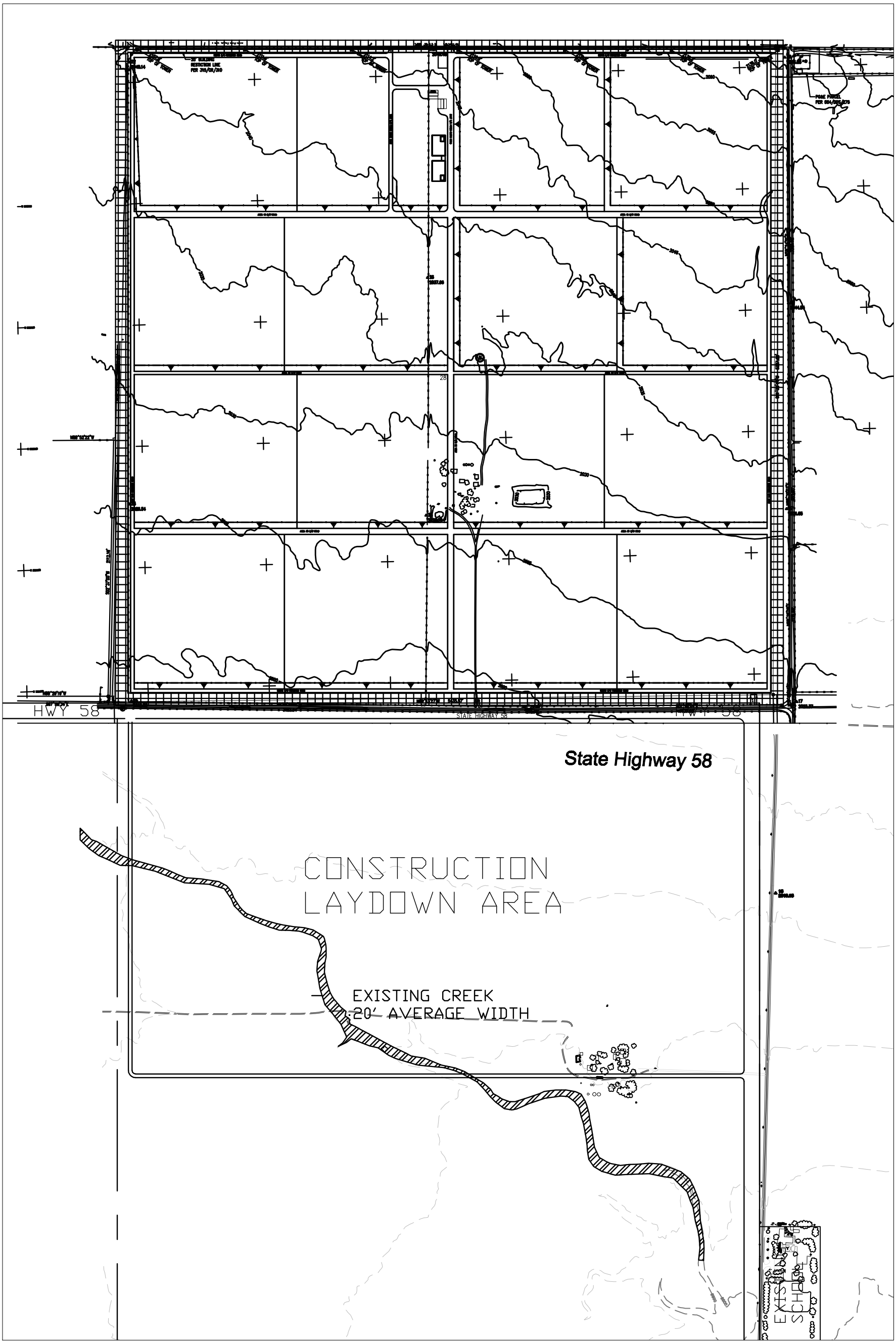
CESF PROJECT SITE
DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
SITE DELINEATION MAP

URS

400 0 400 800 Feet

SCALE: 1"= 800'

CHECKED BY: MM	DATE: 03-26-2008	FIGURE
PM: AL	PROJ. NO: 22239472.01800	2



EXISTING CREEK

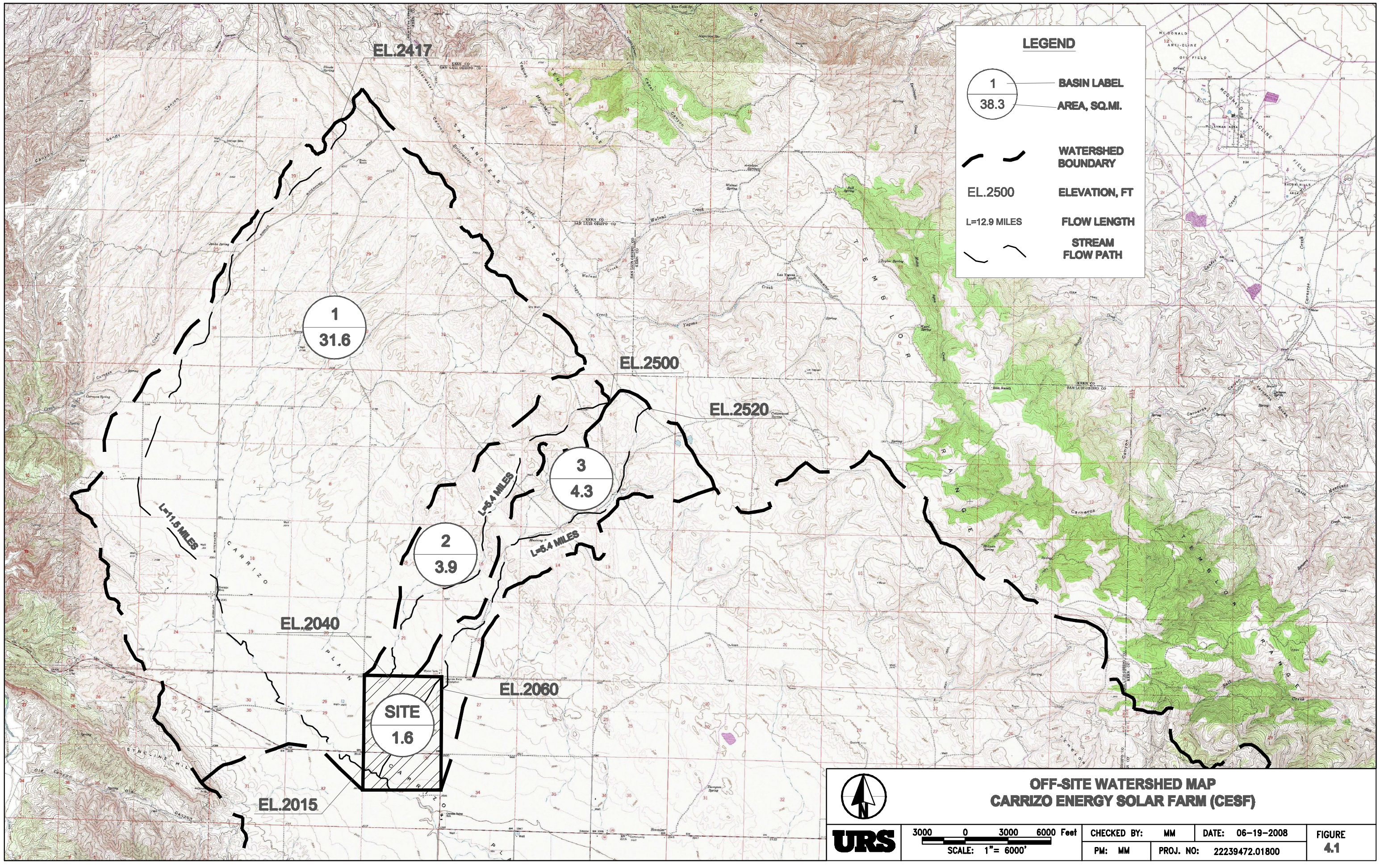
PROPOSED SWALES

CESF PROJECT SITE
DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
WATER COURSES AND CRITICAL AREAS

URS

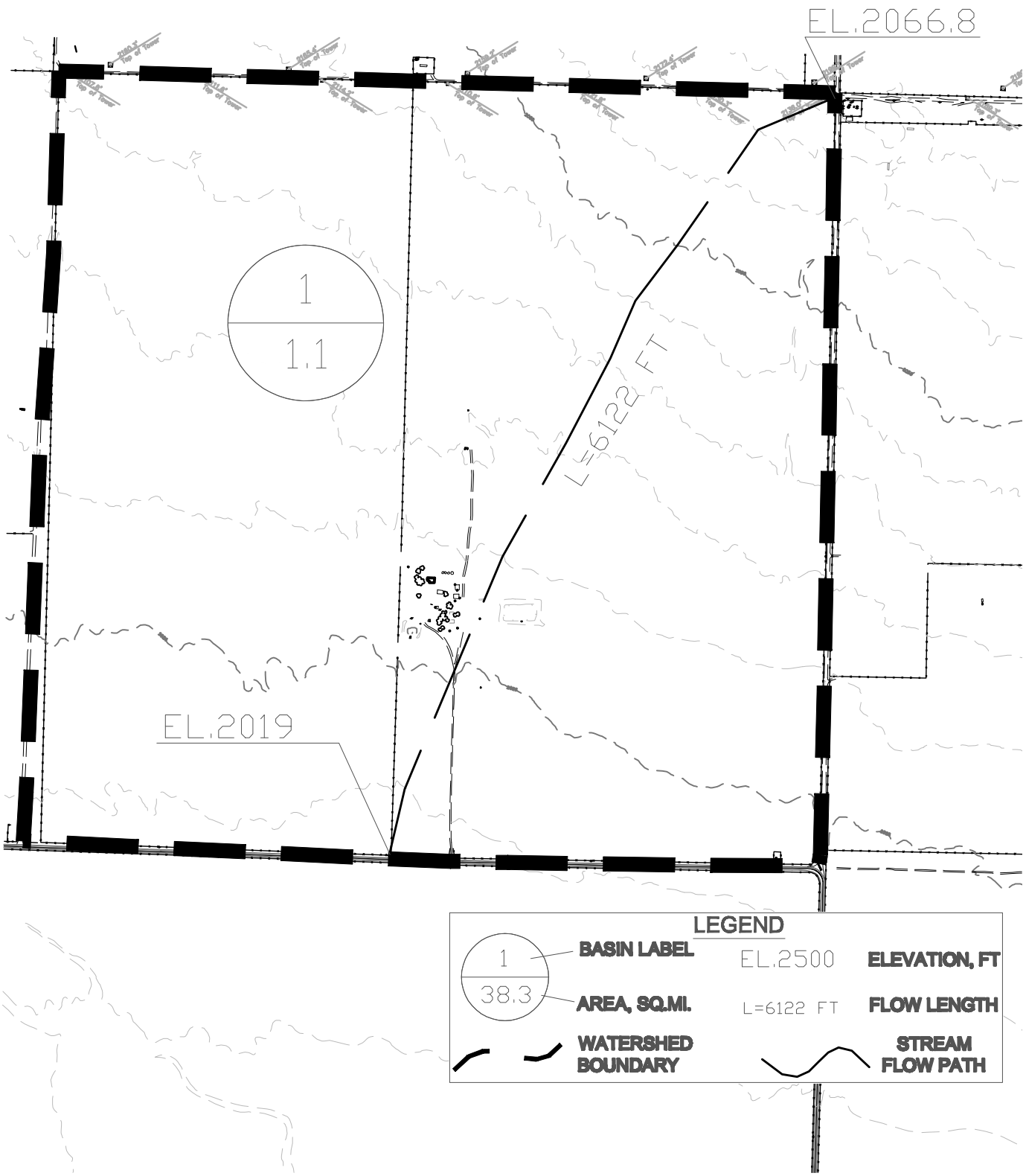
400 0 400 800 Feet
SCALE: 1"= 800'

CHECKED BY: MM	DATE: 03-26-2008	FIGURE 3
PM: AL	PROJ. NO: 22239472.01800	



OFF-SITE WATERSHED MAP
CARRIZO ENERGY SOLAR FARM (CESF)

URS	3000 0 3000 6000 Feet SCALE: 1"= 6000'	CHECKED BY: MM	DATE: 06-19-2008	FIGURE 4.1
		PM: MM	PROJ. NO: 22239472.01800	



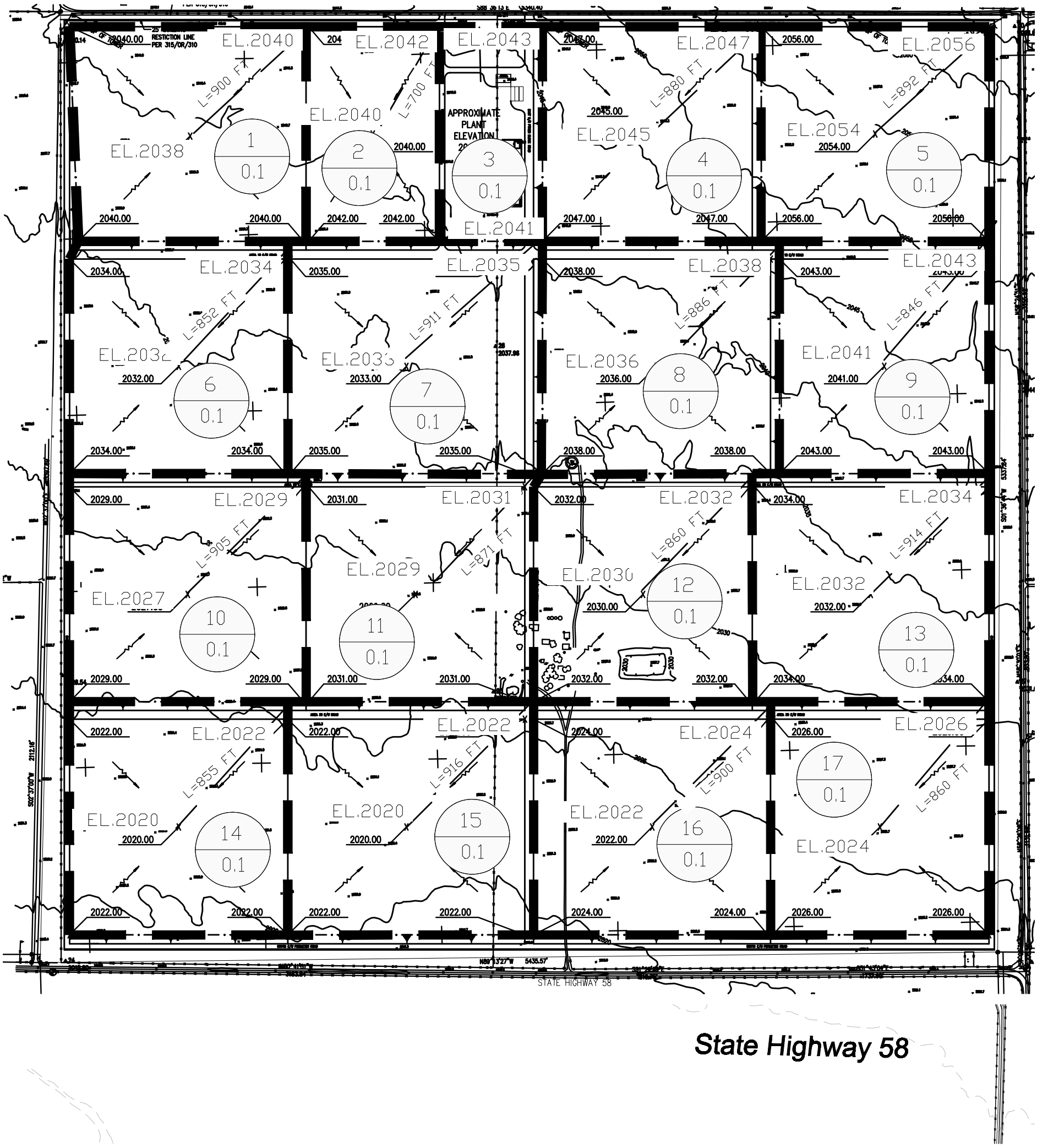
CESF PROJECT SITE
DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
PRELIMINARY EXISTING CONDITION HYDROLOGIC MAP

URS

500 0 500 1000 Feet

SCALE: 1"= 1000'

CHECKED BY: MM	DATE: 03-26-2008	FIGURE 4.2	
PM: AL	PROJ. NO: 22239472.01800		



LEGEND

1 / 38.3 — BASIN LABEL / AREA, SQ.MI.

EL.2500 — ELEVATION, FT

L=6122 FT — FLOW LENGTH

WATERSHED BOUNDARY

STREAM FLOW PATH

CESF PROJECT SITE
DRAINAGE, EROSION AND SEDIMENT EROSION PLAN
PRELIMINARY PROPOSED CONDITION HYDROLOGIC MAP

URS

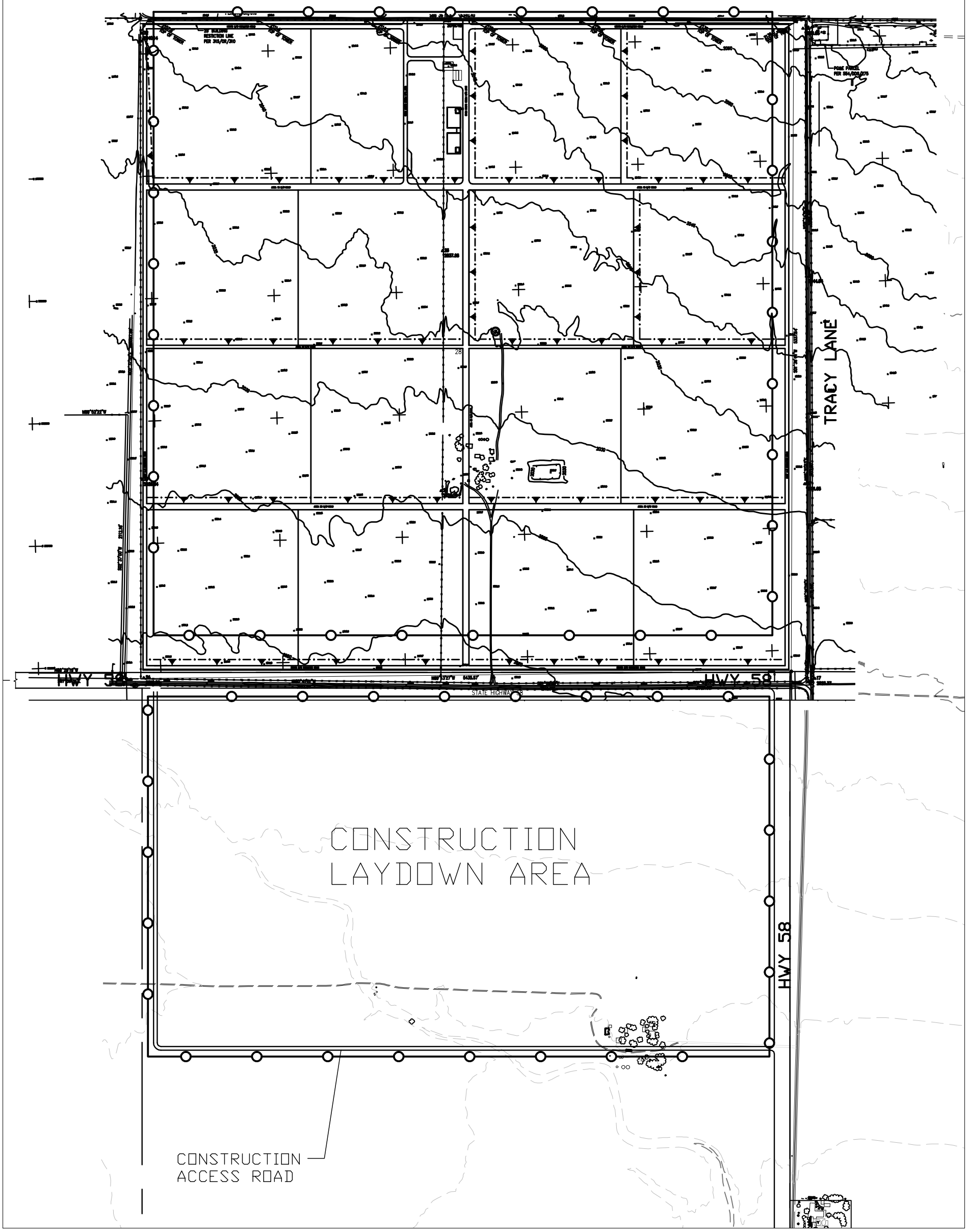
300 0 300 600 Feet

SCALE: 1"= 600'

CHECKED BY: MM | DATE: 03-26-2008

PM: AL | PROJ. NO: 22239472.01800

FIGURE 4.3



AREA OF SOIL DISTURBANCE

NOTE: PRESERVATION OF EXISTING VEGETATION TO BE COORDINATED WITH PROJECT SCHEDULE AND GRADING ACTIVITIES.

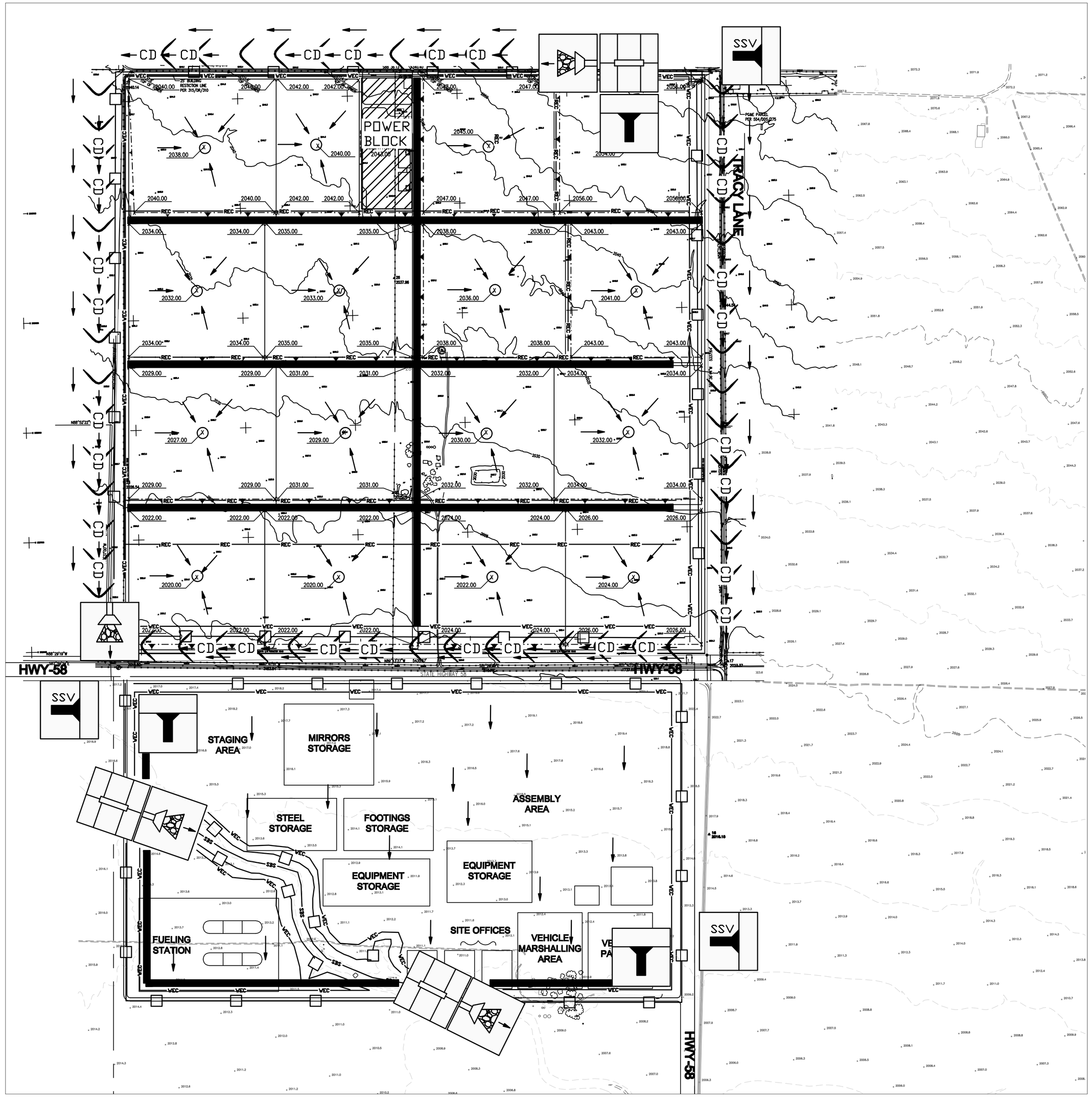
CESF PROJECT SITE
DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
CLEARING AND GRADING LIMITS

URS

400 0 400 800 Feet
SCALE: 1"= 800'

CHECKED BY: MM	DATE: 03-26-2008	FIGURE
PM: AL	PROJ. NO: 22239472.01800	5

BEST MANAGEMENT PRACTICES SITE MAP



LEGEND

- EARTH DIKE AND DRAINAGE SWALE
- VELOCITY DISSIPATION DEVICE
- SILT FENCE OR APPROPRIATE LINEAR SEDIMENT CONTROL BARRIER
- WEC — WEC — WIND EROSION
- REC — REC — ROLLED EROSION CONTROL ON SLOPES (GEOTEXTILE, BLANKETS, ETC.)
- STABILIZED CONSTRUCTION ENTRANCE/EXIT
- TEMPORARY STREAM CROSSING
- SBS — SBS — STREAMBANK STABILIZATION
- SSV — STREET SWEEPING/VACUUMING
- CD — CD — CHECK DAMS
- STABILIZED CONSTRUCTION ROADWAY
- FLOW DIRECTION
- LOW POINT

NOTES:
1. NOT FOR CONSTRUCTION.
2. CONSTRUCTION AREA LAYOUT CONFIGURATION SUBJECT TO REVISION BASED UPON SITE AND CONSTRUCTION CONDITIONS.
3. LOW POINTS WITHIN THE SOLAR FARM AREA WILL COLLECT/INFILTRATE STORMWATER RUNOFF.

CESF PROJECT SITE
DRAINAGE, EROSION AND SEDIMENT CONTROL PLAN
BEST MANAGEMENT PRACTICES (BMP) PLAN

URS | 250 0 250 500 Feet | SCALE: 1"= 500' | CHECKED BY: MM | DATE: 03-26-2008 | PM: AL | PROJ. NO: 22239472.01800 | FIGURE 6

CESF - EXISTING CONDITION BASIN HYDROLOGY PARAMETERS

BASIN	AREA (SQ.FT.)	AREA (ACRES)	AREA (SQ.MI.)	HI ELEV (FT)	LO ELEV (FT)	FLOW LENGTH (FT)	FLOW LENGTH (MI)	SLOPE (FT/FT)	TC (HR)	TC (MIN)	RUNOFF C
1	27878400.0	640.0	1.0	2066.8	2019	6122.0	1.2	0.0078	0.7	42	0.38

EXISTING CONDITION BASIN RUNOFF

STORM EVENT (YR)	INTENSITY (IN/HR)	Q BASIN 1 (CFS)
2	0.50	122
5	0.70	170
10	0.80	195
25	1.00	243
50	1.10	268
100	1.20	292

PROPOSED CONDITION BASIN HYDROLOGY PARAMETERS

BASIN	AREA (SQ.FT.)	AREA (ACRES)	AREA (SQ.MI.)	HI ELEV (FT)	LO ELEV (FT)	FLOW LENGTH (FT)	FLOW LENGTH (MI)	SLOPE (FT/FT)	TC (HR)	TC (MIN)	RUNOFF C
1	1605318	36.9	0.1	2040	2038	900	0.2	0.0022	0.3	15	0.40
2	921947	21.2	0.0	2042	2040	700	0.1	0.0029	0.2	12	0.40
3	712614	16.4	0.0	2043	2042	550	0.1	0.0018	0.2	11	0.40
4	1512762	34.7	0.1	2047	2045	880	0.2	0.0023	0.3	15	0.40
5	1574867	36.2	0.1	2056	2054	892	0.2	0.0022	0.3	15	0.40
6	1631642	37.5	0.1	2034	2032	852	0.2	0.0023	0.2	14	0.40
7	1904631	43.7	0.1	2035	2033	911	0.2	0.0022	0.3	16	0.40
8	1780662	40.9	0.1	2038	2036	886	0.2	0.0023	0.3	15	0.40
9	1567761	36.0	0.1	2043	2041	846	0.2	0.0024	0.2	14	0.40
10	1737947	39.9	0.1	2029	2027	905	0.2	0.0022	0.3	16	0.40
11	1670006	38.3	0.1	2031	2029	871	0.2	0.0023	0.2	15	0.40
12	1602213	36.8	0.1	2032	2030	860	0.2	0.0023	0.2	15	0.40
13	1738901	39.9	0.1	2034	2032	914	0.2	0.0022	0.3	16	0.40
14	1640863	37.7	0.1	2022	2020	855	0.2	0.0023	0.2	15	0.40
15	1848181	42.4	0.1	2022	2020	916	0.2	0.0022	0.3	16	0.40
16	1781428	40.9	0.1	2024	2022	900	0.2	0.0022	0.3	15	0.40
17	1641204	37.7	0.1	2026	2024	860	0.2	0.0023	0.2	15	0.40

PROPOSED CONDITION BASIN RUNOFF

STORM EVENT (YR)	INTENSITY (IN/HR)	Q BASIN 1 (CFS)	Q BASIN 2 (CFS)	Q BASIN 3 (CFS)	Q BASIN 4 (CFS)	Q BASIN 5 (CFS)	Q BASIN 6 (CFS)	Q BASIN 7 (CFS)	Q BASIN 8 (CFS)	Q BASIN 9 (CFS)	Q BASIN 10 (CFS)	Q BASIN 11 (CFS)	Q BASIN 12 (CFS)	Q BASIN 13 (CFS)	Q BASIN 14 (CFS)	Q BASIN 15 (CFS)	Q BASIN 16 (CFS)	Q BASIN 17 (CFS)	Q Cumulative (CFS)
2	0.50	7	4	3	7	7	7	9	8	7	8	8	7	8	8	8	8	8	123
5	0.70	10	6	5	10	10	10	12	11	10	11	11	10	11	11	12	11	11	173
10	0.80	12	7	5	11	12	12	14	13	12	13	12	12	13	12	14	13	12	197
25	1.00	15	8	7	14	14	15	17	16	14	16	15	15	16	15	17	16	15	247
50	1.10	16	9	7	15	16	16	19	18	16	18	17	16	18	17	19	18	17	271
100	1.20	18	10	8	17	17	18	21	20	17	19	18	18	19	18	20	20	18	296

PROPOSED 50-YR STORM, 10-HOUR INTENSITY FOR 10-HOUR DURATION VOLUME RESULTS

STORM EVENT (YR)	INTENSITY (IN/HR)	Q BASIN 1 (CFS)	Q BASIN 2 (CFS)	Q BASIN 3 (CFS)	Q BASIN 4 (CFS)	Q BASIN 5 (CFS)	Q BASIN 6 (CFS)	Q BASIN 7 (CFS)	Q BASIN 8 (CFS)	Q BASIN 9 (CFS)	Q BASIN 10 (CFS)	Q BASIN 11 (CFS)	Q BASIN 12 (CFS)	Q BASIN 13 (CFS)	Q BASIN 14 (CFS)	Q BASIN 15 (CFS)	Q BASIN 16 (CFS)	Q BASIN 17 (CFS)
50	0.47	6.9	4.0	3.1	6.5	6.8	7.0	8.2	7.7	6.8	7.5	7.2	6.9	6.9	7.5	7.1	8.0	7.7
DURATION, (HR)		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
VOLUME REQUIRED, (CF)		249421	143245	110720	235041	244690	253511	295926	276665	243586	270028	259472	248939	248939	270176	254944	287155	276784
VOLUME REQUIRED, (AC-FT)		5.7	3.3	2.5	5.4	5.6	5.8	6.8	6.4	5.6	6.2	6.0	5.7	5.7	6.2	5.9	6.6	6.4

Note: The rainfall volume is based on the theoretical runoff from a 50-year storm, 10-hour intensity for 10-hour duration.

PROPOSED DETENTION/INIFILTRATION AREA PROVIDED VOLUME

BASIN	TOP AREA (SQ.FT.)	BOTTOM AREA (SQ.FT.)	DEPTH (FT)	AVERAGE AREA (SQ.FT.)	VOLUME PROVIDED (CF)	VOLUME PROVIDED (AC-FT)	VOLUME REQUIRED (AC-FT)	SURPLUS VOLUME (AC-FT)
1	1605318.0	0	2	802659	1605318	36.9	5.7	31.1
2	921947.0	0	2	460973.5	921947	21.2	3.3	17.9
3	VOLUME GENERATED WILL FLOW INTO BASIN 7						2.5	
4	1512762.0	0	2	756381	1512762	34.7	5.4	29.3
5	1574867.0	0	2	787433.5	1574867	36.2	5.6	30.5
6	1631642.0	0	2	815821	1631642	37.5	5.8	31.6
7	1904631.0	0	2	952315.5	1904631	43.7	6.8	34.4
8	1780662.0	0	2	890331	1780662	40.9	6.4	34.5
9	1567761.0	0	2	783880.5	1567761	36.0	5.6	30.4
10	1737947.0	0	2	868973.5	1737947	39.9	6.2	33.7
11	1670006.0	0	2	835003	1670006	38.3	6.0	32.4
12	1602213.0	0	2	801106.5	1602213	36.8	5.7	31.1
13	1738901.0	0	2	869450.5	1738901	39.9	5.7	34.2
14	1640863.0	0	2	820431.5	1640863	37.7	6.2	31.5
15	1848181.0	0	2	924090.5	1848181	42.4	5.9	36.6
16	1781428.0	0	2	890714	1781428	40.9	6.6	34.3
17	1641204.0	0	2	820602	1641204	37.7	6.4	31.3

Note: Volume required is the volume to store the 50-year, 10-hour intensity for a 10-hour duration (San Luis Obispo County retention standard)

CESF - Offsite Runoff Volume Calcuations

	Drainage Area sq miles	Area Acreage	Rainfall Total (in)	Runoff Coeff	Volume (ac-ft)	Difference (ac-ft)
Existing	50	32000	10	0.38	10133	
Proposed	49	31360	10	0.38	9931	203

RUNOFF VOLUME

Basin	Area (SQ.MI.)	Area (acres)	Runoff Coefficient	Rainfall Depth (in)	Volume (ac-ft)
1	31.6	20224	0.38	10	6404
2	3.9	2496	0.38	10	790
3	4.3	2752	0.38	10	871
4-Proposed Project Site	1.6	1024	0.38	10	324
Pre-Overall Project Site	41.3	26432	0.38	10	8370
Post-Overall Project Site	40.3	25792	0.38	10	8167
5	111	71040	0.38	10	22496
Pre-Project Overall at North Soda Lake	152	97280	0.38	10	30805
Post-Project Overall at North Soda Lake	151	96640	0.38	10	30603
6	262	167680	0.38	10	53099
Pre-Watershed	414	264960	0.38	10	83904
Post-Watershed (minus Project Site)	413	264320	0.38	10	83701

RUNOFF OUTPUT FROM THE NATIONAL FLOOD FREQUENCY PROGRAM

Basin	Area	2-Yr Storm	5-Yr Storm	10-Yr Storm	25-Yr Storm	50-Yr Storm	100-Yr Storm	500-Yr Storm
	(SQ.MI.)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)
1	31.6	22.1	134	328	784	1390	2220	5650
2	3.9	3.12	19.5	48.9	120	214	349	912
3	4.3	3.33	21	52.7	130	231	377	989
4-Proposed Project Site	1.6	1.5	9.22	23	56.5	99.9	163	427
Pre-Overall Project Site	41.3	28.2	171	417	995	1770	2810	7140
Post-Overall Project Site	40.3	27.6	167	408	974	1730	2750	6990
5	111	71.2	425	1020	2420	4290	6730	16900
Pre-Project Overall at North Soda Lake	152	95.1	566	1360	3200	5670	8870	22200
Post-Project Overall at North Soda Lake	151	94.5	563	1350	3180	5640	8820	22100
6	262	151	902	2170	5090	9060	14200	35400
Pre-Watershed	414	229.0	1370.0	3270.0	7650.0	13600	21200.0	52700
Post-Watershed (minus Project Site)	413	229.0	1360.0	3260.0	7640.0	13600	21100.0	52600

```
National Flood Frequency Program
Version 3.0
Based on Water-Resources Investigations Report 02-4168
Equations from database C:\Program Files\NFF\NFFv3.2_2004-12-14.mdb
Updated by kries 9/22/2004 at 4:03:24 PM fixed decimal place in constant
Equations for California developed using English units

Site: CESF, CALIFORNIA, California
User: Tom_Grace
Date: Tuesday, June 24, 2008 08:58 AM

Rural Estimate: BASIN 1
   Basin Drainage Area: 31.6 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 31.6 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.13 thousand feet
   Crippen & Bue Region 17

Rural Estimate: BASIN 2
   Basin Drainage Area: 3.9 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 3.9 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.19 thousand feet
   Crippen & Bue Region 17

Rural Estimate: BASIN 3
   Basin Drainage Area: 4.3 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 4.3 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.24 thousand feet
   Crippen & Bue Region 17

Rural Estimate: PRE-PROJECT OVERALL AT SITE
   Basin Drainage Area: 41.3 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 41.3 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.13 thousand feet
   Crippen & Bue Region 17

Rural Estimate: POST-PROJECT OVERALL AT SITE
   Basin Drainage Area: 40.3 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 40.3 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.13 thousand feet
   Crippen & Bue Region 17

Rural Estimate: PRE-PROJECT OVERALL AT NORTH SODA LAKE
   Basin Drainage Area: 152 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 152 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.1 thousand feet
   Crippen & Bue Region 17

Rural Estimate: POST-PROJECT OVERALL AT NORTH SODA LAKE
   Basin Drainage Area: 151 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 151 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.1 thousand feet
   Crippen & Bue Region 17

Rural Estimate: PRE-PROJECT TOTAL FOR ENTIRE SODA LAKE
```

```
   Basin Drainage Area: 414 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 414 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.18 thousand feet
   Crippen & Bue Region 17

Rural Estimate: POST-PROJECT TOTAL FOR ENTIRE SODA LAKE
   Basin Drainage Area: 413 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 413 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.18 thousand feet
   Crippen & Bue Region 17

Rural Estimate: BASIN 4-PROJECT SITE
   Basin Drainage Area: 1.6 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 1.6 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.03 thousand feet
   Crippen & Bue Region 17

Rural Estimate: BASIN 6
   Basin Drainage Area: 262 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 262 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.18 thousand feet
   Crippen & Bue Region 17

Rural Estimate: BASIN 5
   Basin Drainage Area: 111 mi2
   1 Region
   Region: Central_Coast_Region
      Drainage_Area = 111 mi2
      Mean_Annual_Precipitation = 10 in
      Altitude_Index = 2.1 thousand feet
   Crippen & Bue Region 17

Flood Peak Discharges, in cubic feet per second
```

Estimate	Recurrence Interval, yrs	Peak, cfs	Standard Error, %	Equivalent Years
BASIN 1	2	22.1	150	
	5	134	110	
	10	328	96	
	25	784	96	
	50	1390	110	
	100	2220	120	
	500	5650		
	maximum: 87500 (for C&B region 17)			
BASIN 2	2	3.12	150	
	5	19.5	110	
	10	48.9	96	
	25	120	96	
	50	214	110	
	100	349	120	
	500	912		
	maximum: 19000 (for C&B region 17)			
BASIN 3	2	3.33	150	
	5	21	110	
	10	52.7	96	
	25	130	96	
	50	231	110	
	100	377	120	
	500	989		

```
                    maximum: 20600 (for C&B region 17)

PRE-PROJECT OVERALL AT SITE       2         28.2     150
                              5          171     110
                             10          417      96
                             25          995      96
                             50         1770     110
                            100         2810     120
                            500         7140
                    maximum: 103000 (for C&B region 17)

POST-PROJECT OVERALL AT SITE      2         27.6     150
                              5          167     110
                             10          408      96
                             25          974      96
                             50         1730     110
                            100         2750     120
                            500         6990
                    maximum: 102000 (for C&B region 17)

PRE-PROJECT OVERALL AT NORTH SODA LAKE       2         95.1     150
                              5          566     110
                             10         1360      96
                             25         3200      96
                             50         5670     110
                            100         8870     120
                            500        22200
                    maximum: 214000 (for C&B region 17)

POST-PROJECT OVERALL AT NORTH SODA LAKE      2         94.5     150
                              5          563     110
                             10         1350      96
                             25         3180      96
                             50         5640     110
                            100         8820     120
                            500        22100
                    maximum: 213000 (for C&B region 17)

PRE-PROJECT TOTAL FOR ENTIRE SODA LAKE       2          229     150
                              5         1370     110
                             10         3270      96
                             25         7650      96
                             50        13600     110
                            100        21200     120
                            500        52700
                    maximum: 342000 (for C&B region 17)

POST-PROJECT TOTAL FOR ENTIRE SODA LAKE      2          229     150
                              5         1360     110
                             10         3260      96
                             25         7640      96
                             50        13600     110
                            100        21100     120
                            500        52600
                    maximum: 342000 (for C&B region 17)

BASIN 4-PROJECT SITE          2          1.5     150
                              5         9.22     110
                             10           23      96
                             25         56.5      96
                             50         99.9     110
                            100          163     120
                            500          427
                    maximum: 8920 (for C&B region 17)

BASIN 6                       2          151     150
                              5          902     110
                             10         2170      96
                             25         5090      96
                             50         9060     110
                            100        14200     120
                            500        35400
                    maximum: 278000 (for C&B region 17)

BASIN 5                       2         71.2     150
```

```
                5          425     110
               10         1020      96
               25         2420      96
               50         4290     110
              100         6730     120
              500        16900
maximum: 182000 (for C&B region 17)
```

NFF
National Flood Frequency Program

NFF - Version 3.2, 2004/09/29

TABLE OF CONTENTS

A. DESCRIPTION

NFF is a Windows program for estimating the magnitude and frequency of peak discharges for unregulated rural and urban watersheds. NFF includes about 2,065 regression equations for 289 flood regions nationwide. Peak discharges with recurrence intervals between 2 and 500 years are estimated by regression equations or statistical extrapolation. The 500-year peak discharge can be compared to regional envelope values from USGS Water-Supply Paper 1887. Typical flood hydrographs for a given T-year peak discharge and flood-frequeny curves can be obtained. Estimates for gaging stations can be obtained by determining the weighted average of estimates obtained from data for the stations with estimates obtained from regression equations, with weights based on the years of record at the gaging station and the equivalent years of record for the regression estimates. Estimates for ungaged sites can be obtained by combining the estimates from regression equations with estimates based on the flow per unit area for an upstream or downstream gaging station.

B. DOCUMENTATION

Documentation of the program history, content, theory, and application, including a users manual, is contained in:

Ries, K.G., III, and Crouse, M.Y., 2002, The National Flood Frequency Program, Version 3: A Computer Program for Estimating Magnitude and Frequency of Floods for Ungaged Sites: U.S. Geological Survey Water-Resources Investigations Report 02-4168, 42 p.

Documentation of the equations, maps, and other information needed to solve the regression equations for individual States is provided on line through links from the NFF web page (http://water.usgs.gov/software/nff.html) to the complete original State reports, fact sheets, or still-current pages from the report for the previous version of NFF:

Jennings, M.E., Thomas, W.O., Jr., and Riggs, H.C., 1994, Nationwide Summary of U.S. Geological Survey Regional Regression Equations for Estimating Magnitude and Frequency of Floods for Ungaged Sites, 1993: U.S. Geological Survey Water-Resources Investigations Report 94-4002, 196 p.

C. HARDWARE REQUIREMENTS

NFF requires a computer running Windows 98 (or newer), or Windows NT Version 4.0 with service pack 5 (or higher). Adobe Acrobat Reader is required to display or print the User Manual in PDF format; however, the User Manual is available in other formats in addition to PDF. Microsoft Internet Explorer version 5.0 or newer is required to invoke the on-line help section. The amount of free disk space that is required varies greatly depending on the

amount of station data stored in database files. For optimal performance, a processor running at 400 megahertz or faster with at least 128 megabytes of memory is recommended.

D. INSTALLATION

The installation program, NFFv3_2.exe, and the Access data base, NFFv3_2.mdb, should be downloaded to a temporary location on the user's computer. To install the program, double-click on NFFv3.exe in Windows Explorer or My Computer. An installation wizard will appear and prompt for a directory in which to save the program and whether or not to create a desktop icon. It is recommended that the directory for saving the program be named NFF and that the icon be created. Follow the prompts provided by the wizard to install the program.

When installation is complete, the directory that contains the program will include the following files:

-	NFF.exe	NFF program
-	ATCoRend.mdb	Database of colors used for graphics
-	current.nff	Program that tracks changes made
-	unins000.exe	Program that uninstalls StreamStatsDB
-	unins000.dat	Used by unins000.exe
-	NFF.chm	Help file

The NFFv3.2_2004-09-29.mdb file should be copied to this directory after the program is installed.

E. RUNNING NFF

NFF can be started by three methods, (1) select NFF from the Programs submenu of the Start menu, (2) double-click on the desktop icon, or (3) double-click on the program name (NFF.exe) in Windows Explorer or My Computer.

After running NFF for the first time, a file named current.nff will be created in the NFF directory. This file tracks user-provided instructions from the past session. Results of the work from the previous session will be displayed in NFF when the program is started again.

F. HELP FILE

The Help file provides full documentation on use of the program. The Help file can be started by clicking on the Help menu toward the top left of the NFF main window, or it can be started before running NFF by double-clicking on NFF.chm in WinWindows Explorer or My Computer. Users should thoroughly read the information in the Help file before trying to use the interface.

G. VERSION HISTORY

Version 3.2 - 2004/12/9 - Updated the database to NFFv3.2_2004-12-14.mdb. Added new peak-flow equations for Connecticut and Kentucky. Corrected an error in the units displayed for conveyance in the Houston urban equations from in/hr to cubic feet per second. Corrected an error in the Wisconsin Area 1 equation for the 5-year recurrence interval.

Version 3.2 - 2004/09/29 - Updated the database to NFFv3.2_2004-09-29.mdb. This database contains new peak-flow equations for Alaska, Idaho, Ohio, Tennessee, Vermont, Wisconsin, and Wyoming. Along with the new database comes the ability to display 90-percent prediction intervals with the estimates for some of the updated States.

Version 3.2 - 2003/04/30 - Fixed a problem with the weighting function for gaging stations when there are no equivalent years for the regression estimates. This version also handles the case of a scenario with regions containing different sets of return intervals. It now reports why this can't be done and recovers much better. No updates to the database were made.

Version 3.1 - 2003/02/27 - Fixed a problem with solving the national urban

equations that occurred when one or more of the local rural equations were missing for the region of interest. If a rural equation, such as the 5-year flow, was missing NFF would use the flow estimate for the next available recurrence interval, such as the 10-year flow, to estimate the urban flow for the missing recurrence interval. All estimates for higher recurrence intervals would also be incorrect.

Version 3.0 - 2002/10/15 - A major change in converting user the interface from Microsoft DOS to Microsoft Windows and converting data base from a binary file to Microsoft Access (Note: Use of trade or product names is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey). Addition of weighted estimates for ungaged sites based on regression estimates for the site of interest and the flow per unit area for an upstream or downstream gaging station. Updates or corrections to equations were included for

Alabama	Minnesota
Alaska	Missouri
American Samoa	Nebraska
Arizona	Nevada
Arkansas	New Mexico
Colorado	North Carolina - rural and urban
Delaware	Oklahoma
Georgia - rural and urban	Pennsylvania
Hawaii	Puerto Rico
Idaho	South Carolina - rural and urban
Iowa	South Dakota
Kansas	Texas - rural
Kentucky - Jefferson County urban	Utah
Louisiana	Virginia
Maine	Washington
Maryland	West Virginia

Version 2.0 - 1996/09/15 - A non-USGS release that added conversions between English and metric units.

Version 1.4 - 1996/09/30 - NFF data base updated to amend incorrect values for:

- New Jersey--the constant 1 was removed from being added to the actual value entered for impervious cover, I
- New York-- incorrect exponents and an incorrect regression constant were corrected for Region 6's 25-year and 500-year equations, respectively
- Wisconsin-- the constant -2.3 was added to the data base to be applied automatically to the actual value entered for 2-year 24-hour rainfall, INTENS, for Areas 1, 3, and 5; incorrect exponents were corrected for Area 3's 5-, 25-, 50-, and 100-year equations

Version 1.3 - 1996/02/14 - Corrected labeling of flood-frequency recurrence intervals for North Dakota. The equations developed for North Dakota are for the 2-, 10-, 15-, 25-, 50-, 100-, and 500-year recurrence intervals rather than the standard 2-, 5-, 10-, 25-, 50-, 100-, and 500-year intervals.

Version 1.2 - 1995/06/02 - NFF data base updated to amend incorrect exponents in West Virginia's Region 6 equations for the 2-year and 10-year recurrence interval.

Version 1.1 - 1994/11/21 - Initial release.

H. DATA BASE

The NFF data base is a Microsoft Access data base that is write protected so that users cannot change the data. It is planned that, rather than releasing a new version of NFF each time new equations become available, the NFF data base will be updated and links to the new documentation will be provided from the NFF web site. Users should check often to determine if the data base has been updated with new equations for their areas of interest.

I. CONTACTS

Inquiries about this software should be directed to:

U.S. Geological Survey
Office of Surface Water
Kernell Ries
12201 Sunrise Valley Dr., MS 415
Reston, VA 20192

Electronic mail: kries@usgs.gov
Fax: 703-648-5722
Phone: 703-648-5307

The following documentation was taken from:

U.S. Geological Survey Water-Resources Investigations Report 94-4002: *Nationwide summary of U.S. Geological Survey regional regression equations for estimating magnitude and frequency of floods for ungaged sites, 1993*

CALIFORNIA

STATEWIDE RURAL

Summary

California is divided into six hydrologic regions (fig. 1). The regression equations developed for these regions are for estimating peak discharges (QT) having recurrence intervals T that range from 2 to 100 years. The explanatory basin variables used in the equations are drainage area (A), in square miles; mean annual precipitation (P), in inches; and an altitude index (H), which is the average of altitudes in thousands of feet at points along the main channel at 10 percent, and 85 percent of the distances from the site to the divide. The variables A and H may be measured from topographic maps. Mean annual precipitation (P) is determined from a map in Rantz (1969). The regression equations were developed from peak-discharge records of 10 years or longer, available as of 1975, at more than 700 gaging stations throughout the State. The regression equations are applicable to unregulated streams but are not applicable to some parts of the State (see fig. 1). The standard errors of estimate for the regression equations for various recurrence intervals and regions range from 60 to over 100 percent. The report by Waananen and Crippen (1977) includes an approximate procedure for increasing a rural discharge to account for the effect of urban development. The influences of fire and other basin changes on flood magnitudes are also discussed.

Procedure

Topographic maps, the hydrologic regions map (fig. 1), the mean annual precipitation from Rantz (1969), and the following equations are used to estimate the needed peak discharges QT, in cubic feet per second, having selected recurrence intervals T.

North Coast Region

$Q2 = 3.52\ A^{0.90}\ P^{0.89}\ H^{-0.47}$
$Q5 = 5.04\ A^{0.89}\ P^{0.91}\ H^{-0.35}$
$Q10 = 6.21\ A^{0.88}\ P^{0.93}\ H^{-0.27}$
$Q25 = 7.64\ A^{0.87}\ P^{0.94}\ H^{-0.17}$
$Q50 = 8.57\ A^{0.87}\ P^{0.96}\ H^{-0.08}$
$Q100 = 9.23\ A^{0.87}\ P^{0.97}$

Northeast Region

$Q2 = 22\ A^{0.40}$
$Q5 = 46\ A^{0.45}$
$Q10 = 61\ A^{0.49}$
$Q25 = 84\ A^{0.54}$
$Q50 = 103\ A^{0.57}$
$Q100 = 125\ A^{0.59}$

Sierra Region

$Q2 = 0.24\ A^{0.88}\ P^{1.58}\ H^{-0.80}$
$Q5 = 1.20\ A^{0.82}\ P^{1.37}\ H^{-0.64}$
$Q10 = 2.63\ A^{0.80}\ P^{1.25}\ H^{-0.58}$
$Q25 = 6.55\ A^{0.79}\ P^{1.12}\ H^{-0.52}$
$Q50 = 10.4\ A^{0.78}\ P^{1.06}\ H^{-0.48}$
$Q100 = 15.7\ A^{0.77}\ P^{1.02}\ H^{-0.43}$

Central Coast Region

$Q2 = 0.0061\ A^{0.92}\ P^{2.54}\ H^{-1.10}$
$Q5 = 0.118\ A^{0.91}\ P^{1.95}\ H^{-0.79}$
$Q10 = 0.583\ A^{0.90}\ P^{1.61}\ H^{-0.64}$
$Q25 = 2.91\ A^{0.89}\ P^{1.26}\ H^{-0.50}$
$Q50 = 8.20\ A^{0.89}\ P^{1.03}\ H^{-0.41}$
$Q100 = 19.7\ A^{0.88}\ P^{0.84}\ H^{-0.33}$

South Coast Region

$Q2 = 0.14\ A^{0.72}\ P^{1.62}$
$Q5 = 0.40\ A^{0.77}\ P^{1.69}$
$Q10 = 0.63\ A^{0.79}\ P^{1.75}$
$Q25 = 1.10\ A^{0.81}\ P^{1.81}$
$Q50 = 1.50\ A^{0.82}\ P^{1.85}$
$Q100 = 1.95\ A^{0.83}\ P^{1.87}$

South Lahontan-Colorado Desert Region

$$Q2 = 7.3A^{0.30}$$
$$Q5 = 53A^{0.44}$$
$$Q10 = 150A^{0.53}$$
$$Q25 = 410A^{0.63}$$
$$Q50 = 700A^{0.68}$$
$$Q100 = 1080A^{0.71}$$

In the North Coast region, use a minimum value of 1.0 for the altitude index (H). Equations are defined only for basins of 25 mi^2 or less in the Northeast and South Lahontan-Colorado Desert regions.

Reference

Waananen, A.O., and Crippen, J.R., 1977, Magnitude and frequency of floods in California: U.S. Geological Survey Water-Resources Investigations Report 77-21, 96 p.

Additional Reference

Rantz, S.E., 1969, Mean annual precipitation in the California region: U.S. Geological Survey Open-File Map (Reprinted 1972, 1975).

Figure 1. Flood-frequency region map for California. (PostScript file of Figure 1.)

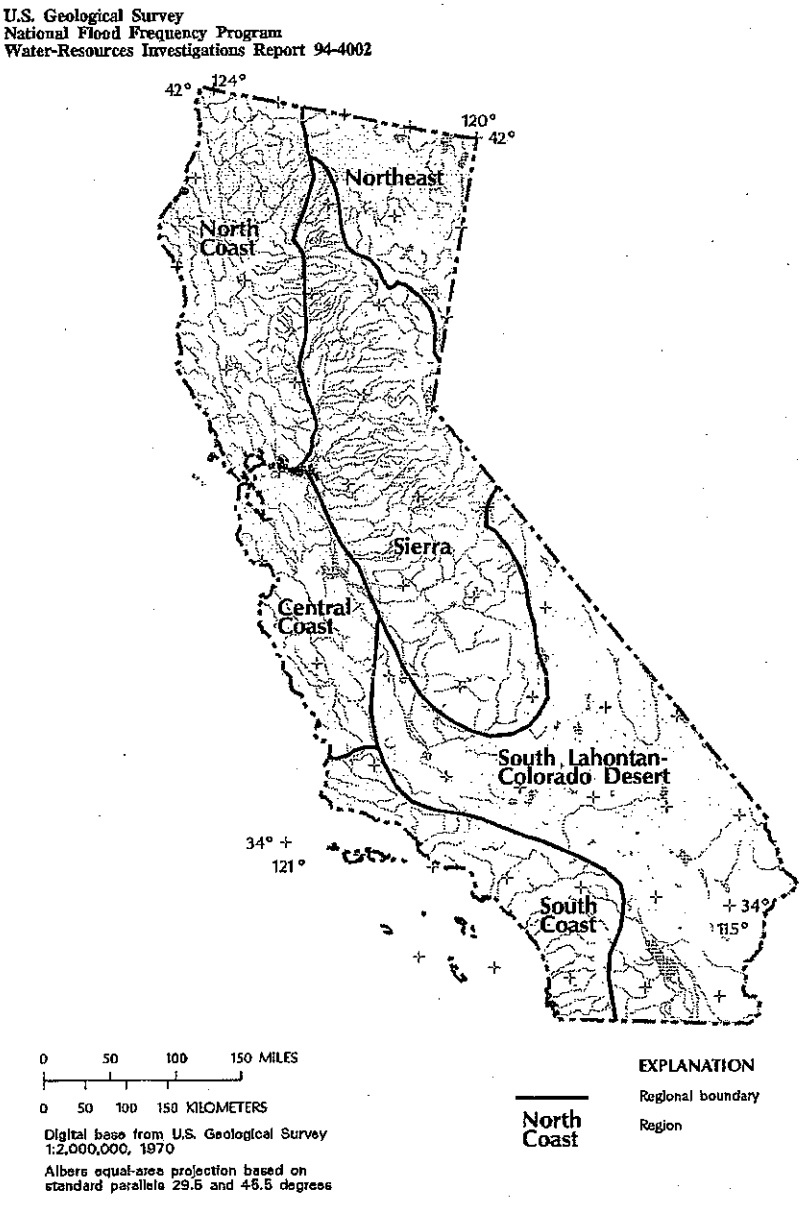
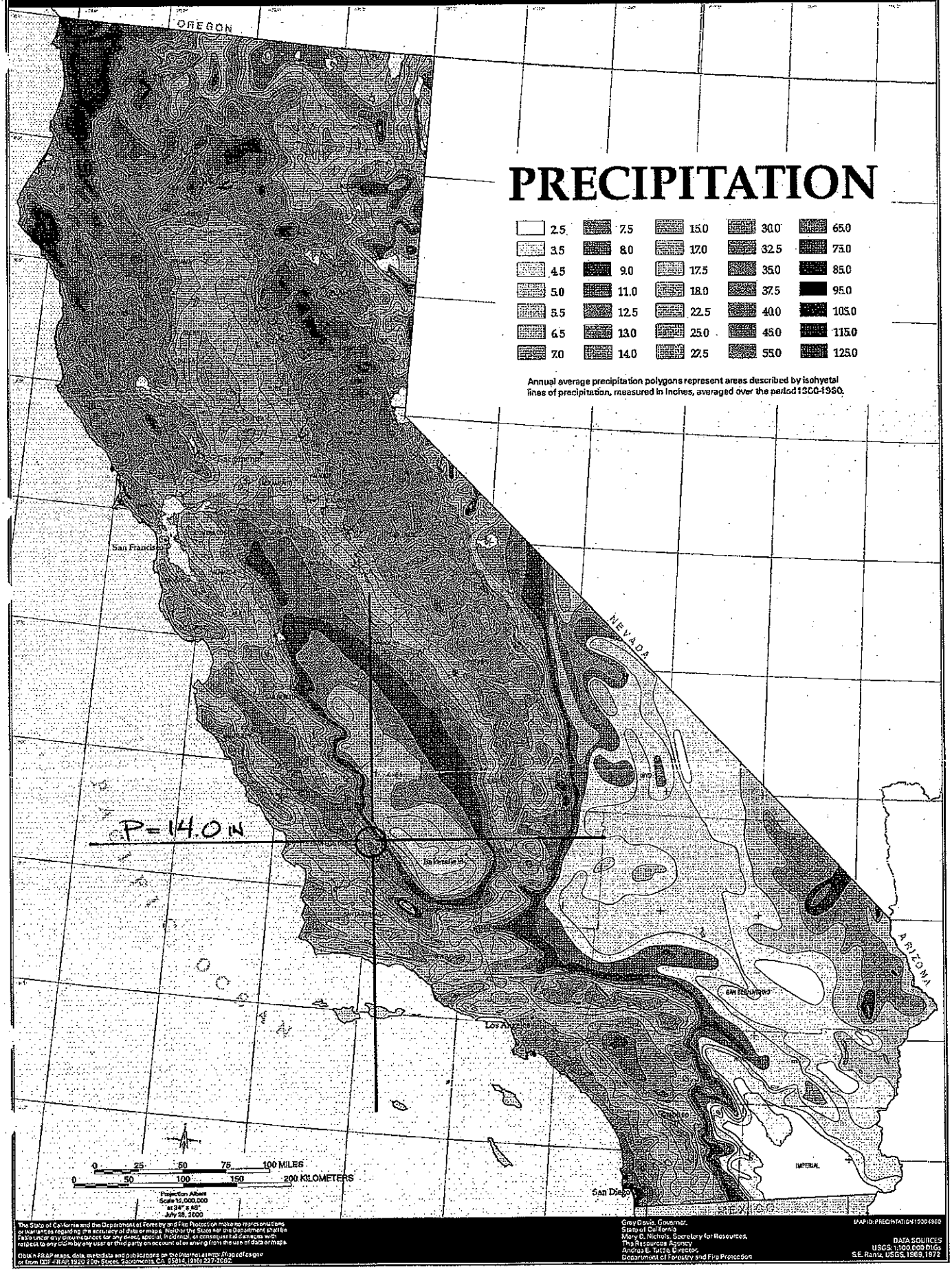


Figure 1. Flood-frequency region map for California.

STATE OF CALIFORNIA



PRECIPITATION

2.5	7.5	15.0	30.0	65.0
3.5	8.0	17.0	32.5	75.0
4.5	9.0	17.5	35.0	85.0
5.0	11.0	18.0	37.5	95.0
5.5	12.5	22.5	40.0	105.0
6.5	13.0	25.0	45.0	115.0
7.0	14.0	27.5	55.0	125.0

Annual average precipitation polygons represent areas described by isohyetal lines of precipitation, measured in inches, averaged over the period 1906-1960.

Projection: Albers
Scale 1:1,000,000
at 34° x 40°
July 28, 2000

Obtain FRAP maps, data, publications on the Internet at http://frap.cdf.ca.gov
or from CDF-FRAP, 1920 20th Street, Sacramento, CA 95814, (916) 227-2625

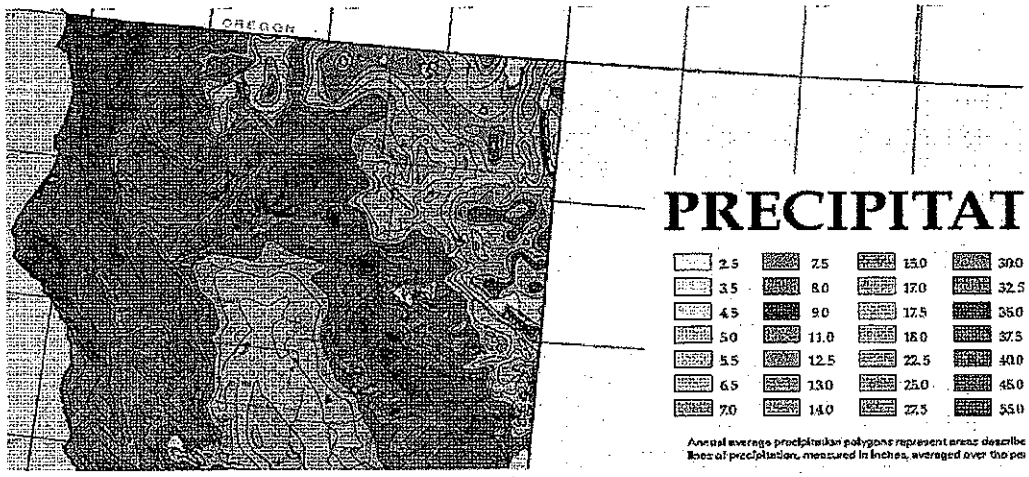
Gray Davis, Governor
State of California
Mary D. Nichols, Secretary for Resources
The Resources Agency
Andrea E. Tuttle, Director
Department of Forestry and Fire Protection

RAPID PRECIPITATION 1906-1960

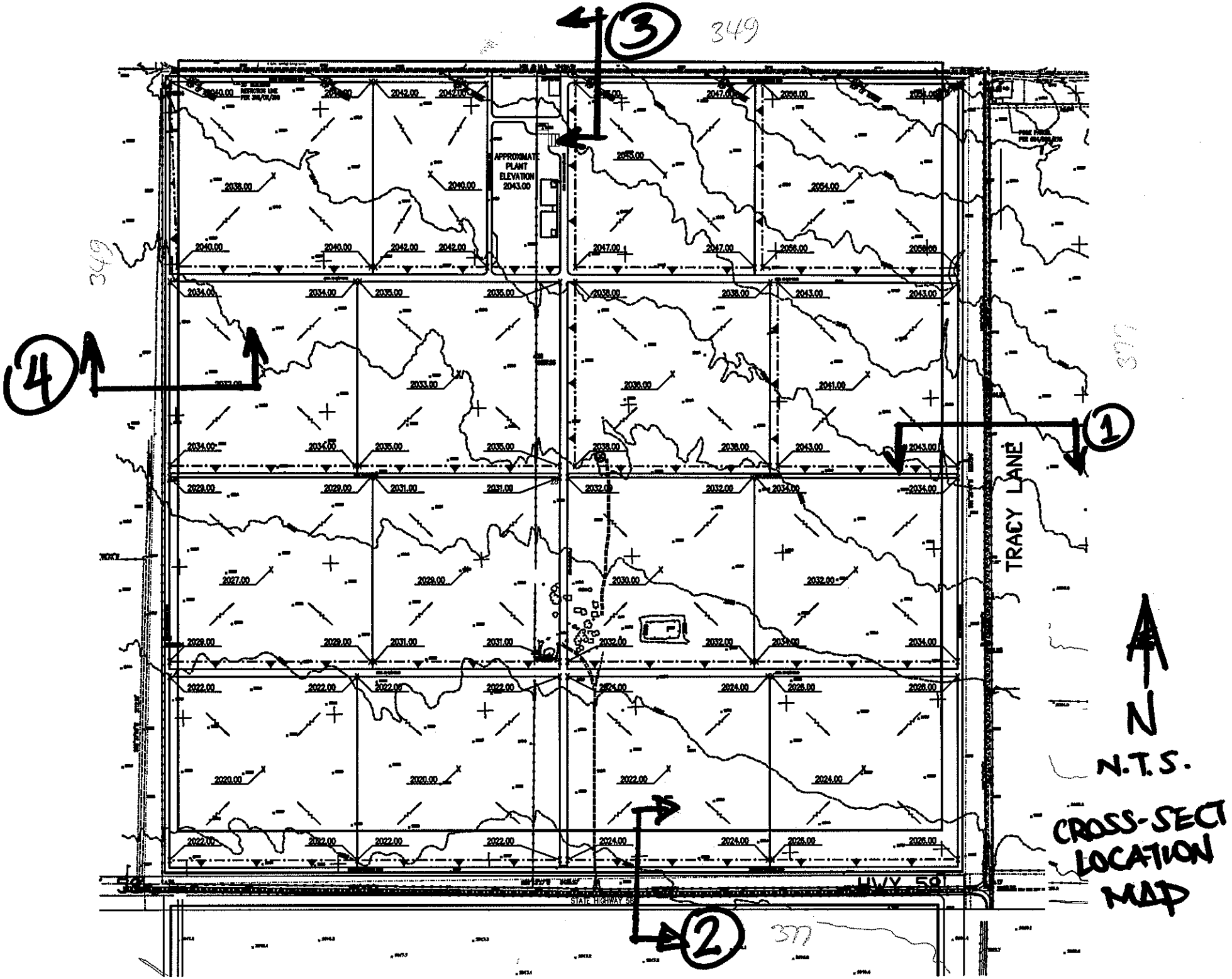
DATA SOURCES
USGS, 1:100,000 DLGs
S.E. Rantz, USGS, 1969, 1972

- **Rivers and Water Projects Maps** (California Department of Water Resources) Contains relief maps of California showing major rivers and federal, state and local water projects that comprise the water delivery system for California.
- **Water Resources of California** (US Geological Survey) Series of six maps that show streams, lakes and reserviors; annual average precipation, and shaded relief in various combinations.
- **WaterWatch--Current Water Resources Conditions: California** (US Geological Survey) Series of maps that graphically show streamflow conditions in California. Maps are updated daily or more frequently. Individual maps show real-time streamflow compared to historical streamflow, flood and high flow conditions, daily streamflow compared to historical streamflow, 7-day average streamflow compared to historical streamflow, below normal 7-day average streamflow compared to historical streamflow, and drought watch. Mouse-over any of the 200+ recording sites to get detailed site information.

Weather and Climate



- **Average Annual Precipitation (Inches), California, 1961-1990** (Oregon Climate Service) 1995
- **Average Temperature for January/July** (Maps.com)
- ***Calfornia Annual Precipitation*** (US Natural Resources Conservation Service) 1999 (map G4361.C883 1998 .U5) Scale 1:1,850,000
- **California Average Annual Precipitation** (Maps.com)
- **California Climate Zones Map** (California Energy Commission) Shows 16 climate zones that are based on energy use, temperature, weather and other factors.
- **California Reference Evapo Transpiration (ETO) Zones** (California Irrigation Management Information System) Shows 16 reference ETO zones.
- ***California Wind Atlas*** (California Energy Commission and California Department of Water Resources) 1985 (Cal Docs E 2015 W55) Available wind data is summarized using charts, maps, and graphs.
- **California Average Annual Precipitation Zones, 1900-60** (California Dept. of Forestry and Fire Protection, Fire and Resource Assessment Program) Isohyetal map of California at a scale of 1:1,000,000 showing mean annual precipitation during the period 1900-1960. Created from the map ***Mean Annual Precipitation in the California Region*** (Rantz) 1969/reprinted 1972 (Docs I 19.2 P92 1972).
- **Late Pleistocene Map of California** (US Geological Survey) Reconstruction of landscape features about 18,000 years ago at the peak of the last Ice Age, including mountains covered by glaciers, intermontain basin lakes and exposed shoreline.
- ***Precipitation Frequency Atlas of the Western United States. Vol. 11. California*** (US National Weather Service) 1973 (Docs C 55.22 folio) Contains series of precipitation-frequency maps at a scale of 1:2 million for 6 and 24-hour durations for return periods from 2 to 100 years. Northern California


3
4
1
2
APPROXIMATE PLANT ELEVATION 2043.00
TRACY LANE
HWY 50
STATE HIGHWAY 50
N
N.T.S.
CROSS-SECT LOCATION MAP

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Jun 26 2008

CESF-AUSRA PRELIMINARY CROSS-SECTIONS 1 & 2

Trapezoidal

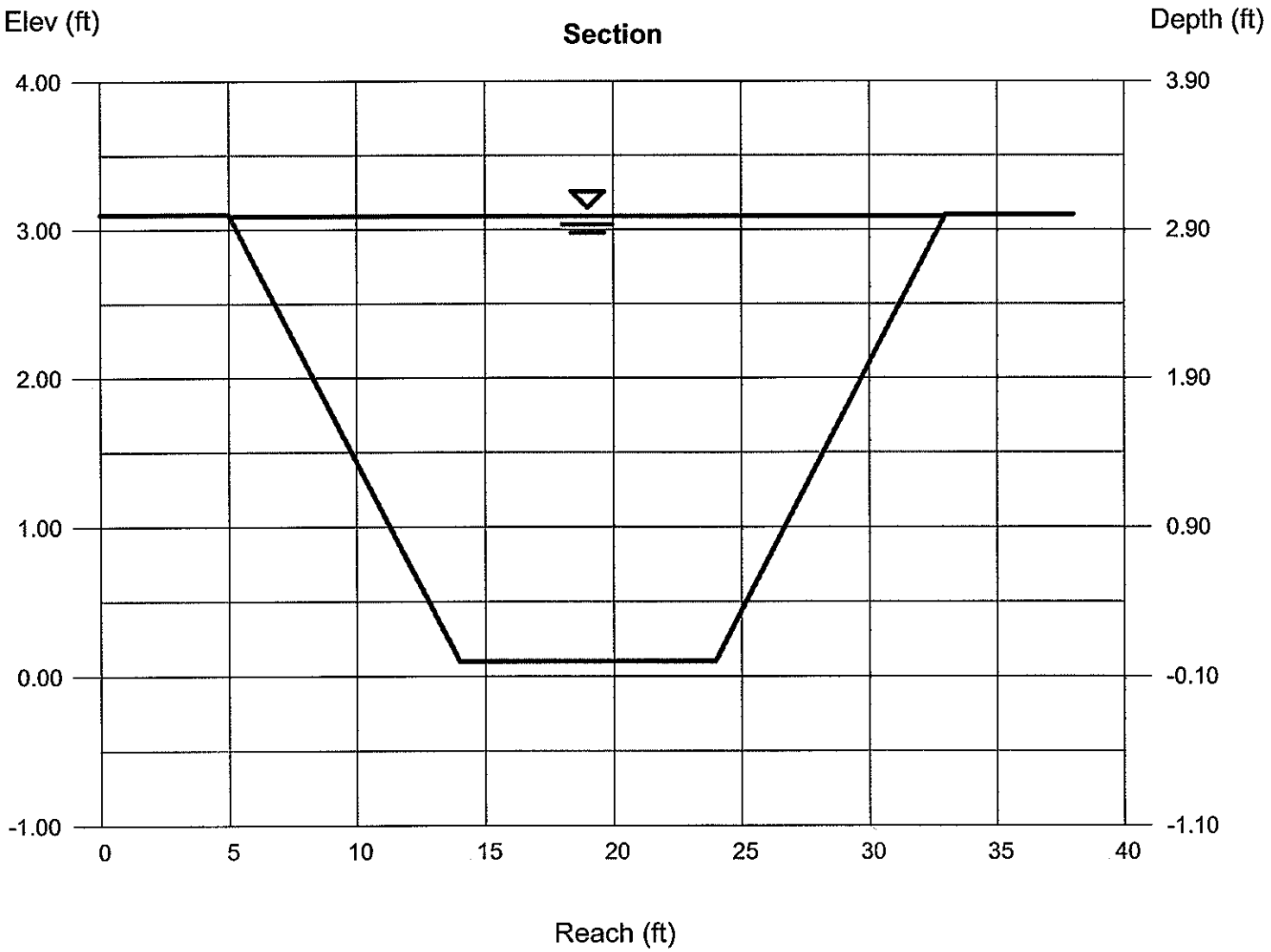
Bottom Width (ft)	= 10.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 0.10
Slope (%)	= 1.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 377.00

Highlighted

Depth (ft)	= 2.99
Q (cfs)	= 377.00
Area (sqft)	= 56.72
Velocity (ft/s)	= 6.65
Wetted Perim (ft)	= 28.91
Crit Depth, Yc (ft)	= 2.70
Top Width (ft)	= 27.94
EGL (ft)	= 3.68



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Jun 26 2008

CESF-AUSRA PRELIMINARY CROSS-SECTIONS 3 & 4

Trapezoidal

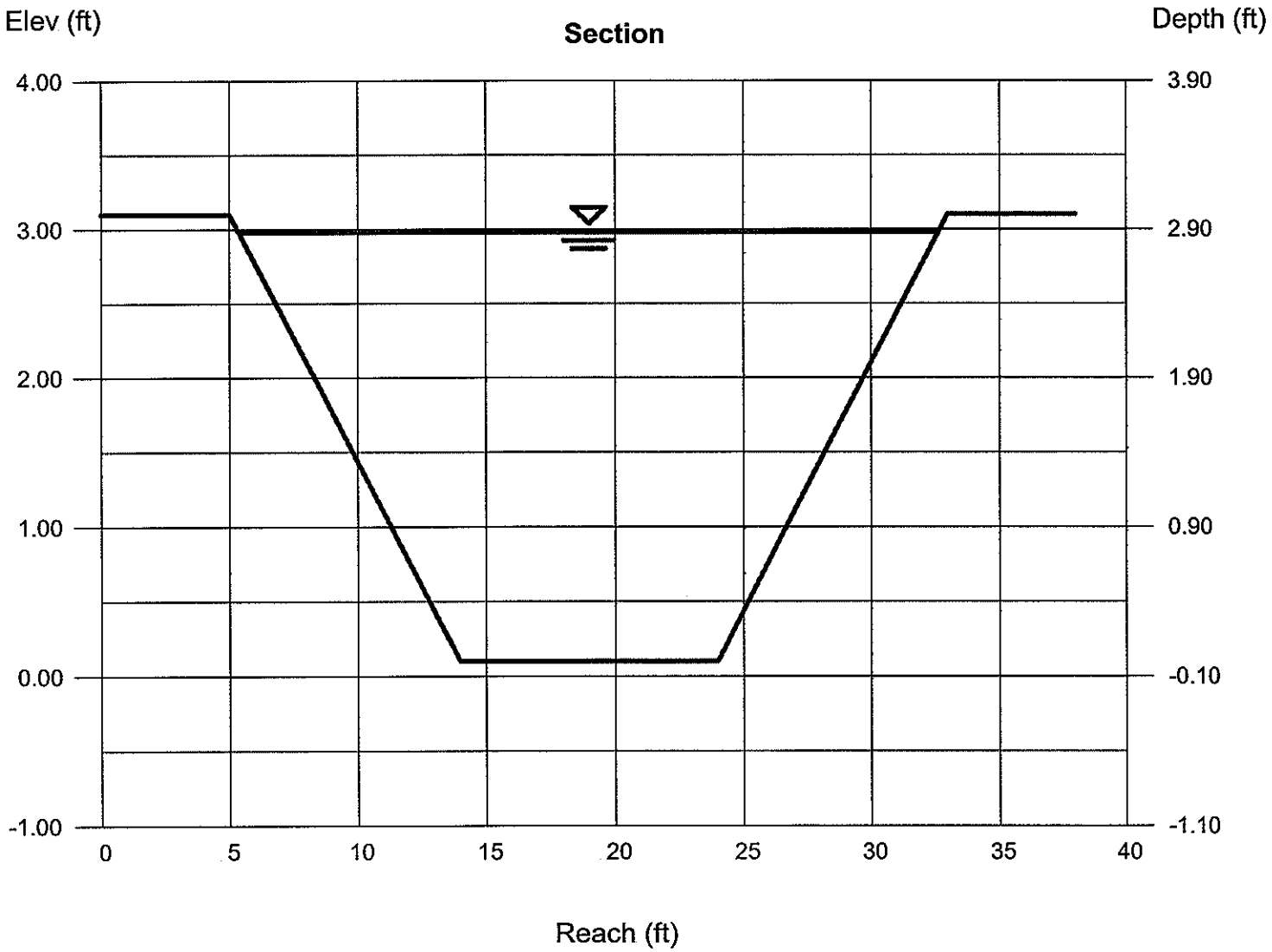
Bottom Width (ft)	= 10.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 0.10
Slope (%)	= 1.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 349.00

Highlighted

Depth (ft)	= 2.88
Q (cfs)	= 349.00
Area (sqft)	= 53.68
Velocity (ft/s)	= 6.50
Wetted Perim (ft)	= 28.21
Crit Depth, Yc (ft)	= 2.59
Top Width (ft)	= 27.28
EGL (ft)	= 3.54



Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. Thursday, Jun 26 2008

Box Culvert

(2) 4'x4' RCB

Invert Elev Dn (ft)	= 2010.00
Pipe Length (ft)	= 25.00
Slope (%)	= 1.00
Invert Elev Up (ft)	= 2010.25
Rise (in)	= 48.0
Shape	= Box
Span (in)	= 48.0
No. Barrels	= 2
n-Value	= 0.013
Inlet Edge	= Sq Edge
Coeff. K,M,c,Y,k	= 0.061, 0.75, 0.04, 0.8, 0.5

Embankment

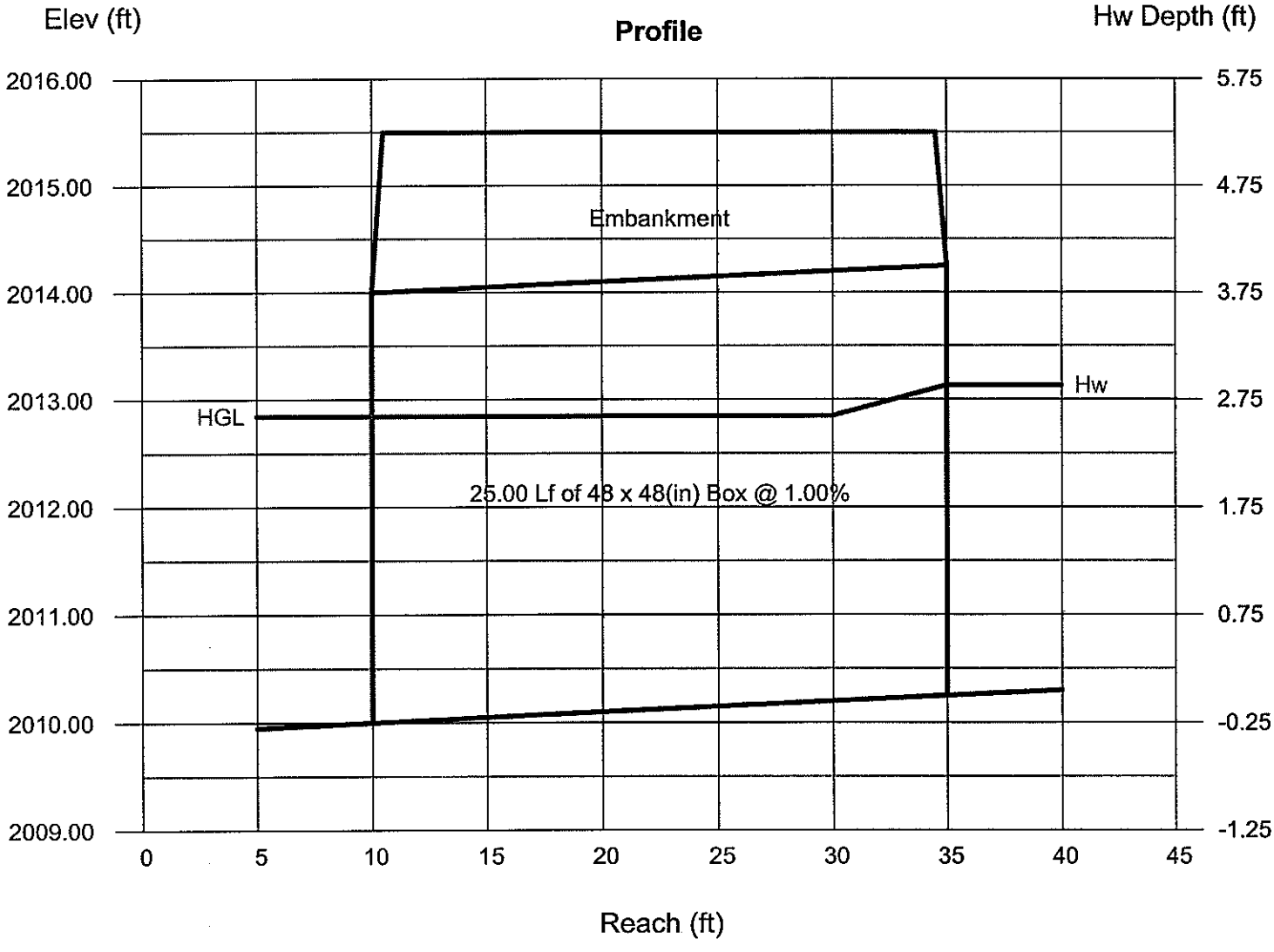
Top Elevation (ft)	= 2015.50
Top Width (ft)	= 24.00
Crest Width (ft)	= 25.00

Calculations

Qmin (cfs)	= 100.00
Qmax (cfs)	= 800.00
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 100.00
Qpipe (cfs)	= 100.00
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 4.39
Veloc Up (ft/s)	= 4.81
HGL Dn (ft)	= 2012.85
HGL Up (ft)	= 2012.85
Hw Elev (ft)	= 2013.13
Hw/D (ft)	= 0.72
Flow Regime	= Inlet Control



Q			Veloc		Depth		HGL			
Total	Pipe	Over	Dn	Up	Dn	Up	Dn	Up	Hw	Hw/D
(cfs)	(cfs)	(cfs)	(ft/s)	(ft/s)	(in)	(in)	(ft)	(ft)	(ft)	
100.00	100.00	0.00	4.39	4.81	34.16	31.17	2012.85	2012.85	2013.13	0.72
150.00	150.00	0.00	6.03	6.56	37.31	34.32	2013.11	2013.11	2014.04	0.95
200.00	200.00	0.00	7.48	9.31	40.11	32.23	2013.34	2012.94	2014.99	1.19
250.00	242.31	7.69	8.59	9.92	42.31	36.63	2013.53	2013.30	2015.72	1.37
300.00	262.54	37.46	9.09	10.19	43.32	38.63	2013.61	2013.47	2016.12	1.47
350.00	278.34	71.66	9.47	10.39	44.08	40.17	2013.67	2013.60	2016.46	1.55
400.00	291.79	108.21	9.79	10.56	44.72	41.45	2013.73	2013.70	2016.76	1.63
450.00	303.90	146.10	10.06	10.70	45.29	42.59	2013.78	2013.80	2017.04	1.70
500.00	314.54	185.46	10.30	10.83	45.79	43.57	2013.82	2013.88	2017.30	1.76
550.00	324.75	225.25	10.53	10.94	46.26	44.51	2013.86	2013.96	2017.55	1.82
600.00	333.83	266.17	10.73	11.05	46.67	45.34	2013.89	2014.03	2017.78	1.88
650.00	342.49	307.51	10.92	11.14	47.06	46.12	2013.92	2014.09	2018.01	1.94
700.00	350.71	349.29	11.09	11.23	47.43	46.85	2013.95	2014.15	2018.24	2.00
750.00	358.75	391.25	11.26	11.31	47.78	47.56	2013.98	2014.21	2018.46	2.05
800.00	366.03	433.97	11.44	11.44	48.00	48.00	2014.00	2014.25	2018.66	2.10

Q_{10} 328 CFS →

Q_{25} 784 CFS →

Carrizo Energy Solar Farm (CESF)
Soil Erosion Estimates Using RUSLE 2

Existing Condition	Construction No BMPs	Construction Silt Fence	Final Terraced	Final Laydown	Final Total
ton/ac/yr	ton/ac/yr	ton/ac/yr	ton/ac/yr	ton/ac/yr	ton/ac/yr
0.91	1	0.48	0.25	0.91	0.47
ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr
873.6	960	460.8	160	291.2	451.2

Assumptions:

1. Existing condition consists of highly disturbed land/ range grass
2. Maximum slope length is 1000 feet. Existing overall slope is 1%
3. Soils are clay loam.
4. Proposed Condition during construction will include BMPs such as silt fences.
5. Final Condition in operations area contains series of terraces.
6. Final Condition in construction laydown area consists of disturbed range grass.
7. Operations area consists of 640 acres and construction laydown is 320 acres.

RUSLE2 Profile Erosion Calculation Record

Info: Profile is default that RUSLE2 uses when you have not specified a profile.

File: profiles\CESF Existing Range Grass

Inputs:
Location: Bakersfiled at point
Soil: clay loam (l-m OM, s-m perm)
Horiz. overland flow path length: 1000 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
Highly disturbed land\long term vegetation\range grass 4 yrs after last disturbance w/o mulch	Highly disturbed land\range grass	lb	100

Contouring: default
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
Soil loss erod. portion: 0.91 t/ac/yr
Detachment on slope: 0.91 t/ac/yr
Soil loss for cons. plan: 0.91 t/ac/yr
Sediment delivery: 0.91 t/ac/yr

Crit. slope length:
Surf. cover after planting: 0 %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/15/0	Highly disturbed land\blade fill material		0
4/15/0	basic/general\begin growth	Highly disturbed land\range grass	0
4/15/4	basic/general\no operation		0
4/15/5	basic/general\no operation		0

RUSLE2 Profile Erosion Calculation Record

Info: Profile is default that RUSLE2 uses when you have not specified a profile.

File: profiles\CESF Proposed Construction No Controls

Inputs:
Location: Bakersfiled at point
Soil: clay loam (l-m OM, s-m perm)
Horiz. overland flow path length: 1000 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*

Contouring: default
Strips/barriers: (none)
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
Soil loss erod. portion: 1.00 t/ac/yr
Detachment on slope: 1.00 t/ac/yr
Soil loss for cons. plan: 1.00 t/ac/yr
Sediment delivery: 1.00 t/ac/yr

Crit. slope length:
Surf. cover after planting: 0 %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/15/0	Highly disturbed land\heavy/offset disk		0

RUSLE2 Profile Erosion Calculation Record

Info: Profile is default that RUSLE2 uses when you have not specified a profile.

File: profiles\CESF Proposed Construction Silt Fence

Inputs:
Location: Bakersfiled at point
Soil: clay loam (l-m OM, s-m perm)
Horiz. overland flow path length: 1000 ft
Avg. slope steepness: 1.0 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*
Highly disturbed land\silt fence\silt fence half retardance	Highly disturbed land\silt fence half retardance	lb	50.0

Contouring: default
Strips/barriers: silt fence half retardance
Diversion/terrace, sediment basin: (none)
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
Soil loss erod. portion: 1.00 t/ac/yr
Detachment on slope: 0.99 t/ac/yr
Soil loss for cons. plan: 0.99 t/ac/yr
Sediment delivery: 0.48 t/ac/yr

Crit. slope length: 1000 ft
Surf. cover after planting: 0 %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/15/0	Highly disturbed land\heavy/offset disk		0
1/1/1	basic/general\begin growth	Highly disturbed land\silt fence half retardance	0

RUSLE2 Profile Erosion Calculation Record

Info: Profile is default that RUSLE2 uses when you have not specified a profile.

File: profiles\CESF Proposed Final w Terraces

Inputs:
Location: Bakersfiled at point
Soil: clay loam (l-m OM, s-m perm)
Horiz. overland flow path length: 400 ft
Avg. slope steepness: 0.20 %

Management	*Vegetation*	*Yield units*	*Yield (# of units)*

Contouring: default
Strips/barriers: (none)
Diversion/terrace, sediment basin: 1 - 0.2% grade terrace in middle
Subsurface drainage: (none)
Adjust res. burial level: Normal res. burial

Outputs:
Soil loss erod. portion: 0.26 t/ac/yr
Detachment on slope: 0.26 t/ac/yr
Soil loss for cons. plan: 0.26 t/ac/yr
Sediment delivery: 0.25 t/ac/yr

Crit. slope length:
Surf. cover after planting: 0 %

Date	*Operation*	*Vegetation*	*Surf. res. cov. after op, %*
4/15/0	Highly disturbed land\heavy/offset disk		0

Carrizo Energy Solar Farm (CESF)
Wind Erosion Rates using Wind Erosion Prediction System (WEPS)

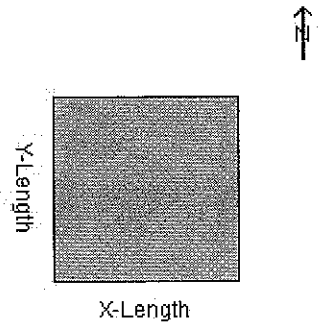
Existing Condition Minimum	Existing Condition Maximum	Construction No BMPs	Construction with BMPs	Final Condition with BMPs
ton/ac/yr	ton/ac/yr	ton/ac/yr	ton/ac/yr	ton/ac/yr
2	19	38.7	< 1	< 1
ton/yr	ton/yr	ton/yr	ton/yr	ton/yr
1280	12160	37152	< 800	< 640

Assumptions:
1. Existing condition consists of highly disturbed agricultural/grazing land.
2. Minimum existing condition consists of dry land farming/winter wheat production (average of two scenarios).
3. Maximum existing condition consists of seasonal cattle grazing with minimal wind controls.
4. Construction without BMPs assumes completely bladed/graded site with no BMPs in place.
5. Construction with BMPs assumes bladed/graded site with Wind Erosion BMPs.
6. Final condition assumes wind erosion BMPs in place.
7. Construction condition includes disturbance on half of construction laydown area.

WEPS Run Summary

NRCS Natural Resources Conservation Service

Client CESF
Farm No Existing **Tract No** **Field No**
Run Name Existing-Graze_1
Run Location CESF
Management Graze
Soil Yeguas_310_40_L



Simulation & Site Information

Mode : NRCS **Soil Loss T:** 5 T/ac/yr
State : California **Latitude :** 35.387 °N
County : San Luis Obispo **Longitude :** 120.04 °W

Field Dimension Information

X-Length : 5279.86 ft **Elevation :** 269.03 ft
Y-Length : 5279.86 ft **Orientation :** 0 °
Area : 639.97 ac

Weather Station / Files

Cligen Station :BUTTONWILLOW
Wingen Station :SAN LUIS OBISPO

Period	Crop	Gross Loss (tons/acre)	Net Soil Loss From Field (tons/acre)			
			Total	Creep/Salt.	Suspension	PM10
Rot. yr: 1		19.3	19.3	4.37	14.94	0.922
Ave. Annual		19.3	19.3	4.37	14.94	0.922

Date	Operation	Crop
Jan 01, 01	Begin growth	no crop
Mar 01, 01	Graze, stubble or residue 50 pct	
May 01, 01	Begin weed growth	no crop

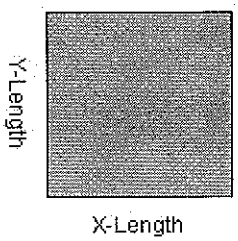
Run specific information:

Date Created: Apr 23, 2008 15:17

WEPS Run Summary

NRCS Natural Resources Conservation Service

Client CESF
Farm No Existing - **Tract No** **Field No**
Run Name Existing-WWheat-Grass-Fallow1
Run Location CESF
Management Wheat, winter-Sudangrass, hay, Conv, CMZ5
Soil Yeguas_310_40_L



Simulation & Site Information

Mode : NRCS **Soil Loss T:** 5 T/ac/yr
State : California **Latitude :** 35.387 °N
County : San Luis Obispo **Longitude :** 120.04 °W

Field Dimension Information

X-Length : 5279.86 ft **Elevation :** 629.99 ft
Y-Length : 5279.86 ft **Orientation :** 0 °
Area : 639.97 ac

Weather Station / Files

Cligen Station :BUTTONWILLOW
Wingen Station :SAN LUIS OBISPO

Period	Crop	Gross Loss (tons/acre)	Net Soil Loss From Field (tons/acre)			
			Total	Creep/Salt.	Suspension	PM10
Rot. yr: 1	Wheat, winter	0.6	0.6	0.18	0.39	0.023
Rot. yr: 2	Sorghum, forage	5.1	5.1	1.99	3.07	0.190
Ave. Annual		2.8	2.8	1.09	1.73	0.106

Harvest Date	Crop Name	Residue lbs/acre	Harvest Yield	Yield % Moisture
Jul 10, 01	Wheat, winter	1850	13.762 bu/ac	10.9
Sep 01, 02	Sorghum, forage	181	0.524 ton/ac	12.0

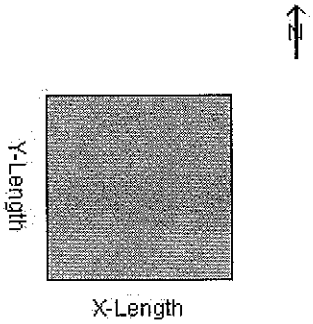
Date	Operation	Crop
Jul 10, 01	Harvest, killing crop 50pct standing stubble	Wheat, winter
Oct 20, 01	Chisel, sweep shovel	
Apr 11, 02	Chisel, sweep shovel	
Apr 13, 02	Cultivator, field 6-12 in sweeps	
Apr 15, 02	Drill or airseeder, double disk	Sorghum, forage
Sep 01, 02	Harvest, hay, no regrowth	Sorghum, forage
Sep 03, 02	Chisel, sweep shovel	
Sep 05, 02	Cultivator, field 6-12 in sweeps	
Sep 10, 02	Drill or airseeder, double disk	Wheat, winter

Date Created: Apr 23, 2008 15:25

WEPS Run Summary

NRCS Natural Resources Conservation Service

Client CESF
Farm No Existing - **Tract No** **Field No**
Run Name Existing-WWheat-Grass-Fallow1_1
Run Location CESF
Management WWheat-fallow, Conv, CMZ 5
Soil Yeguas_310_40_L



Simulation & Site Information

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Y-Length : 5279.86 ft **Orientation :** 0 °
Area : 639.97 ac

Weather Station / Files

Cligen Station :BUTTONWILLOW
Wingen Station :SAN LUIS OBISPO

Period	Crop	Gross Loss (tons/acre)	Net Soil Loss From Field (tons/acre) Total	Creep/Salt.	Suspension	PM10
Rot. yr: 1	Wheat, winter	0.0	0.0	0.00	0.00	0.000
Rot. yr: 2		2.0	2.0	0.52	1.45	0.085
Ave. Annual		1.0	1.0	0.26	0.72	0.043

Harvest Date	Crop Name	Residue lbs/acre	Harvest Yield	Yield % Moisture
Jul 10, 01	Wheat, winter	4607	46.272 bu/ac	10.9

Date	Operation	Crop
Jul 10, 01	Harvest, killing crop 50pct standing stubble	Wheat, winter
Oct 20, 01	Chisel, sweep shovel	
May 01, 02	Chisel, sweep shovel	
Jun 01, 02	Chisel, sweep shovel	
Jul 01, 02	Rodweeder	
Aug 15, 02	Rodweeder	
Sep 01, 02	Cultivator, field 6-12 in sweeps	
Sep 10, 02	Drill or airseeder, double disk	Wheat, winter

Date Created: Apr 23, 2008 15:28

ROTATION 1°23'46.61"
GRID NORTH
PLANT NORTH

APPROXIMATE PLANT ELEVATION 2043.00

S65°36'13"E 5340.40'

N85°52'22"W

S02°37'00"W 2112.16'

N88°29'19"W

S87°59'34"E

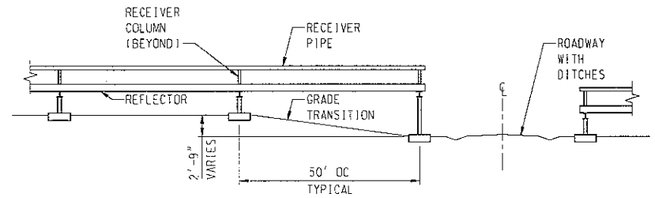
N89°13'27"W 5435.57'

LEGEND

2050	EXISTING CONTOUR, 5' INTERVAL
	EXISTING FENCE
	GRADE BREAK
2050.00	FINISHED GRADE SPOT ELEVATION
	DRAINAGE FLOW
TOC	TOP OF CONCRETE
TOG	TOP OF GRAVEL
FL	FLOWLINE
EL	ELEVATION
IE	INVERT ELEVATION

NOTES

1. EXISTING FEATURES ARE DEPICTED BY LIGHTER WEIGHT (SCREENED) LINES. NEW STRUCTURES AND FACILITIES ARE SHOWN IN HEAVIER LINE WEIGHTS.
2. SEE DRAWING C1-1 FOR BASIS OF BEARING, COORDINATE SYSTEM AND ELEVATIONS.
3. ALL ELEVATIONS SHOWN ARE FINISHED GRADE, UNLESS OTHERWISE NOTED.
4. FINISH GRADES SHALL BE WITHIN +/- 0.10' OF ELEVATIONS SHOWN.
5. FINISHED GRADE SHALL BE UNIFORMLY SLOPED AND FREE OF SURFACE IRREGULARITIES. PROVIDE SMOOTH TRANSITIONS BETWEEN GRADE CHANGES. GRADES SHALL SLOPE AWAY FROM BUILDINGS AND SLABS AT MINIMUM 2% FOR 10'.
6. FINISHED GRADE SHALL BE 6" MINIMUM BELOW TOP OF CONCRETE EXCEPT FOR PADS INTENDED FOR VEHICLE PARKING. GRADING SHALL DIRECT SURFACE WATER AWAY FROM STRUCTURES.
7. CONTRACTOR SHALL ESTABLISH EROSION AND SEDIMENTATION CONTROLS PRIOR TO INITIATING ANY EARTH WORK AND SHALL COMPLY WITH ALL MEASURES INDICATED IN THE CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN AND MONITORING PROGRAM PREPARED FOR THIS PROJECT.



TYPICAL GRADE TRANSITION SECTION

SECTION A
SCALE NTS

0 150 300 600 900 FEET
1"= 300'

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	*	*	*	*	*	*	*
INIT	*	*	*	*	*	*	*

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD	REFERENCE DRAWINGS
A	ISSUED FOR CEC SUPPLEMENT	06/20/08	WMT	WKW	WKW	DEJ	

DSGN	WKW	06/18/08
DRN	WMT	06/18/08
CKD	WKW	06/19/08

SCALE: 1" = 300'-0"
FOR 22x34 DWG ONLY

POWER ENGINEERS

AUSRA
CARRIZO ENERGY SOLAR FARM
PRELIMINARY
GRADING AND DRAINAGE PLAN

JOB NUMBER 113226
REV A
DRAWING NUMBER C3-1

wtabler 6/20/2008 \\BOI\POS\pdsadm\113226\dwg\civil\44acc3_1.dgn

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC IMPROVEMENT STANDARDS
2007 UPDATE

5. STORM DRAINAGE

5.1 DESIGN STANDARDS

These standards are intended to meet the requirements of the National Flood Insurance Program and other County ordinances.

The design of proposed development sites shall handle waters generated by storms, springs, or other sources from both on-site and off-site impacts. Each improvement shall be designed so as to not alter the rate, concentration or location of historic flow patterns. There must not be damage to either the development site itself or any other land, either upstream or downstream. "Damage," as used here, is defined as water having sufficient depth or velocity to damage improvements or to deposit or scour soil. Where it is reasonable to do so, the design shall seek to improve adverse conditions that affect the site or adjacent lands.

Provisions shall be made in the design of a drainage system to insure that the system may be extended to serve and to properly handle the entire drainage area at the time of ultimate development. This is to include the entire upstream portion and the portion of the drainage watershed outside the development site, regardless of existing conditions.

The design standards contained herein are minimal, and are intended to provide general guidance. Design details are the responsibility of the Project Engineer and must follow good engineering practice.

Exceptions to these standards may be allowed by the Department, when it can be determined that such exceptions are in the best interest of the public in the neighborhood of the development site. For example, an exception to allow alteration or concentration of flow onto adjacent properties may be permitted by the Department, if there are adequate downstream facilities provided to handle the total flow without adverse affect on other properties. In this event, the Developer may be required to participate in the cost of said facilities, and/or obtain easements or other rights as needed.

Drainage improvement designs should incorporate recommendations from the community drainage studies referenced in the Introduction of this volume.

5.1.1 HYDROLOGY

A. Drainage Report Requirements. See the Appendix for detailed drainage report format.

B. Rational Method. Hydraulic designs shall use the Rational Method, for areas not to exceed 200 acres. This method is discussed in the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 22 (2001), "Urban Drainage Design Manual."

C. Special Design Problems. For special design problems, or drainage areas in excess of 200 acres, the Project Engineer shall provide such reference information, as is necessary to confirm the hydraulic design being proposed. The design must conform to the Design Approach laid out at the beginning of this Chapter. An acceptable method for determining storm runoff is the National Resource Conservation Service method.

D. Runoff Coefficients. Runoff coefficients for use in the Rational Method shall be determined using County Standard H-3 for developed areas, and H-3a for undeveloped areas.

E. Design storms. The following information shall be used for determining the appropriate design storm:

Table 5-1 Determination of Design Storms

Type of Waterway	Drainage Area	Primary Design Storm[1]	Secondary Design Storm[2]
Major	>4 square miles (>2,560 acres)	100 years	N/A
Intermediate	1-4 square miles (640-2,560 acres)	50 years	100 years
Minor	<1 square mile (<640 acres)	25 years	50 years

[1] All components of a drainage system must be designed to convey the runoff from the Primary Design Storm, with freeboard.

[2] All components of a drainage system must be able to convey the runoff from the Secondary Design Storm without freeboard; otherwise, alternate surface

routes must be identified and provided with proper erosion protection and easement status.

Note that a given waterway may be classed as minor in its upper reaches, then change to intermediate at a point where the drainage area exceeds one square mile and change again to major where the drainage area exceeds four square miles.

Drainage calculations shall show that there will be no damage to properties under either the Primary or Secondary Design Storm for any size waterway.

5.1.2 HYDRAULIC DESIGN STANDARDS

A. Open Channels and Culverts. Manning's Formula shall be used to compute capacities of all open channels and culverts. The methods presented in FHWA Hydraulic Circular No. 5, "Hydraulic Charts for the Selection of Highway Culverts," may be used to evaluate culvert flow conditions.

The "n" values to be used in Manning's Formula shall conform to the values provided in the Appendix.

B. Hydraulic Grade Line. While conveying the runoff from the Primary Design Storm, the hydraulic grade line shall be a minimum of 0.50 feet below the elevation of:

- The top of inlet grate or the bottom of curb opening of catch basins, and
- The manhole covers of storm drain manholes.

The hydraulic grade line at those structures shall be calculated by adding to the hydraulic grade line in the culvert main the following:

- The velocity head within the main culvert into which the inlet (and lateral, if any) discharges or which the manhole serves,
- The head loss within said lateral, and
- All the minor losses necessary to attain that velocity.

C. Downstream Constraints. Discharge leaving the site in the Primary and Secondary Design Storms shall not be greater than pre-development discharge in each case, unless it can be demonstrated that downstream facilities have adequate capacity.

D. Provide for Overland Escape. All components of drainage systems in public improvements shall be evaluated to consider the effect of failure of individual components and identify the route of overland escape. The

evaluation shall identify any necessary measures to prevent erosion along this route.

E. Conveyance of Drainage in Urban Areas. In all subdivisions of an average lot size of 20,000 square feet or less, and in all developments within other land use categories inside Urban Reserve Lines, all surface drainage shall be conveyed in street gutters and cross-gutters. Any flows which cannot be conveyed within the capacity of these facilities (per Section 5.1.1 E of these Standards) shall be conveyed in culverts. No concentrated flows shall be permitted across the surface of any sidewalk. Inlets or under-sidewalk drains shall be used in such situations where needed, when approved by the Department, and shall conform to Standard Drawing series D-4.

F. San Luis Obispo Creek Watershed Drainage Design Manual. The City and County of San Luis Obispo have developed the San Luis Obispo Creek Watershed Drainage Design Manual to provide criteria and planning procedures for floodplains, waterways, channels and culverts in the San Luis Obispo Creek watershed. This watershed comprises Zone 9 of the San Luis Obispo County Flood Control and Water Conservation District.

It is recommended that private property owners submitting applications for grading and building permits within the San Luis Obispo Creek watershed follow these guidelines and procedures if they wish to streamline their environmental permitting processes. The design criteria will be used by the County in drainage facility design review and the checking of design and construction of private projects. It is required that these guidelines and procedures be followed on projects which, upon completion, will be managed and maintained by the County.

Drainage facility review, as used here, includes the review of all drainage and hydraulic structures, and all supporting engineering calculations. Drainage facilities include, but are not limited to: hydraulic structures, open channels, culverts, pipes and culverts, stormwater management structures, bank stabilization and bank repair structures, and grade control and aquatic enhancement structures that may be placed in stream channels.

Guidelines for stream corridor planting and management, bank repair and stabilization structures and devices, and general erosion control and stormwater management requirements are also provided in this Manual.

It is critically important that any proposed channel modification and/or drainage improvement project preserve, protect and enhance the waterways within the San Luis Obispo Creek watershed, include stream-side or riparian vegetation and aquatic habitat and fisheries. Although specific

design criteria and design procedures are presented, the Project Engineer is invited to be as creative as possible in ways that provide functional, safe and aesthetically pleasing channels or waterways, which are also compatible with the environment.

Early consultation with the Department of Public Works, and the Department of Planning & Building, and collaboration with stream geomorphologists and biologists prior to completing engineering designs that potentially impact creek resources in this watershed, is strongly encouraged.

Alternate methods of analysis and design are subject to the approval of the Department.

Copies of the San Luis Obispo Creek Watershed Drainage Design Manual are available for review or purchase from the Department. The manual is also available on-line at the following address:

slocity.org/publicworks/download/wmp/ddm.pdf

5.1.3 DIVERSION OF DRAINAGE

A. Maintain Historic Path. Unless an individual project requires diversion of water to conform to a comprehensive drainage plan, water shall be received and discharged in substantially the same location and velocity which existed prior to development and as nearly as possible in the manner which existed prior to development. Should diversion be required, sufficient work shall be done upstream and/or downstream to provide all affected properties at least the same level of flood protection as existed prior to the diversion.

B. Diversion Permitted Only Within Limits of Project. The diversion of natural watercourses will be allowed only within the limits of the proposed improvement. All natural drainage must leave the improved area at its original horizontal and vertical alignment and with approximately the same discharge velocity as existed prior to development, unless a special agreement indemnifying and approved by the County has been executed with the adjoining property owners.

C. Improvements In Natural Watercourses. Improvements in natural watercourses will not be approved unless the capacity of the improved waterway is at least that of the natural waterway.

D. Permits. No work shall be permitted in natural watercourses without the appropriate permits from State and Federal regulatory agencies (e.g., California Department of Fish & Game, U.S. Army Corps of Engineers, U.S. Fish & Wildlife Service, Regional Water Quality Control Board, and others as required.)

5.1.4 ALIGNMENT OF DRAINAGE FACILITIES

A. Locate within Road or Public Easement. Drainage facilities accepting runoff from public roads, streets or other public areas shall be located in a public street or road, or within a public drainage easement. These easements must be offered for dedication to the public before the improvement will be approved for construction.

B. Avoid Combining with Utility Easements. Drainage easements shall be used for drainage purposes exclusively and shall not be combined with easements required for other public utility purposes.

C. Easement Width. Easements for culverts shall provide a minimum width of ten feet, with pipe at the quarter point on the north or west. All such easements shall provide access and future maintenance working areas. Whenever possible, easements for culverts shall be along or adjacent to property lines and outside of areas where structures are planned. On pipes of 24" diameter or greater, or trenches exceeding five feet in depth, the easement shall have additional width to provide ample future maintenance working area as required by the Department.

D. Culvert Alignment. Storm drain lines are to be parallel with the centerline of streets. The design shall avoid meandering, offsetting, and unnecessary angular changes. No angular changes more than 10 degrees shall be made without a junction structure. No single change, even with a junction structure, shall exceed 90 degrees.

E. Adjacent Property. Where a minor improvement of a drainage facility falls on adjacent property, a recorded easement from the adjacent property owners for such construction and a copy of the approval of the adjacent owners shall be submitted to the Department prior to approval of the improvement plans. Agreements between property owners shall hold the County harmless from any damage claim arising from said agreement.

5.2 CONSTRUCTION SPECIFICATIONS

5.2.1 DRAINAGE STRUCTURES

The design and construction of drainage structures and special drainage items shall conform to the designs contained in these Standards (unless otherwise noted). Special care must be taken to insure that all drainage structures and pipe are designed at such a capacity that the drainage system may be extended or enlarged to serve the entire drainage area at ultimate development. The Rational Method formula (Q=CIA), with all numerical quantities for the Primary Design Storm, shall be indicated on the improvement plans at each drainage structure.

A. Manholes. Standard precast concrete manholes shall be used wherever feasible. When cases arise where special manholes or junction boxes are required, the design shall be approved by the Department. All manholes shall conform to the following requirements:

1. Any pipes placed at a grade of 1% or flatter, shall have manholes provided every 200 feet. Pipes at a grade of greater than 1% shall follow the criteria in #2 and #3 below.

2. Manholes shall be located at junction points, changes in gradient and changes in pipe size. On curved pipes with radii of 200 feet to 400 feet, manholes shall be placed at the BC or EC of the curve and on 300-foot maximum intervals along the curve for pipes of 24 inches and less in diameter, and 500-foot maximum intervals along the curve for pipes greater than 24 inches in diameter. Curves with radii less than 200 feet will be handled on an individual basis.

3. Spacing of manholes or inlets, of such size as to be enterable for maintenance, shall not exceed 500 feet along a tangent alignment for pipes 24 inches and smaller in diameter, and 600 feet along a tangent alignment for pipes greater than 24 inches in diameter, except under special approved conditions. The spacing of manholes shall be nearly equal wherever possible.

4. All manholes shall have standard 24 inch diameter manhole covers. No manholes shall be allowed in roadway gutter or flowlines. Maintenance access points in roadway gutter or flowlines shall be standard drainage inlets with bicycle-proof grates.

B. Inlets. Gutter inlets shall be in accordance with the types shown on Standard Drawings series D-2, or approved equivalent "precast" products, or other approved special inlets. See the State Standard Drawings for extended curb opening inlets. Pavement drainage design approaches are presented in FHWA Hydraulic Engineering Circular No. 22.

All inlets shall conform to the following requirements:

1. The capacity and spacing of drainage inlets shall be such that the spread of water in a Primary Design Storm does not inundate the traveled way (which includes all through and center turning lanes, but does not include bike lanes or right-turn-only lanes), as follows:

   a. For roads with design speeds less than 45 mph, the spread encroachment on the traveled way shall not be greater than ½ the outside through lane width.

   b. For roads with design speeds greater than or equal to 45 mph, the spread shall not encroach on the traveled way at all; any inundation shall be limited to the area outside the traveled way as defined above.

2. Where there is a potential for ponding at sag vertical curves (or other locations), pavement drainage shall be checked for a Secondary Design Storm. The spread encroachment shall comply with the requirements above.

3. Sufficient drainage capacity shall be provided within the road right-of-way and other drainage facilities to convey a 100-year storm without damage to any structures.

4. No more than 1.0 cubic feet per second (cfs) shall be allowed to "bypass" a midblock inlet. No more than 0.3 cfs shall be allowed to go around a curb return at an intersection.

5. Sheet flow across a road shall not exceed 0.1 cfs.

6. All "at-grade" grates shall be adequate for State of California HS-20 traffic loading, and shall be "bicycle-proof."

C. Junction boxes. Junction boxes shall be constructed of reinforced Portland cement concrete which complies with the compressive strength requirements provided in the Appendix, or fabricated from reinforced concrete pipe sections where size limitations permit. All junction boxes shall conform to the following requirements:

1. Minimum wall thickness for poured-in-place reinforced concrete junction boxes shall be six inches; eight inches when invert is in excess of 6 feet.

2. The inside dimension of junction boxes shall be such as to provide a minimum of three inches clearance on the outside diameter of the largest outfall pipe.

3. All manholes shall have the standard 24-inch manhole cover (Phoenix P1090, Pinkerton A640, or approved equal).

D. Other Structures. The following requirements shall apply to other drainage structures, as noted:

1. All headwalls, wingwalls, and endwalls shall be of reinforced Portland cement concrete which complies with the compressive strength requirements found in the Appendix.

2. All headwalls, wingwalls, and endwalls shall be considered individually and shall be, in general, designed in accordance with the State Standards or approved by the Department.

3. Trash racks shall be provided where in the opinion of the Department they are necessary to prevent clogging of culverts and storm drains, or to provide safety to the general public.

4. Guardrail or pedestrian/worker railings may be required by the Department at culverts, headwalls and box culverts and on steep side-slopes. When so required, the railing shall be installed in accordance with State Standards and Specifications.

5. For reinforced concrete box culverts and structural plate arch culverts, all materials, designs and construction shall conform to the provisions of the State Specifications and the State Standard Plans unless approved otherwise by the Department.

5.2.2 BASINS

Two types of drainage basins are utilized in San Luis Obispo County, as determined appropriate by site conditions and project requirements: retention basins and detention basins. The Department shall determine which type of basin shall be used based on the downstream hydrology for each development site. The types of basins are further discussed below. In all cases, the Project Engineer shall provide evidence that the basin will completely drain within seven days to the satisfaction of the Department.

If a basin is determined to be required to serve a particular subdivision or land development project, which was not evaluated during the application phase of the project, then the developer shall consult with the Department of Planning & Building to determine if any grading permit or land use permit is required for the construction of the basin. If a grading permit or land use permit is required, a copy is to be submitted to the Department of Public Works prior to approval of the plans.

A. Retention Basin. Any drainage basin which is used as a terminal disposal facility shall be classified as a retention basin.

1. Basin Capacity. The basin capacity is to be based on the theoretical runoff from a 50-year storm, 10-hour intensity for 10-hour duration. No reduction in required capacity shall be given for soil percolation rates. In addition, an antecedent moisture factor of 1.3 shall be required in locations where there are limited areas for overflow (i.e., a natural sump).

2. Inlet Structure. The inlet structure shall be designed to meet the requirements of Section 5.2.1 B, above.

3. Percolation Test Required. A minimum of 3 percolation tests per basin shall be submitted to the Department for approval prior to construction, to determine that the basin will be able to drain within the seven-day standard noted above. Soil borings may be required by the Department, in areas where there is concern about shallow depth to groundwater.

B. Detention Basin. Any drainage basin which has a downstream outlet designed to meter the outflow shall be classified as a detention basin. Basin capacity shall be based on receiving the runoff from a 50-year storm with the watershed in its fully-developed condition, and releasing the flow equivalent to the runoff from a 2-year storm with the project site in its pre-development condition. The outlet shall release water in a non-erosive manner. Orifice plates shall not be permitted as a metering device.

C. Deep Basins. Any retention or detention basin shall be considered a deep basin if the depth to the overflow point is greater than two (2) feet. Deep basins shall be designed according to County Standard Drawing D-1.

D. Shallow Basins. Any retention or detention basin shall be considered a shallow basin if the depth to the overflow point is two (2) feet or less. Shallow basins shall be designed according to County Standard Drawing D-1a.

E. Subsurface Basins. As an alternative, subsurface basins may be used for either retention or detention of site runoff, where the Project Engineer provides information from the Soils Engineer which demonstrates to the satisfaction of the Department that their application is suitable for project conditions. At a minimum, use of subsurface basins shall be limited to locations where it is demonstrated that the depth to seasonally high groundwater is no less than ten (10) feet.

For project designs proposing the use of subsurface basins, the Project Engineer must demonstrate that attention has been given to the following areas of concern:

1. Design Criteria.
- Percolation rate
- Lateral distance to wells or septic facilities
- Distance to structures on site

2. Gravel Backfill. Gravel backfill shall be 3/4" - 2" angular, clean rock. The Project Engineer may assume a "void ratio" of 25% of the volume of the gravel backfill in the computation of the storage volume of the subsurface basin.

3. Materials.

a. The storage chamber shall be fully perforated (by the manufacturer) HDPE pipe with a minimum diameter of 18 inches and a maximum diameter of 60 inches. Larger diameter pipes may be used with approval from the Department. Storage chambers shall meet the requirements of Section 5.2.8 of these standards as well as AASHTO Section 12 (including Load and Resistance Factor Design - LRFD - requirements).

b. Geotextiles. Filter fabric shall comply with the requirements of AASHTO M288, Class 2 non-woven or equivalent.

4. Operational Requirements.
- Water quality of inflow (both sediment and chemical loading)

- Maintenance plan, including provisions for vehicular access and confined-space entry safety requirements, where applicable
- Overflow path (See 5.2.3 G below), including easements as required
- Freeboard (See 5.2.3 I below) – some may be included in parking areas, per the requirements of 5.2.3 L, below

F. Easement Requirements. All drainage basins accepting runoff from public roads, streets or other public areas shall be located in an easement offered for dedication to the public. Reversionary clauses shall not be permitted. The offer of dedication will only be accepted when the basin is complete and in use. If a fence is required it shall be located not more than four inches inside the drainage easement line, except where setbacks are required as part of the land use permit or by the Land Use Ordinance.

G. Overflow Path Required. The design of all drainage basins shall identify the designated route for overflow. The Project Engineer shall design the overflow path so that the flow in a 100-year storm is non-erosive and will not damage downstream improvements, including other basins. Easements will be required for concentrated flows onto private properties.

H. Fencing Requirements. All surface drainage basins shall be evaluated to determine if they require fencing, as follows:

1. All deep basins are required to be fenced according to the specifications found in the Materials section below. Exceptions to the requirement for fencing may be granted for locations with no public traffic, subject to approval of the Department.

2. Shallow basins are not required to be fenced.

I. Freeboard Requirements. All basins shall be designed to provide "freeboard," measured from the design water surface to the lowest-elevation (the "overflow point") at which the basin would overflow during a greater-than-design storm. This overflow point may be a location on the basin perimeter, a point outside the basin perimeter if the location is a natural sump, or the flowline of the inlet structure for gutter flow entering the basin. An overflow path shall be identified as required in subsection G, above. The amount of freeboard to be provided under design-storm conditions is as follows:

1. Deep basins require one foot of freeboard above the design-storm water surface elevation.

2. Shallow basins require freeboard equal to 15% of their design depth.

3. Subsurface basins require freeboard equal to 20% of their maximum storage depth.

J. Bench Requirements. All drainage basins shall provide a bench around the perimeter to provide for maintenance, as follows:

1. Deep basins shall provide a bench five feet wide between the fence and the top of the basin side slope.

2. Shallow basins shall provide a bench five feet wide between the easement line and the top of the basin side slope.

K. Maintenance Requirements. Perpetual maintenance of all drainage basins shall be the responsibility of the developer, unless the maintenance responsibility is assumed by a public entity or a property owners' association. Deep basins shall provide an access ramp for maintenance vehicles, as depicted in Standard Drawing D-1. The Department will not assume maintenance responsibility for any subsurface basin.

L. Parking Areas. Parking areas may be used to store part of all of the volume required to be retained or detained, subject to the following criteria:

1. The maximum depth of inundation in the design storm shall be six (6) inches.

2. No more than 50% of the parking area shall be inundated in the Primary Design Storm.

5.2.3 CHANNELS AND SWALES

All channel realignment or improvement shall be shown on the improvement plans and shall conform to the requirements of these Standards and Specifications. No diversion to roadside ditches will be allowed from natural drainage courses.

A. Types. Open conduits may be natural watercourses, earthen channels or swales, or channels or swales lined with the materials such as those listed below:

- Low-growing grass, which will form a thick, dense sod. The proposed grass mixture is to be submitted to and approved by the Department.
- Temporary or permanent turf reinforcement mats/erosion control blankets.
- Rock slope protection, class and placement to be determined by the Project Engineer.
- Concreted-rock slope protection, class and placement to be determined by the Project Engineer.
- Concrete slope paving.
- Air-blown mortar, with reinforcement as determined necessary by the Project Engineer.

- Gabions – only if required by permit conditions from other regulatory agencies.
- Other natural linings approved by the Resource Conservation District, or State/Federal regulatory agencies.

Lining materials shall be selected which will be non-erosive under velocities calculated in the design storm, and which will provide for ease of ongoing maintenance, as approved by the Department. Where linings are required, they shall extend to the full height of freeboard, as defined below.

B. Freeboard Required. Realigned channels or swales may be required to be lined to an elevation of at least 1.0 foot above the design hydraulic gradient. The side slopes for realigned channels or swales shall not exceed 1:1 on the lined portion and 2:1 on the unlined portion (3:1 in sandy soil). Freeboard of at least one foot, or 0.2 of the specific energy (whichever is greater) shall be provided at design capacity for all channels or swales.

C. Improvement Plans. For all intermediate or major channels, either realigned or natural, within an improvement, the following information shall be shown on improvement plans in addition to the information heretofore required:

- Typical sections.
- Profile of the existing channel for a minimum of 500 feet each side of the development in order to establish an average profile grade through the development.

D. Velocity Requirements. Channels or swales shall comply with the following requirements:

1. Minimum velocity for channels or swales flowing full, with freeboard, shall be two feet per second (2 fps).

2. The maximum velocity in constructed, unlined earth channels or swales shall not exceed that which would cause erosion (maximum 4 fps).

3. The maximum velocity in shotcrete or concrete lined channels or swales shall not exceed 10 fps.

E. Natural Waterways. For natural waterways, the design flow may be allowed in the natural overflow area if a drainage easement is provided, which will include the overflow area, and freeboard as specified above exists between the water surface and adjacent ground.

F. Channel Side Inlets. Drainage facilities shall be so constructed and areas adjacent to channels so graded that side drainage will enter in a manner which will prevent erosion. This will often require constructed side inlets and collector ditches to carry side flow to inlets.

G. Fencing Requirements. For all open-conduit drainage facilities, the following requirements shall apply:

1. Constructed channels or swales with side slopes five to one (5:1) or flatter do not require fencing, unless determined necessary by the Department for public safety.

2. Natural channels need not be fenced, except where special hazards exist.

3. For minor channels or swales with depths less than 3.0 feet and for localized areas steeper than five to one (5:1) on other channels or swales, the Department may allow the fence requirement to be waived.

4. Any required fence shall be located no more than four inches within the required easement lines and shall provide sufficient room for maintenance vehicles as set out, or as specified by the Department.

5.2.4 CULVERTS

All culverts shall be shown on the improvement plans and shall conform to the requirements of the State Specifications and State Standard Drawings unless otherwise specified by the Department.

A. Types. Culverts shall be of either cast-in-place or precast reinforced concrete pipe, corrugated steel pipe, or HDPE corrugated pipe with smooth interior walls as specified below in Section 5.2.8. PVC pipe shall not be used for culverts in public improvements. Aluminum pipe shall not be used if concrete structures such as headwalls or future storm drain inlets are ever to be constructed upon them. HDPE pipe, when used, shall be completely buried to avoid degradation from ultraviolet radiation.

B. Minimum Diameter. Minimum pipe diameter allowable on any storm drain which will be maintained by the County shall be 18 inches. A lesser size may be used for down drains on fill slopes, or for privately-maintained facilities, if approved by the Department. If smaller pipes are approved for use, they shall include cleanouts, with maximum 100-foot spacing and at all junctions, as required.

C. Hydraulic Design Requirements. Waterways placed in culvert systems may be designed for full conduit capacity and pressure flow. The hydraulic entrance condition at a culvert minor waterway shall be such that the Primary Design Storm discharge will have the specified freeboard in the upstream channel or waterway and that the 100-year discharge will be contained within the banks of the upstream waterway or drainage easement. The entrance to the culvert conveying a minor waterway may be submerged provided that the above criteria are satisfied, and that there is no damage from backwater inundation.

D. Velocity Requirements. Culverts shall comply with the following requirements:

1. Minimum design velocity in culverts shall be two feet per second (2 fps) when conduit is flowing at design discharge.

2. Maximum design velocity shall not exceed 15 fps when culvert is flowing at design discharge.

E. Preformed Flared End Sections. On all culverts, preformed concrete, metal or plastic end sections shall be utilized, unless greater protection is required.

F. Cover Requirements. Minimum cover shall be two (2) feet within the full width of the traveled way. At locations where the general minimum cover requirements cannot feasibly be obtained, the conduit shall be encased in concrete per Standard Drawing U-4b, with prior approval by the Department.

G. Separation. There shall be a minimum 12" separation (O.D. to O.D.) between storm drains and water or sewer mains. Where either pipe is protected by concrete encasement, the separation shall be measured to the outside of the concrete encasement.

H. Subsurface Drainage. Where a road section will retain subsurface drainage within cut slopes of newly-constructed roads, the Department may require the installation of a subsurface drainage system, minimum four (4) inches in diameter, with cleanouts as shown in the State Standard Plans.

5.2.5 OUTFALLS

A. Improvement Plans. All drainage outfalls shall be shown both in plan and profile on the improvement plans until a definite "daylight" condition is established.

B. Accommodation for Future or Phased Development. When improvements have more than one unit or phase, the drainage outfall shall be designed to extend to the property boundary, and beyond if required. All outfalls, whether temporary or final, shall be shown both in plan and profile on improvement plans, and shall be designed to operate safely even if future units or phases are never completed. Necessary easements and agreements shall be provided prior to approval of improvement plans.

C. Culvert Energy Dissipaters. Energy dissipaters shall be designed in accordance with the provisions of the State Highway Design Manual Chapter 870, Channel and Shore Protection Erosion Control. The following items shall be determined and shown on the plans:

- Stable rock size (weight)
- Rock Slope Protection (RSP) class
- Dissipater trench dimensions
- Rock placement method
- RSP fabric type

Culvert energy dissipaters shall be designed for the flow from the Primary Design Storm. Rock slope protection gradation shall conform to Section 72 of the State Standard Specifications.

5.2.6 DRAINAGE PUMPS

The use of drainage pumps shall be avoided whenever possible. They shall be used only with the approval of the Department.

A. Gravity Outfall during Summer. If the use of a drainage pump is approved, the drainage system shall be so designed as to provide for gravity outfall during summer months and periods of low water stages. If a low stage gravity outfall is impossible or impracticable, a pump of smaller capacity for low stage flow may be used. Additional improvements may be required to handle adverse impacts downstream. Approval must be granted by the Department.

B. Standby Equipment. Drainage pumps shall be equipped with standby equipment for power and pumps. Pumps shall have alternating operation characteristics.

C. Floodgates. When specified by the Department, the outfall shall be equipped with floodgates of an approved design.

D. Design Storm. Pumping installations shall be so designed as to accommodate a design storm as specified by the Department.

E. Pump Design. Pumping stations shall be designed so that gravity flow does not flow through the pump pit. Each pumping installation shall receive separate approval, including all machinery, electrical system, piping system, housing installation and other miscellaneous design features.

F. Maintenance. Maintenance of all drainage pumps shall be the responsibility of the developer, unless the maintenance responsibility is assumed by a public entity or a property owners' association.

5.2.7 INSTALLATION REQUIREMENTS

A. Backfill. Structure Backfill shall conform to the requirements of Section 19-3.06, "Structure Backfill," of the State Specifications and the following requirements:

1. Inspection Required. Structure backfill shall not be placed until the structure footings or other portions of the structure or facility have been inspected and approved for backfilling as directed by the Department.

2. Suitable Material Required. When the material from the structure excavation is unsuitable for use as structure backfill, it shall be disposed of as directed by the Department, and shall be replaced by suitable material approved by the Department.

B. Sawcut and Pavement Replacement. Any installations requiring trenching or excavation into existing paved areas, shall comply with the requirements of Section 3.2.2 F of these Standards for sawcut and pavement replacement.

5.2.8 MATERIALS

All drainage items shall be of the material and construction methods required in accordance with the applicable portions of the State Specifications as herein noted, specified or modified.

A. Pipe. Culvert pipe shall comply with the following requirements:

1. Reinforced Concrete Pipe (RCP) shall conform to the specifications of Section 65 of the State Specifications.

Excavation for RCP shall conform to Section 6.2.2 of these specifications except that where tongue and groove pipe is utilized excavation need only be to one inch below the outside diameter of the pipe in uniform material and three inches below the outside of the pipe in rocky material.

Laying of RCP shall conform to the specifications of Section 65-1.07 of the State Specifications.

Jointing of RCP shall conform to the specifications of Section 65-1.06 of the State Specifications.

2. Non-reinforced Concrete Pipe shall conform to the specifications of ASTM Designation C-14. The construction method shall conform to the method specified for reinforced concrete pipe.

3. Corrugated Steel Pipe shall conform to the material and construction methods of Section 66 of the State Specifications. Wall thickness shall be specified. Attention is directed to the backfill requirements of Section 19-3 of the State Specifications and Section 5.2.8 of these Specifications, except that pea gravel or other suitable gravel material may be utilized for bedding and backfill.

4. High-Density Polyethylene (plastic) smooth-inner-wall pipe shall conform to the provisions of Section 64 of the State Specifications and to AASHTO M-294-03. Installation and backfill shall conform to the requirements of Section 64-1.05 of the State Specifications.

B. Concrete. Concrete Structures shall be in accordance with these Standards and Specifications and in addition, they shall conform to the requirements of Section 51 of the State Specifications.

C. Reinforcement. Shall conform to the requirements of Section 52 of the State Specifications.

D. Portland Cement Concrete. Shall conform to the compressive strength requirements found in the Appendix.

E. Geotextile Lined Channels and Swales. Adequate vegetative cover shall be established throughout all geotextile channel and swale linings. The Project Engineer shall demonstrate that a proposed geotextile lining is adequate for the velocity and shear stress that will be experienced in the Primary Design Storm. Additional guidelines for selection of geotextiles can be found in the Appendix.

F. Concrete Lined Channels. Concrete lined channels shall be constructed of the materials and in accordance with Section 72-4 of the State Specifications.

G. Grouted Rock Rip Rap Channels. Shall conform to the materials and methods called for in State Specifications 72-5.

Weep Holes - Weep hole pipe consisting of 2-½ inch diameter galvanized iron pipe shall be placed through the grouted rock rip rap along both sides of the channel approximately one foot above the channel invert. Spacing of weep holes shall be such as to provide complete drainage of the foundation and filter material and shall not exceed ten feet.

H. Fencing. Fencing required for drainage channels or basins, as determined above, shall comply with the following requirements:

1. Fence for drainage channel enclosure shall be six-foot chain link as specified in Section 80-1.01 of the State Specifications, with or without extension arms and barbed wire as specified on the plans.

2. Chain link fence shall be of the materials and construction as specified in Section 80-4 of the State Specifications.

3. Drive gates and walk gates will be provided, complete with master keyed locks and keys, at such locations as specified by the Department for the purpose of maintenance vehicles and personnel.

4. Other fencing materials may be considered for facilities which are not to be maintained by the County, and will require approval by the Department prior to improvement plan approval.

I. Landscaping. Where landscaping is required by project conditions of approval for any constructed drainage facility, the following requirements shall apply:

1. Plants shall be selected to be appropriate for the climate zone where they are to be installed, and shall be drought-tolerant.

2. On the bottom and sides of drainage basins, landscaping shall be limited to grass or other ground cover. No shrubs or trees shall be permitted.

3. The Project Engineer shall submit a landscape plan for approval. The Department of Public Works shall coordinate this approval with the Department of Planning & Building.

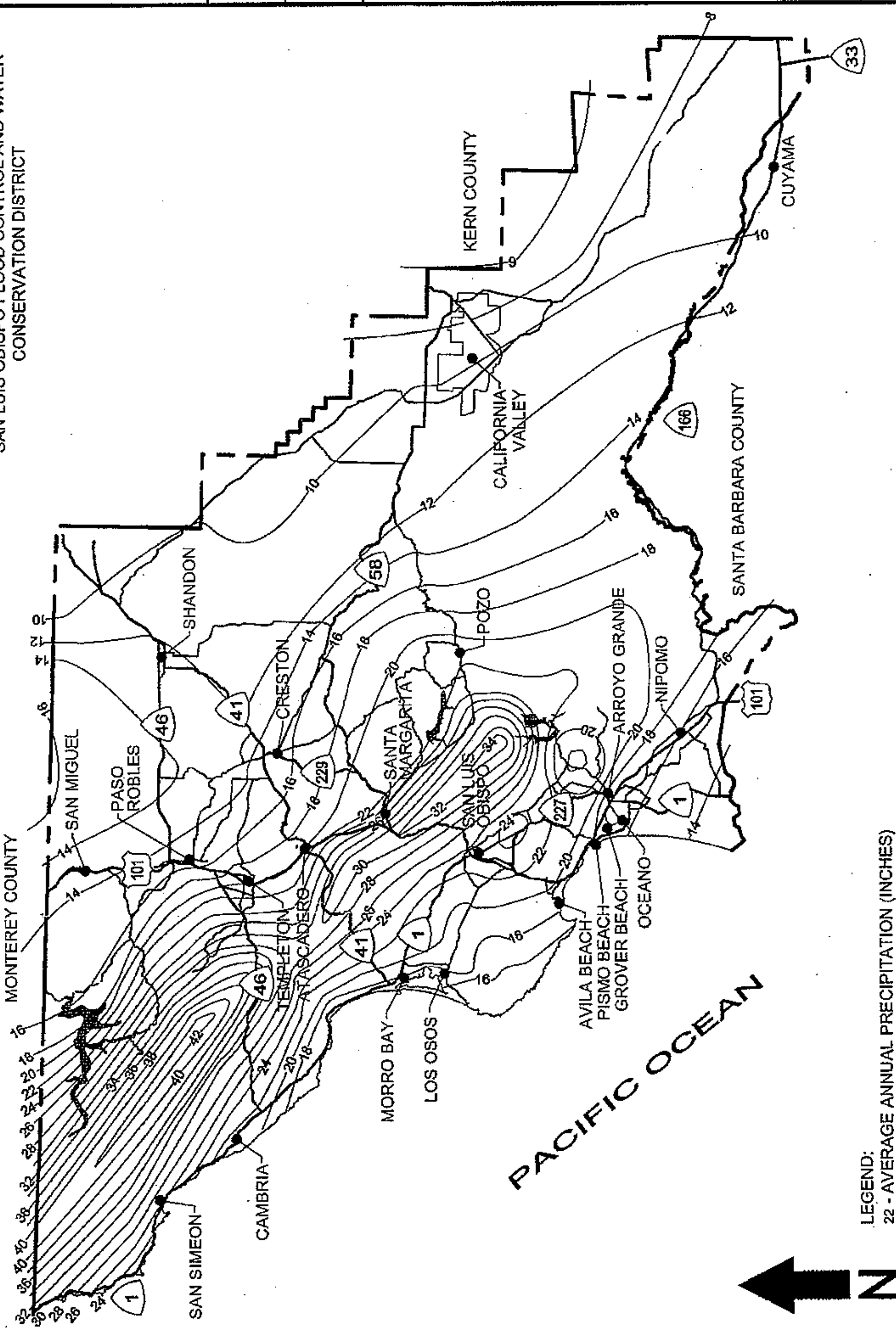
4. Maintenance of all landscaping and irrigation shall be the responsibility of the developer, unless the maintenance responsibility is assumed by a public entity or a property owners' association.

Revisions					
Description	Approved	Date	Description	Approved	Date

SAN LUIS OBISPO COUNTY AVERAGE ANNUAL PRECIPITATION

(JULY 1 THROUGH JUNE 30) FOR 42 YEAR PERIOD FROM 1955-56 THROUGH 1997-98)

SAN LUIS OBISPO FLOOD CONTROL AND WATER CONSERVATION DISTRICT



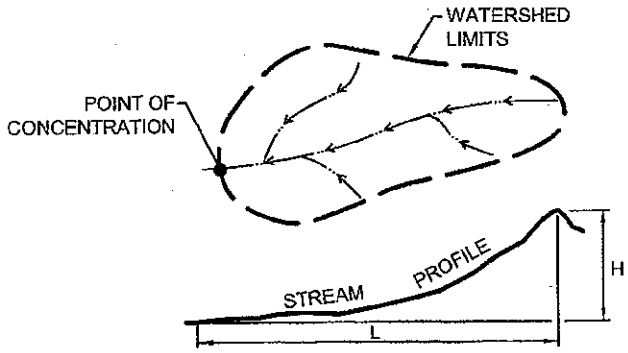
LEGEND:
22 - AVERAGE ANNUAL PRECIPITATION (INCHES)

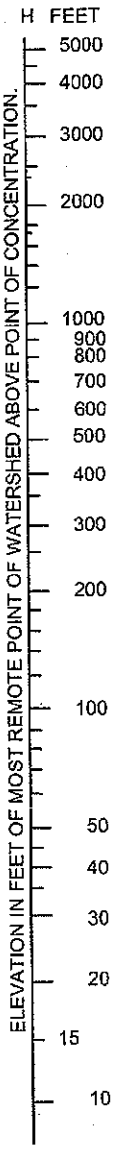
SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

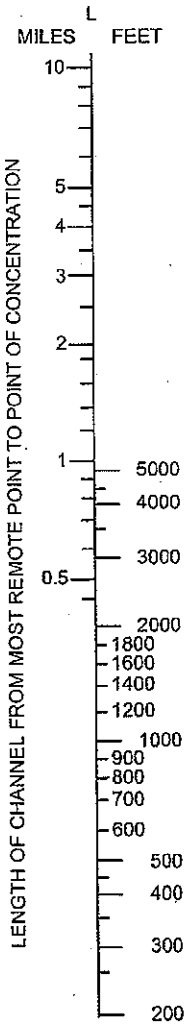
AVERAGE ANNUAL RAINFALL

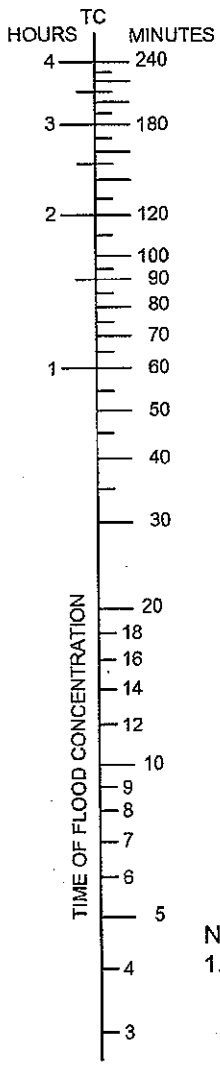
Scale: NTS	Issued: Aug. 2006
Drawing No: H-1	
Sheet No: 1 OF 1	

Revisions					
Description	Approved	Date	Description	Approved	Date









EQUATIONS FOR ESTIMATED "TIME OF CONCENTRATION"

$$Tc = \left(\frac{11.9L^3}{H}\right)^{0.385}$$

LEGEND:
Tc = TIME OF CONCENTRATION IN HOURS.
L = LENGTH OF CHANNEL IN MILES.
H = DIFFERENCE IN ELEVATION BETWEEN MOST REMOTE POINT AND THE POINT OF CONCENTRATION IN FEET.

NOTES:
1. THIS NOMOGRAPH IS TO BE LIMITED TO WATERSHED AREAS OF 200 ACRES OR LESS. FOR LARGER WATERSHEDS REFER TO THE DESIGN STANDARDS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TIME OF CONCENTRATION

FOR WATERSHEDS LESS THAN 200 ACRES

Scale:	Issued: Aug. 2006
Drawing No:	H-2
Sheet No:	1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date

TABLE 1: RATIONAL METHOD STANDARD RUNOFF COEFFICIENTS FOR DEVELOPED AREAS

TYPE OF DEVELOPMENT	SOIL TYPE	SLOPE <2%	SLOPE 2% to 10%	SLOPE >10%	FOOT NOTE
RESIDENTIAL LOTS > 20,000 SF	C	0.35	0.40	0.50	1,2
"	S	0.25	0.35	0.40	1,2
RESIDENTIAL LOTS 10,000 SF TO 19,999 SF	C	0.40	0.45	0.55	1,2
"	S	0.30	0.40	0.45	1,2
RESIDENTIAL LOTS 6,000 SF TO 9,999 SF	C	0.45	0.55	0.65	1,2
"	S	0.35	0.40	0.50	1,2
PLANNED DEVELOPMENTS (PUD)	C	0.65	0.70	0.75	1,2
"	S	0.60	0.65	0.70	1,2
APARTMENTS	C	0.50	0.60	0.70	2
"	S	0.40	0.50	0.60	2
INDUSTRIAL	C	0.55	0.65	0.75	2
"	S	0.45	0.55	0.65	2
COMMERCIAL	C	0.75	0.80	0.85	2
"	S	0.70	0.75	0.80	2

FOOT NOTES:
1. ESTIMATION OF COMPOSITE "C" VALUE USING ESTIMATED IMPERVIOUS AREAS AND STD. DWG. H-3a (TABLE 2) MAY BE REQUIRED BY THE DEPARTMENT. IMPERVIOUS AND PAVED AREAS SHALL USE C=0.95.
2. ALL VALUES SHOWN ARE INTENDED TO BE MINIMUMS. HIGHER VALUES MAY BE REQUIRED BY THE DEPARTMENT.

LEGEND:
C - CLAY, ADOBE, ROCK, OR IMPERVIOUS MATERIAL
S - SAND, GRAVEL, LOAM, OR PERVIOUS MATERIAL

NOTES:
1. COEFFICIENTS FOR RESIDENTIAL LOTS ASSUME TYPICAL SINGLE FAMILY RESIDENCE WITH ASSOCIATED GARAGE, DRIVEWAY, FLATWORK, AND LANDSCAPING. HIGHER DENSITY RESIDENTIAL DEVELOPMENTS MAY REQUIRE USING COMPOSITE COEFFICIENT EVALUATED BY THE DESIGN ENGINEER AND BASED ON PROPOSED DEVELOPMENT IMPERVIOUS AREAS.
2. FOR ALL TYPES OF DEVELOPMENT, COEFFICIENTS ARE INCLUSIVE OF ONLY THE LOT AREA OUTSIDE THE RIGHT-OF-WAY (NET LOT AREA). PAVED SURFACES BETWEEN ROAD CENTERLINE AND RIGHT-OF-WAY SHALL BE EVALUATED SEPARATELY AND INCLUDED TO DETERMINE A COMPOSITE "C" FACTOR.
3. ALL IMPERVIOUS AREAS AND PAVED AREAS SHALL USE C = 0.95.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RUNOFF COEFFICIENTS FOR DEVELOPED AREAS

Scale:	Issued: Aug. 2006
Drawing No:	H-3
Sheet No:	1 OF 2

Revisions					
Description	Approved	Date	Description	Approved	Date
CORRECT TO MATCH HWY. DES. MAN.	REM	NOV 07			

TABLE 2: RATIONAL METHOD STANDARD RUNOFF COEFFICIENTS FOR UNDEVELOPED AREAS

	EXTREME	HIGH	NORMAL	LOW
RELIEF	0.28 TO 0.35 STEEP, RUGGED TERRAIN WITH AVERAGE SLOPES ABOVE 30%	0.20 TO 0.28 HILLY, WITH AVERAGE SLOPES OF 10% TO 30%	0.14 TO 0.20 ROLLING, WITH AVERAGE SLOPE OF 5% TO 10%	0.08 TO 0.14 RELATIVELY FLAT LAND, WITH AVERAGE SLOPES OF 0% TO 5% 0.12
SOIL INFILTRATION	0.12 TO 0.16 NO EFFECTIVE SOIL COVER, EITHER ROCK OR THIN MANTLE OF NEGLIGIBLE INFILTRATION CAPACITY	0.08 TO 0.12 SLOW TO TAKE UP WATER, CLAY OR SHALLOW LOAM SOILS OF LOW INFILTRATION CAPACITY, IMPERFECTLY OR POORLY DRAINED	0.06 TO 0.08 NORMAL; WELL DRAINED LIGHT OR MEDIUM TEXTURED SOILS, SANDY LOAMS, SILT AND SILT LOAMS	0.04 TO 0.06 HIGH; DEEP SAND OR OTHER SOILS THAT TAKES UP WATER READILY, VERY LIGHT WELL DRAINED SOILS
VEGETAL COVER	0.12 TO 0.16 NO EFFECTIVE PLANT COVER, BARE OR VERY SPARSE COVER	PRO 0.08 TO 0.12 POOR TO FAIR; CULTIVATION CROPS, OR POOR NATURAL COVER, LESS THAN 20% OF DRAINAGE AREA OVER GOOD COVER	EX 0.06 TO 0.08 FAIR TO GOOD; ABOUT 50% OF AREA IN GOOD GRASSLAND OR WOODLAND, NOT MORE THAN 50% OF AREA IN CULTIVATED CROPS	0.04 TO 0.06 GOOD TO EXCELLENT; ABOUT 90% OF DRAINAGE AREA IN GOOD GRASSLAND, WOODLAND, OR EQUIVALENT COVER
SURFACE STORAGE	EX 0.10 TO 0.12 NEGEIGIBLE SURFACE DEPRESSIONS FEW AND SHALLOW; DRAINAGE WAYS STEEP AND SMALL, NO MARSHES	0.08 TO 0.10 LOW; WELL DEFINED SYSTEM OF SMALL DRAINAGE WAYS, NO PONDS OR MARSHES	PR 0.06 TO 0.08 NORMAL; CONSIDERABLE SURFACE STORAGE, LAKES AND POND MARSHES	0.04 TO 0.06 HIGH; SURFACE STORAGE, HIGH; DRAINAGE SYSTEM NOT SHARPLY DEFINED; LARGE FLOOD PLAIN STORAGE OR LARGE NUMBER OF PONDS OR MARSHES

(REFERENCES FIGURE 819.2A OF HIGHWAY DESIGN MANUAL)

EXAMPLE:

GIVEN: AN UNDEVELOPED WATERSHED CONSISTING OF:
1. ROLLING TERRAIN WITH AVERAGE SLOPES OF 5%
2. CLAY SOILS
3. GOOD GRASSLAND AREA
4. NORMAL SURFACE DEPRESSIONS

FIND: THE RUNOFF COEFFICIENT FOR THE ABOVE WATERSHED

SOLUTION:
1. RELIEF = 0.14
2. SOIL INFILTRATION = 0.08
3. VEGETAL COVER = 0.04
4. SURFACE STORAGE = 0.06

ANSWER: THE RUNOFF COEFFICIENT, C = 0.32

EX 0.38
PR 0.40

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RUNOFF COEFFICIENTS FOR UNDEVELOPED AREAS

Scale:	Issued: Aug. 2006
Drawing No: H-3a	
Sheet No: 2 OF 2	

Revisions					
Description	Approved	Date	Description	Approved	Date

TABLE 1: ANNUAL RAINFALL < 14":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	1.00	0.90	0.60	0.40	0.26	0.22	0.18	0.14
5	1.40	1.20	0.80	0.50	0.37	0.32	0.25	0.20
10	1.70	1.40	1.00	0.60	0.44	0.38	0.30	0.23
25	2.00	1.70	1.10	0.70	0.54	0.47	0.37	0.28
50	2.20	1.90	1.30	0.80	0.60	0.53	0.44	0.34
100	2.40	2.10	1.40	0.90	0.65	0.59	0.48	0.36

TABLE 2: ANNUAL RAINFALL 14" TO 17":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	1.30	1.10	0.80	0.50	0.35	0.30	0.23	0.18
5	1.90	1.60	1.10	0.70	0.49	0.42	0.33	0.26
10	2.30	1.90	1.30	0.80	0.60	0.51	0.40	0.30
25	2.60	2.20	1.50	1.00	0.71	0.63	0.50	0.38
50	3.00	2.50	1.70	1.10	0.81	0.74	0.60	0.47
100	3.20	2.70	1.90	1.20	0.90	0.80	0.65	0.49

TABLE 3: ANNUAL RAINFALL 18" TO 21":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	1.70	1.40	1.00	0.65	0.44	0.37	0.29	0.22
5	2.30	1.90	1.30	0.85	0.60	0.52	0.41	0.33
10	2.80	2.40	1.60	1.03	0.74	0.64	0.50	0.38
25	3.20	2.70	1.90	1.20	0.92	0.80	0.64	0.50
50	3.70	3.10	2.10	1.40	1.05	0.92	0.74	0.58
100	4.00	3.40	2.30	1.50	1.13	1.00	0.80	0.62

TABLE 4: ANNUAL RAINFALL 22" TO 28":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	2.10	1.80	1.20	0.77	0.55	0.47	0.36	0.28
5	2.80	2.50	1.70	1.05	0.76	0.64	0.52	0.42
10	3.60	3.00	2.10	1.30	0.92	0.81	0.64	0.48
25	3.90	3.50	2.40	1.50	1.10	0.98	0.78	0.60
50	4.50	3.90	2.60	1.70	1.28	1.15	0.94	0.72
100	5.00	4.30	2.90	1.85	1.40	1.25	0.98	0.76

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RAINFALL INTENSITY DATA

Scale:	Issued: Aug. 2006
Drawing No:	H-4
Sheet No:	1 OF 1

ROCK ENERGY DISSIPATER at CULVERT OUTLET

length, metric table (rock size, trench depth, RSP-fabric), determining rock size.

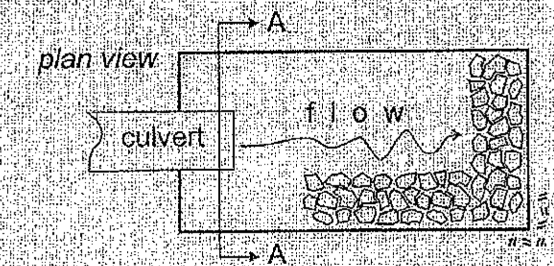
Design notes.

1. Determine **rock size** based on **culvert outlet velocity.**
   - A. 1st trial rock size by N.K. Berry's equation (1948), see USBR EM-25 : $\mathbf{d = 0.0126\ V^2}$ d diameter feet, V fps, specific gravity 2.65
   - B. Compare to Caltrans Bank & Shore Equation 1. With 1V:1.5H (if H>1.5, size will be small) and specific gravity = 2.65

     STABLE ROCK WEIGHT (**W**) = $\mathbf{0.0000568\ V^6}$ (equation 1)

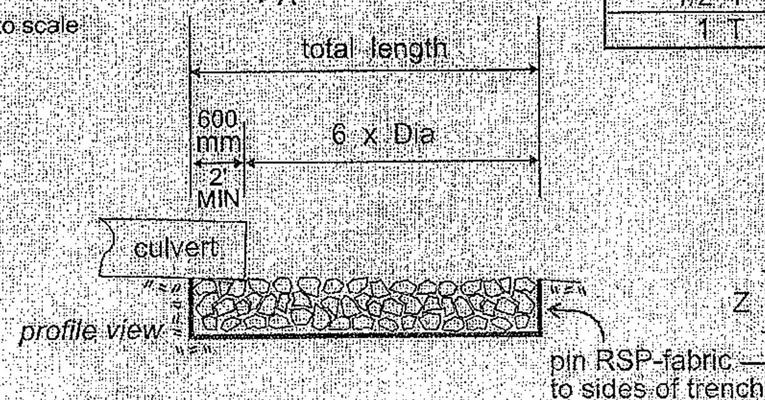
     Equation 1 gives rock size on bank, usually smaller than size from Berry equation for bedload movement along channel bottom.
   - C. Also compare above rock sizes to HEC-14 chart, Figure II-C-1, on page II-9 (1975), originally from Searcy (1967)
   - D. Select final rock size based on engineering judgment and field experience at similar sites.
2. When downstream channel requires rock bank protection, compare dissipater rock size to bank rock size.
3. Adjust length (increase or decrease) based on site-specific constraints.

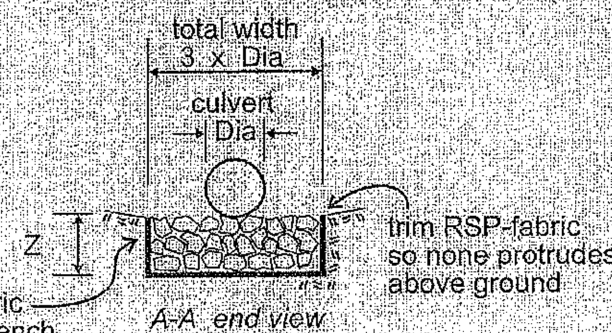
Construction note. Length, width, depth dimensions are approximate, (squared-off excavation not required).



ROCK SIZE RSP-class	Z trench depth Range mm	Type of RSP-fabric nonwoven or woven
Backing No. 2	10" 250 - 400 16"	A or B
Backing No. 1	12" 300 - 450 18"	A or B
Light	18" 450 - 600 24"	B
1/4 T	30" 750 - 900 36"	B
1/2 T	36" 900 - 1100 42"	B
1 T	48" 1200 - 1500 60"	B

not to scale





Revisions					
Description	Approved	Date	Description	Approved	Date

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

ROCK SLOPE PROTECTION SIZING METHOD AT CULVERT OUTLETS

Scale:

Issued: Aug. 2006

Drawing No: H-5

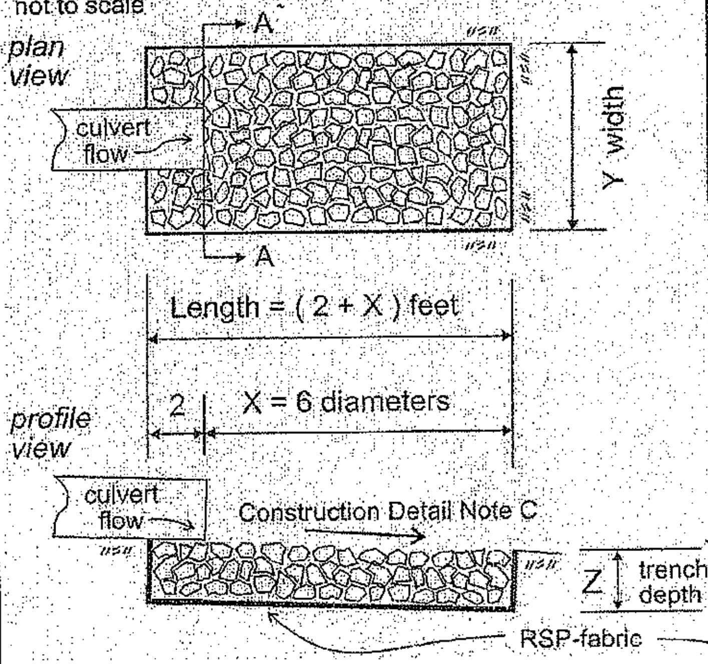
Sheet No: 1 OF 2

Description	Approved	Date	Description	Approved	Date

TABLE and SKETCHES for Rock Energy Dissipater at Culvert Outlet July 2005 Sheet 2 of 2

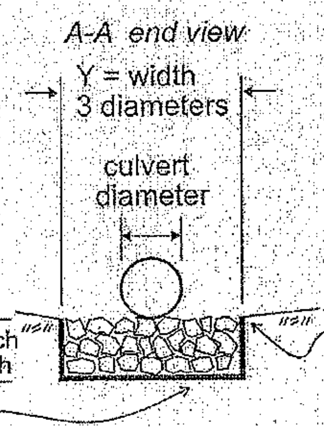
W50 standard rock weight. Select a W50 greater than determined stable rock weight W.	D50 feet of standard W50	Z trench depth in feet 1.5 times D50 of standard W50	RSP-class method B	RSP-fabric Type nonwoven or woven
25 pounds	0.66	1.0	Backing No. 2	A or B
75 pounds	0.95	1.5	Backing No. 1	A or B
200 pounds	1.32	2.0	Light	B
¼ ton	1.79	2.7	¼ ton	B
½ ton	2.26	3.4	½ ton	B
1 ton	2.85	4.3	1 ton	B

not to scale



Basic dissipater dimensions (X, Y)

1. Determining stable rock weight W, design guidelines, see sheet 1 of 2.
2. Added 2 feet to dissipater, supports culvert end, prevents headcut.
3. Table (standard rock sizes, D50, Z, RSP-class, RSP-fabric Type).
4. RSP-fabric details.
5. Construction Detail Notes A, B, C, and D. Include them on contract plans.



Construction Detail Notes

A. Excavate and/or fill dissipater trench to dimensions (X, Y, Z) as shown on plans. Squared edges not required.

B. Place RSP-fabric loosely, and pin it to sides of trench.

C. Place RSP-class of dissipater rock in trench. Rock shall not protrude above culvert flowline or adjacent ground. Match dissipater grade with downstream flow line and adjacent ground.

D. Trim RSP-fabric so that none protrudes above ground.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

ROCK SLOPE PROTECTION SIZING METHOD AT CULVERT OUTLETS

Scale:	Issued: Aug. 2006
Drawing No:	H-5a
Sheet No:	2 OF 2

A.2 EROSION CONTROL NOTES

1. Erosion control measures shall be implemented on all projects and shall include source control, including protection of stockpiles, protection of slopes, protection of all disturbed areas, and protection of accesses. In addition, perimeter containment measures shall be placed prior to the commencement of grading and site disturbance activities unless the Public Works Department determines temporary measures to be unnecessary based upon location, site characteristics or time of year. The intent of erosion control measures shall be to keep all sediment from entering a swale, drainageway, watercourse, or onto adjacent properties.

2. Site inspections and appropriate maintenance of erosion control devices shall be conducted and documented prior to, during, and after rain events.

3. The developer shall be responsible for the placement and maintenance of all erosion control devices as specified by the approved plan until such time that the project is accepted as complete by the Public Works Department. Erosion control devices may be relocated, deleted or additional items may be required depending on the actual soil conditions encountered. Additional erosion control devices shall be placed at the discretion of the Engineer of Work, County Inspector, SWPPP Monitor, or RWQCB Inspector. Guidelines for determining appropriate erosion control devices are included in the appendix of the Public Improvement Standards.

4. All erosion control devices shall be the first order of work and shall be in place between October 15 and April 15 or anytime when the rain probability exceeds 30%. This work shall be installed or applied after each area is graded and no later than five (5) working days after completion of each area.

5. The Engineer of Work and the Public Works Department shall be notified before October 15 for inspection of installed erosion control devices.

6. A standby crew for emergency work shall be available at all times during the rainy season (October 15 through April 15). Necessary materials shall be available and stock piled at convenient locations to facilitate rapid construction or maintenance of temporary devices when rain is imminent.

7. Permanent erosion control shall be placed and established with 90% coverage on all disturbed surfaces other than paved or gravel surfaces, prior to final inspection. Permanent erosion control shall be fully established prior to final acceptance. Temporary erosion control measures shall remain in place until permanent measures are established.

8. In the event of a failure, the developer and/or his representative shall be responsible for cleanup and all associated costs or damages. In the event that damage occurs

within the right of way and the County is required to perform cleanup, all work shall cease on the project until cleanup costs are fully paid.

9. If any work is not in compliance with the plans or permits approved for the project, the Department shall revoke all active permits and recommend that County Code Enforcement provide a written notice or stop work order in accordance with Section 22.52.140 [23.10] of the Land Use Ordinance.

10. All projects involving site disturbance of one acre or greater shall comply with the requirements of the National Pollutant Discharge Elimination System (NPDES). The developer shall submit a Notice of intent (NOI) to comply with the General Permit for Construction Activity with the Regional Water Quality Control Board (RWQCB). The developer shall provide the County with the Waste Discharge Identification Number (WDID #) or with verification that an exemption has been granted by RWQCB.

    WDID # _____

11. Person to contact 24 hours a day in the event there is an erosion control/ sedimentation problem (Storm Water Compliance Officer):

    Name_____
    Local Phone Number_____

APPENDIX B. EROSION AND SEDIMENTATION CONTROL

B.1 Plan Requirements. Each Erosion & Sedimentation Control Plan shall provide County Erosion Control Notes (see Appendix A) and reference specific details pertaining to the topics listed below. The information provided may reference Caltrans or California Stormwater Quality Association (CASQA) or other sources, if approved by the Department.

B.1.1 TEMPORARY SOIL STABILIZATION (EROSION CONTROL)

reference the typical standard(s) used, by number	Caltrans	CASQA
Scheduling	SS-1	EC-1
Preservation of Existing Vegetation	SS-2	EC-2
Hydraulic Mulch	SS-3	EC-3
Hydroseeding	SS-4	EC-4
Soil Binders	SS-5	EC-5
Straw Mulch	SS-6	EC-6
Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats	SS-7	EC-7
Wood Mulching	SS-8	EC-8
Earth Dikes/Drainage Swales & Lined Ditches	SS-9	EC-9
Outlet Protection/Velocity Dissipation Devices	SS-10	EC-10
Slope Drains	SS-11	EC-11
Streambank Stabilization	SS-12	EC-12
Polyacrylamide	-	EC-13

B.1.2 TEMPORARY SEDIMENT CONTROL

reference the typical standard(s) used, by number		
Silt Fence	SC-1	SE-1
Sediment/Desilting Basin	SC-2	SE-2
Sediment Trap	SC-3	SE-3
Check Dam	SC-4	SE-4
Fiber Rolls	SC-5	SE-5
Gravel Bag Berm	SC-6	SE-6
Street Sweeping and Vacuuming	SC-7	SE-7
Sandbag Barrier	SC-8	SE-8
Straw Bale Barrier	SC-9	SE-9
Storm Drain Inlet Protection	SC-10	SE-10
Chemical Treatment	-	SE-11

B.1.3 WIND EROSION CONTROL

reference the typical standard(s) used, by number		
Wind Erosion Control	WE-1	WE-1

B.1.4 TRACKING CONTROL

reference the typical standard(s) used, by number		
Stabilized Construction Entrance/Exit	TC-1	TC-1
Stabilized Construction Roadway	TC-2	TC-2
Entrance/Outlet Tire Wash	TC-3	TC-3

B.2 Maintenance. The plans shall include a General Note discussing the maintenance schedule of the devices specified in #1-4 above.

B.3 Post-construction or Permanent Erosion Control. The plans shall include measures that are proposed to prevent erosion and sedimentation in the completed condition of the project. This may include, but is not limited to, hydroseeding or planned landscaping treatments.

B.4 Cost Estimate for Bonding for Erosion Control Measures. A figure of 2% - 15% shall be used for estimating the cost of implementing erosion control measures (including permanent erosion control).

B.5 For More Information. The references cited above are available with more detail and explanation at the following websites:

Caltrans: http://ruralits.org/hq/construc/stormwater/manuals.htm

CASQA: http://www.cabmphandbooks.com/Construction.asp

LIGHTING PLAN

LIGHTING NOTES

1. VERIFY UNDERGROUND UTILITIES, PIPING AND DUCT BANKS PRIOR TO INSTALLATION.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL COORDINATION OF LIGHTING FIXTURE LOCATIONS AND FOR RELOCATION OF FIXTURE WHERE NECESSARY TO AVOID INTERFERENCE.

3. INSTALLATION DETAILS, WHEN SHOWN, ARE GENERAL IN NATURE AND SHALL BE ADAPTED TO SATISFY FIELD CONDITIONS.

4. GRAPHICAL REPRESENTATIONS ON THE LIGHTING DETAILS ARE GENERAL IN NATURE AND MAY NOT ACCURATELY DEPICT THE EQUIPMENT OF THE MANUFACTURER LISTED.

5. PHOTOELECTRIC CELLS SHALL BE POSITIONED IN THE FIELD AT A LOCATION FREE FROM SHADOWS CAUSED BY OBSTRUCTIONS, FACING NORTH, AND SUCH THAT LIGHT FROM THE LUMINARES BEING CONTROLLED DOES NOT SHINE ON THE CELL.

6. SEPARATE CONDUIT SYSTEMS SHALL BE PROVIDED FOR ALL RECEPTACLES AND LIGHTING CIRCUITS.

7. MOUNTING HEIGHTS OF LIGHTING FIXTURES SHALL BE THE DISTANCE BETWEEN THE FINISHED FLOOR OR GRADE AND THE BOTTOM OF THE FIXTURE.

8. ALL 120/208V RECEPTACLES, FIXTURES, AND SWITCHES SHALL BE GROUNDED BY MEANS OF A GREEN INSULATED GROUNDING CONDUCTOR RUN WITH THE LINE/PHASE CONDUCTORS FROM THE PANEL GROUND BUS TO THE RECEPTACLES/FIXTURES, AND SWITCHES. THE GROUNDING CONDUCTOR SHALL BE THE SAME SIZE AS THE CIRCUIT LINE/PHASE CONDUCTORS.

9. ALL WORK AND MATERIALS SHALL BE NEW, U.L. LISTED AND IN ACCORDANCE WITH THE LATEST REVISIONS OF THE NATIONAL ELECTRICAL CODE.

10. IT IS NOT THE INTENTION OF THESE DRAWINGS THAT EVERY FITTING, HANGER, WIRE OR DEVICE BE SHOWN. ALL SUCH ITEMS SHALL BE FURNISHED AND INSTALLED AS NECESSARY FOR A COMPLETE ELECTRICAL SYSTEM COMFORMING TO THE LATEST APPLICABLE LOCAL CODES AND THE NATIONAL ELECTRICAL CODE.

11. USE OF MANUFACTURER AND CATALOG NUMBERS ARE INTENDED TO CONVEY QUALITY AND TYPE OF MATERIAL REQUIRED. ALL MATERIAL IS SPECIFIED "OR APPROVED EQUAL" UNLESS NOTED. ALTERNATES MAY BE USED IF APPROVED BY ENGINEER.

13. MINIMUM SIZE OF RIGID CONDUIT SHALL BE $^{3}/_{4}$" EXCEPT FOR LIGHTING FIXTURE STEMS (PENDANTS) WHICH MAY BE $^{1}/_{2}$" RIGID GALVANIZED STEEL (RGS).

14. CONDUITS SHALL BE SIZED IN ACCORDANCE WITH THE REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC). THE EXACT CONDUIT ROUTING AND ARRANGEMENT WITHIN CONDUIT GROUPS SHALL BE DETERMINED BY THE ELECTRICAL CONTRACTOR. THE SUPPORTS FOR METALLIC CONDUIT ARE TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR, AT INTERVALS NOT TO EXCEED 10'-0". WHERE CONDUITS ARE TO BE ROUTED BELOW CABLE TRAYS, THE CONDUITS SHALL BE SUPPORTED BELOW THE LOWEST TRAY. CONDUIT SHALL NOT BE SUPPORTED FROM PIPE HANGERS. CONDUITS SHALL BE INSTALLED PARALLEL TO OR PERPENDICULAR TO WALLS, STRUCTURAL MEMBERS OR THE INTERSECTION OF VERTICAL PLANES AND CEILINGS UNLESS SPECIFICALLY SHOWN OTHERWISE ON THE DRAWINGS. THE MINIMUM HEADROOM FOR ALL CONDUIT RUNS (INCLUDING SUPPORT MATERIALS) SHALL BE 6'-9" . TO ALLOW FOR INSTALLATION OF INSULATION AND EXPANSION, ROUTE CONDUIT PER FOLLOWING MINIMUM CLEARANCES:

    * DUCTS 14" CLEARANCE
    * PIPING 18" CLEARANCE

15. WHERE OPENINGS THROUGH GRATING ARE REQUIRED, THEY SHALL BE FINISHED IN A NEAT AND WORKMANLIKE MANNER BY WELDING A $^{1}/_{4}$" STEEL BAND TO GRATING BARS AROUND OPENING. WHERE GRATING IS GALVANIZED, AFTER WELDING IS COMPLETED, THE SURFACES SHALL BE TOUCHED UP WITH A ZINC RICH COATING.

16. RACEWAYS OR CONDUITS CROSSING BUILDING OR STRUCTURAL EXPANSION JOINTS, SHALL BE PROVIDED WITH SUITABLE EXPANSION FITTINGS. THESE FITTINGS SHALL BE INSTALLED IN A MANNER THAT WILL ENSURE GROUND PATH CONTINUITY IN EACH CONDUIT OR RACEWAY. FOR ALL CONDUITS PENETRATING WALLS OR FLOORS ABOVE THE GROUND FLOOR, THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING NECESSARY BLOCKOUTS OR PIPE SLEEVES FOR CONDUIT PENETRATION, WHETHER OR NOT THEY ARE SHOWN ON THE DRAWINGS. THIS WORK SHALL BE COORDINATED WITH THE CONCRETE POUR TO ELIMINATE AS MUCH CORE DRILLING AS POSSIBLE

17. THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ADDITIONAL PULL POINTS (PULL SLEEVES, WIREWAYS OR PULL BOXES) WHERE REQUIRED TO LIMIT THE NUMBER OF 90 DEGREE BENDS TO THE REQUIREMENTS OF THE NEC. PULL BOXES SHALL BE FURNISHED BY THE ELECTRICAL CONTRACTOR AND SHALL BE SIZED AND INSTALLED IN ACCORDANCE WITH NEC

18. ALL CONDUITS ENTERING HAZARDOUS AREAS SHALL BE PROVIDED WITH CONDUIT SEALS OR RACEWAY ARRANGEMENT IN ACCORDANCE WITH THE NEC.

19. EXCEPT FOR TERMINATIONS AT EQUIPMENT WITH HUBS, ALL METAL CONDUIT SHALL BE TERMINATED WITH AN INSULATING BUSHING PRIOR TO PULLING CABLE.
    * A GROUNDING TYPE BUSHING SHALL BE USED FOR CONDUITS ENTERING EQUIPMENT.
    * AN UNGROUNDED TYPE BUSHING SHALL BE USED FOR CONDUITS TERMINATING AT EQUIPMENT WITH DOUBLE LOCKNUTS. WHEN CONCENTRIC OR ECCENTRIC CONDUIT KNOCKOUTS ARE USED IN DEVICES OR EQUIPMENT, IN ADDITION TO PROVIDING DOUBLE LOCKNUTS, THE CONTRACTOR SHALL TERMINATE THE CONDUIT USING A PROPERLY GROUNDED BUSHING.

20. LIGHTING AND RECEPTACLE CIRCUITS SHALL NOT BE INSTALLED IN CABLE TRAYS.

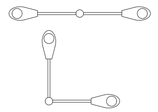
21. FIXTURE STEMS (PENDANTS) SHALL NOT EXCEED 10'-0" IN LENGTH, EXCEPT WHERE NOTED. ADDITIONAL SUPPORTING STRUCTURE SHALL BE PROVIDED WHERE REQUIRED.

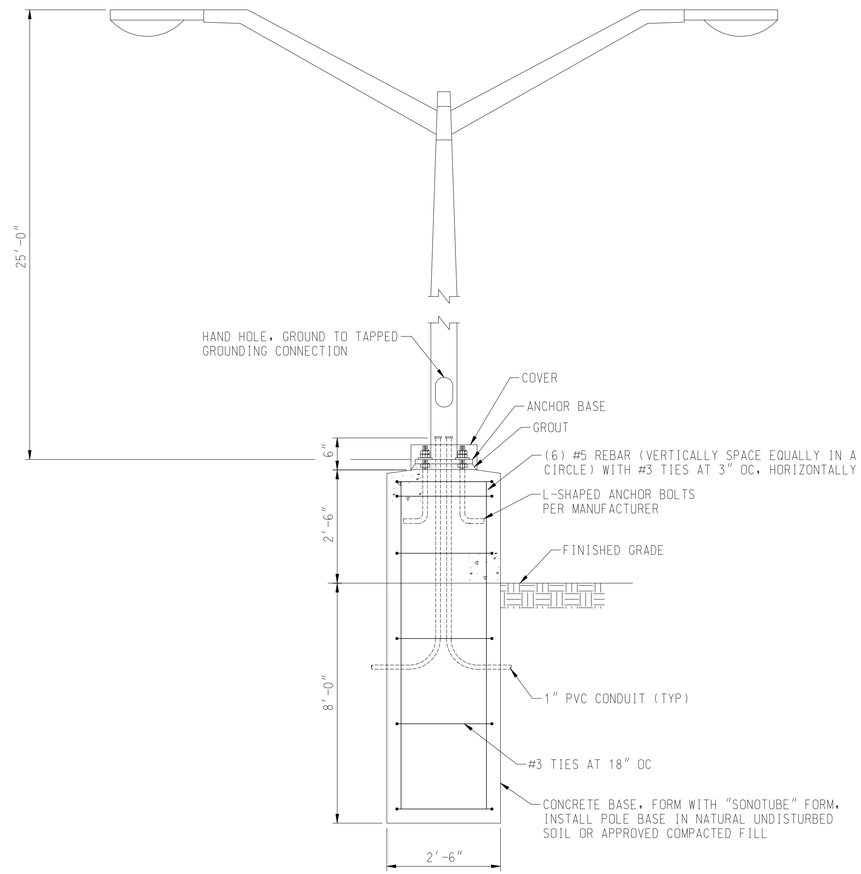
22. ALL DIRECT BURIAL SERVICE ENTRANCE, FEEDER AND BRANCH-CIRCUIT WIRING SHALL BE OF AN APPROVED TYPE IN ACCORDANCE WITH PROVISIONS OF THE NEC.

23. UPON COMPLETION OF LIGHTING SYSTEM, ENERGY OPERATIONS WILL PROVIDE SITE SURVEY AND AREAS REQUIRING ADDITIONAL LIGHTING SHALL BE MODIFIED ACCORDINGLY.

24. ALL OUTDOOR LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTACTOR GROUPS INCLUDING POWER BLOCK AREA LIGHTING, POWER BLOCK EQUIPMENT LIGHTING, SOLAR FIELD STEAM DRUM AREA LIGHTING AND SOLAR FIELD PERIMETER SECURITY LIGHTING. EACH GROUP SHALL BE INDEPENDENTLY CONTROLLED WITH A HAND-OFF-AUTO SWITCH. AREA LIGHTING AND EQUIPMENT LIGHTING SHALL BE AUTOMATICALLY CONTROLLED WITH A PHOTOELECTRIC CELL. SOLAR FIELD PERIMETER SECURITY LIGHTING SHALL BE AUTOMATICALLY CONTROLLED VIA THE PLANT SECURITY SYSTEM. ELEVATED EQUIPMENT LIGHTING IN THE POWER BLOCK SHALL BE FURTHER CONTROLLED BY LOCAL SWITCHES.

LIGHTING FIXTURE SCHEDULE

LABEL	SYMBOL	MANUFACTURER & CATALOG NUMBER	DESCRIPTION	QUANTITY	APPROX MOUNT HEIGHT (UNLESS NOTED OTHERWISE)
A1		LITHONIA CHM SERIES CHM 250M FL 480 SCWA LPI	SOLAR FIELD PERIMETER SECURITY LIGHTING 250W METAL HALIDE OUTDOOR POLE-MOUNT ROADWAY LIGHTING (FLAT TEMPERED GLASS LENS) WITH PULSE START	46	25'-0"
A2				4	25'-0"
B		LITHONIA KAD SERIES DAD 250S 240 SPD04 LPI	POWER BLOCK AREA LIGHTING (FULL CUTOFF) 250W HIGH PRESSURE SODIUM OUTDOOR POLE MOUNT AREA LIGHTING	17	25'-0"
C		LITHONIA TWAC SERIES TWAC 100S 240 LPI	POWER BLOCK AND SOLAR FIELD AREA LIGHTING (FULL CUTOFF) 100W HIGH PRESSURE SODIUM OUTDOOR WALL MOUNT AREA LIGHTING	21	VARIABLE
D		CROUSE-HINDS VMV SERIES VMV-(PART NUMBER AS REQUIRED)	POWER BLOCK EQUIPMENT LIGHTING (SHIELDED AND DIRECTED, AND SWITCHED WHEN ELEVATED) INDUSTRIAL HIGH PRESSURE SODIUM OUTDOOR EQUIPMENT LIGHTING	TBD	VARIABLE



TYPICAL SOLAR FIELD PERIMETER POLE MOUNTED FIXTURE DETAIL

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD	REFERENCE DRAWINGS
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ	E9-10 SITE SECURITY PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08

SCALE: NONE

FOR 22x34 DWG ONLY

POWER ENGINEERS

AUSRA

CARRIZO ENERGY SOLAR FARM

ELECTRICAL LIGHTING DETAILS, GENERAL NOTES, AND LEGEND

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-1

dwolfley 6/27/2008 \\BOIPDS\pdsadm\113226\dwg\elec\54auE9_1.dgn

\\boipds\pdsadm\113226\dwg\elec\54auE9_10.dgn

dwolfley 6/27/2008

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INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	–	–	–	–	–	–	–
INIT	–	–	–	–	–	–	–

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ

REFERENCE DRAWINGS	
E9-1	DETAILS, NOTES, LEGEND
E9-11	POWER BLOCK PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08

SCALE: 1" = 300'

FOR 22x34 DWG ONLY

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CARRIZO ENERGY SOLAR FARM

ELECTRICAL LIGHTING
SITE SECURITY PLAN

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-10

PLANT NORTH

EAST N/S POWER BLOCK ROAD

ADMIN BLDG

PARKING

SHOP/ WAREHOUSE

CONTROL ROOM ABOVE

MAINTENANCE (MIRROR WASHERS)

RECOVERED WATER TREATMENT

DEMINERALIZED WATER EQUIPMENT

RECOVERED WATER TANKS

DEMINERALIZED WATER

CONDENSATE STORAGE TANK

RAW WATER FIREWATER

FIREWATER PUMPS

ACC 1

ACC 2

SEPTIC TANK & LEACHING FIELD

GASOLINE & DIESEL

WEST N/S POWER BLOCK ROAD

200′-0″ (TYP)

15′-0″

NOTES

1. EQUIPMENT LIGHTING AND BUILDING LIGHTING REQUIREMENTS ARE NOT PROVIDED ON THIS DRAWING.

0 25 50 100 150 FEET

1″= 50′

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ

REFERENCE DRAWINGS	
E9-1	DETAILS, NOTES, LEGEND
E9-10	SITE SECURITY PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08

SCALE: 1″ = 50′

FOR 22x34 DWG ONLY

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CARRIZO ENERGY SOLAR FARM

ELECTRICAL AREA LIGHTING
POWER BLOCK PLAN

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-11

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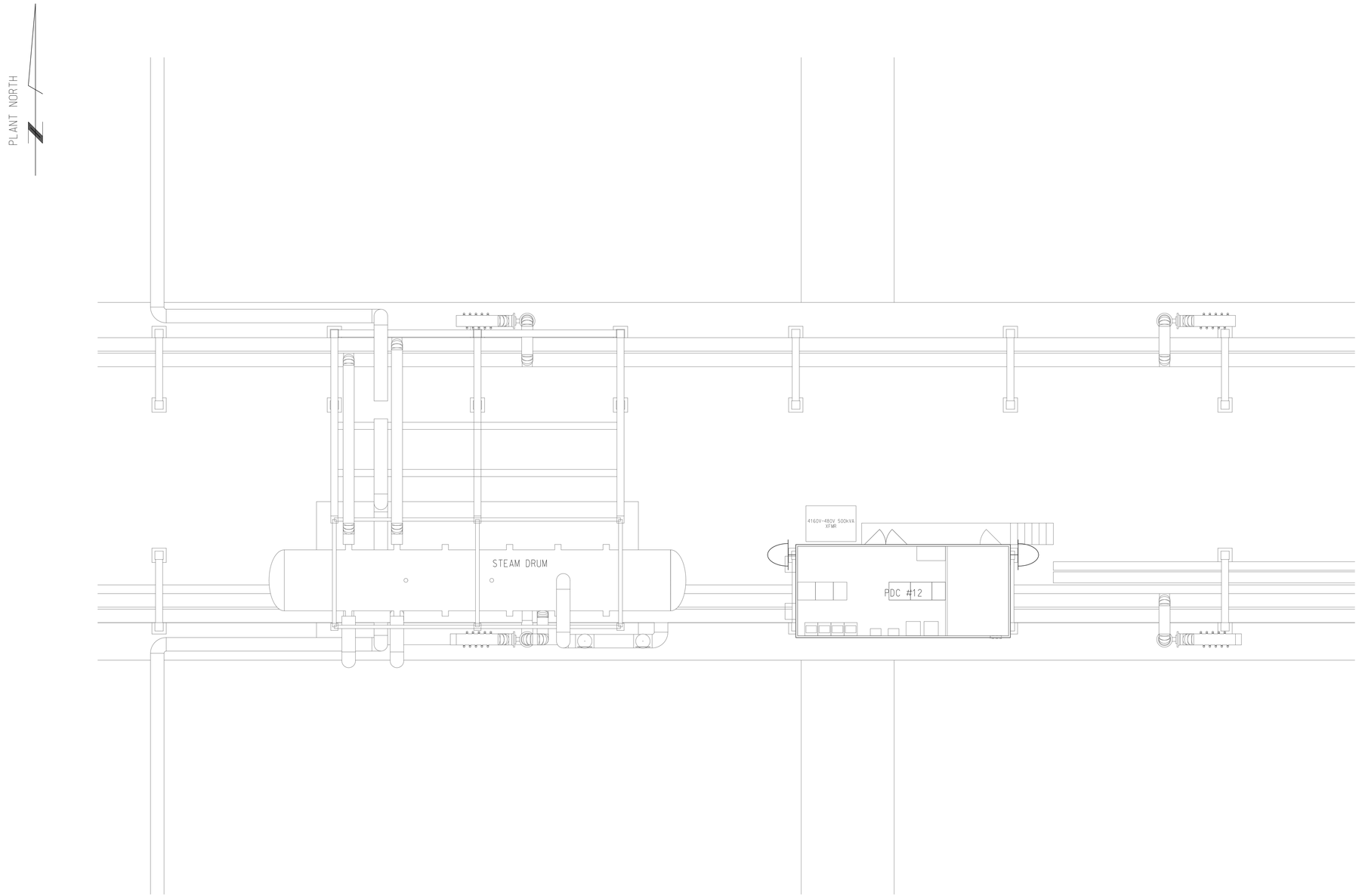

NOTES

1. EQUIPMENT LIGHTING AND BUILDING LIGHTING REQUIREMENTS ARE NOT PROVIDED ON THIS DRAWING.

0 5 10 20 FEET

1/8"= 1'- 0"

INTER-DISCIPLINE REVIEW							
DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ

REFERENCE DRAWINGS	
E9-1	DETAILS, NOTES, LEGEND
E9-10	SITE SECURITY PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08

SCALE: 1/8" = 1'-0'

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CARRIZO ENERGY SOLAR FARM

ELECTRICAL AREA LIGHTING
STEAM DRUM PLAN

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-12

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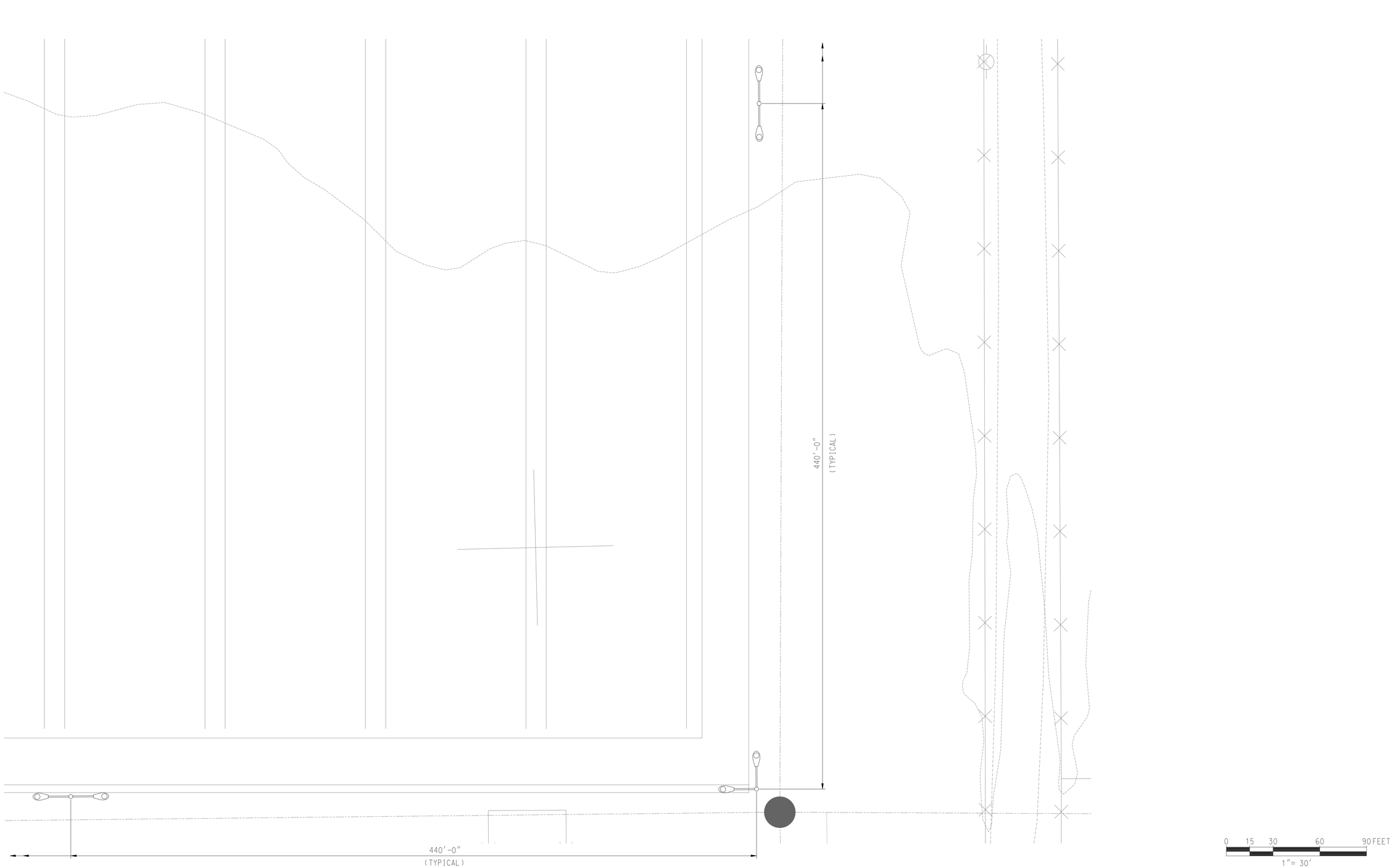

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INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	HVAC	I&C	MECH	STRUCT
DATE	-	-	-	-	-	-	-
INIT	-	-	-	-	-	-	-

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	ISSUED FOR REVIEW	6/27/08	RDQ	RDQ	SK	DEJ

REFERENCE DRAWINGS	
E9-1	DETAILS, NOTES, LEGEND
E9-10	SITE SECURITY PLAN

DSGN	RDQ	6/23/08
DRN	RDQ	6/23/08
CKD	SK	6/23/08

SCALE: 1" = 30'

FOR 22x34 DWG ONLY

POWER ENGINEERS

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CARRIZO ENERGY SOLAR FARM

ELECTRICAL LIGHTING
SITE SECUITY DETAIL PLAN

JOB NUMBER 113226

REV A

DRAWING NUMBER E9-13

AIR QUALITY DATA

Appendix C
Diesel Emergency Firewater Pump Emissions

CESF

Emissions from Emergency Diesel Firewater Pump

Rated Horsepower	**300**	**BHP**
Testing duration	**30**	**min/week**
Yearly testing	**52**	**week/year**
Expected non-emergency usage	**30**	**hr/yr**

Pollutant	Emision Factor	Emission Rate per Testing	Yearly Emission Rate	Hourly Emission Rate	Annual Emission Rate
	g/HP/Hr	lb/hr	lb/yr	g/s	g/s
NO_X	4.27	1.41	42.36	0.178	6.10E-04
CO	0.33	0.11	3.27	0.014	4.71E-05
VOC (Total Hydrocarbons)	0.32	0.11	3.17	0.013	4.57E-05
SO_X		0.001	0.04	0.0002	6.44E-07
PM_{10}	0.14	0.05	1.39	0.006	2.00E-05

Note: SO_2 emission calculated from spec sheet gpm of fuel usage and sulfur content of 15 ppm in fuel.

Engine parameters

Flow Rate (acfm)	1740	64.825	m/s
Exhaust Temp (degrees F)	770	683.15	K
Stack Diameter (feet)	0.4167	0.127	m
Stack height (feet) above ground	18	5.486	m
fire pump building height (ft)	15	4.572	m
fuel usage (gal/hr)	14		
diesel density (lb/gal)	7.1		

Data from Vendor Clarke JW6H-UF40
Stack diameter determined from the CARB "Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines" Oct 2000

Appendix C
Diesel Emergency Generator Emissions

CESF

Emissions from Emergency Diesel Generator 1000eKW

Rated Horsepower	**1341**	**BHP**
Testing duration	**30**	**min/week**
Yearly testing	**52**	**week/year**
Expected non-emergency usage	**30**	**hr/yr**

Pollutant	Emision Factor	Emission Rate per Testing	Yearly Emission Rate	Hourly Emission Rate	Annual Emission Rate
	g/HP/Hr	lb/hr	lb/yr	g/s	g/s
NO_X	4.82	7.13	213.75	0.899	3.08E-03
CO	0.19	0.28	8.43	0.035	1.21E-04
VOC (Total Hydrocarbons)	0.01	0.01	0.44	0.002	6.38E-06
SO_X		0.008	0.24	0.0010	3.42E-06
PM_{10}	0.02	0.03	1.02	0.004	1.47E-05

Note: SO_2 emission calculated from spec sheet gpm of fuel usage and sulfur content of 15 ppm in fuel.

Engine parameters

Flow Rate (acfm)	8387.2	122.060	m/s
Exhaust Temp (degrees F)	964.9	791.43	K
Stack Diameter (feet)	0.6667	0.2032	m
Stack height (feet) above ground	18	5.486	m
generator building height (ft)	15	4.572	m
fuel usage (gal/hr)	74.3		
diesel density (lb/gal)	7.1		

Data from Vendor CAT diesel generator set standby 1000ekW 1250 kVA

The calculation below is referred to the "*Power/Utility Reporting Protocol Version 1.0 April 2005*", California Climate Action Registry

Step 1. Identify the annual consumption of each fossil and non-fossil fuel

Diesel fuel for the generator and the firewater pump

Step 2. Determine annual consumption of the fuel

	Max Fuel Flow HHV (MMBtu/hr)	Hours of Operation (hr/yr)	Fuel Consumed (MMBtu)	number of unit	Total Annual Fuel Consumed (MMBtu)
Emergency Diesel Generator	3.42	30.00	102.45	1	102
Emergency Diesel Firewater Pump	0.76	30.00	22.92	1	23
Total					125

note:
1. Max Fuel Flow HHV: used 3.42 MMBtu/hr for the emergency diesel power generator (1341 bhp);
2. Max Fuel Flow HHV: used 0.76 MMBtu/hr for the emergency diesel firewater pump (300 bhp).

Step 3. Apply or Derive an Appropriate CO_2 Emission Factors for Each Fuel

Find the emission factors for natural gas and diesel

Natural gas	Diesel (Distillate Oil)	Unit
53.05	73.14	(kg CO2/MMBtu)
0.003901	0.000907	(kg CH4/MMBtu)
0.001361	0.000358	(kg N2O/MMBtu)

Step 4. Calculate fuel's carbon dioxide (CO_2) emissions

(1) Emergency Diesel Power Generator
Total Emissions (metric tons) = Adjusted Emission Factor (kg CO_2/MMBtu) x Fuel Consumed (MMBtu) x 0.001 metric tons/kg
= 7.49 metric tons

(2) Emergency Diesel Firewater Pump
Total Emissions (metric tons) = Adjusted Emission Factor (kg CO_2/MMBtu) x Fuel Consumed (MMBtu) x 0.001 metric tons/kg
= 1.676 metric tons

Step 5a . Calculate each fuel's methane (CH_4) emissions .

(1) Emergency Diesel Power Generator
Total Emissions (metric tons) = Adjusted Emission Factor (kg CH_4/MMBtu) x Fuel Consumed (MMBtu) x 0.001 metric tons/kg
= 9.29255E-05 metric tons

(2) Emergency Diesel Firewater Pump
Total Emissions (metric tons) = Adjusted Emission Factor (kg CH_4/MMBtu) x Fuel Consumed (MMBtu) x 0.001 metric tons/kg
= 2.07887E-05 metric tons

Step 5b. Calculate each fuel's N_2O emissions

(1) Emergency Diesel Power Generator
Total Emissions (metric tons) = Adjusted Emission Factor (kg N_2O/MMBtu) x Fuel Consumed (MMBtu) x 0.001 metric tons/kg
= 3.66784E-05 metric tons

(2) Emergency Diesel Firewater Pump
Total Emissions (metric tons) = Adjusted Emission Factor (kg N_2O /MMBtu) x Fuel Consumed (MMBtu) x 0.001 metric tons/kg
= 8.20546E-06 metric tons

Step 6. Convert CH_4 and N_2O emissions to CO_2 equivalents and sum all subtotals

Greenhouse Gas GWP (SAR, 1996)
Source: Intergovernmental Panel on Climate Change, Second Assessment Report (1996)

Greenhouse Gas	GWP (SAR, 1996)
CO_2	1
CH_4	21
N_2O	310

RESULTS

Total Metric Tons of CO_2e = Total Metric Tons of CO_2 + CH_4 Tons of CO_2e + N_2O Tons of CO_2e

Equipment / Cases	Emergency Diesel Power Generator	Emergency Diesel Firewater Pump	Yeraly Emissions - Total Metric Tons of CO_2e
1 Emergency Diesel Power Generator and 1 Emergency Diesel Firewater Pump	7.51	1.68	9.19

Appendix C
SF_6 emissions

CESF

Estimated SF_6 emissions from any equipment on the proposed project site

Breaker	Qty	Typical Make	Typical Model	SF6 Lbs/Bkr	Leakage Rate	Leakage Lbs/Yr (per Bkr)	Leakage Lbs/Yr (All Bkrs)	CO_2e emissions (metric tons/Yr)
230kV Main Breaker (2000A)	2	GE-Hitachi HVB	HP Series	240	1%	2.4	4.8	52.04
230kV Transformer Breaker (2000A)	5	GE-Hitachi HVB	HP Series	240	1%	2.4	12	130.09
34.5kV Capacitor Breaker (1200A)	10	GE-Hitachi HVB	HS Series	31	1%	0.31	3.1	33.61
34.5kV Solar Group Breaker (1200A)	15	GE-Hitachi HVB	HS Series	31	1%	0.31	4.65	50.41
48.3kV Capacitor Switcher	15	Southern States	CapSwitcher	7	0.50%	0.035	0.525	5.69
							CO_2e emissions (metric tons/Yr)	271.83

Note:

Greenhouse Gas Global Warming Potentials (GWPs) - Intergovernmental Panel on Climate Change, Second Assessment Report (1996)

Greenhouse Gas	GWP (SAR, 1996)
SF_6	23,900

ADDENDUM NO. 1 TO PRELIMINARY GEOTECHNICAL INVESTIGATION

URS

July 1, 2008

Mr. Perry Fontana
Ausra CA, II (dba Carrizo Energy, LLC)
2585 E. Bayshore Drive
Palo Alto, California 94303

Subject: Addendum No. 1 to Preliminary Geotechnical Investigation
Carrizo Energy Solar Farm (07-AFC-8)
San Luis Obispo County, California
URS Project No. 27658060.02100

Dear Mr. Fontana:

URS Corporation Americas (URS) has prepared this addendum to update the seismic coefficients for the Carrizo Energy Solar Farm (CESF) in accordance with the 2007 California Building Code (CBC). URS provided geotechnical and geologic recommendations for the project in a report titled "Preliminary Geotechnical Investigation, Carrizo Energy Solar Farm (CESF), San Luis Obispo County, California," URS Project No. 22239472.01200, dated October 1, 2007.

The 640-acres (one square mile) required for the power plant footprint is planned to be located on one section of land (Section 28) adjacent to SR58/Carrisa Highway. The Compact Linear Fresnel Reflector (CLFR) solar concentrating lines will cover the majority of Section 28 and the steam drums will be located across the solar field. Most of the other components will be located within the 'power block' at the north-central side of the Section. A portion of Section 33 immediately to the south will be used for construction laydown and onsite manufacturing.

CBC Seismic Coefficients

URS evaluated seismic design coefficients in accordance with the 2007 CBC based on soil conditions and site location with respect to seismic sources. The table below presents the CBC seismic design coefficients for proposed structures. Because of the project size, there is a variation in seismic design coefficients across the site, with the highest values at the northeast corner of Section 28 nearest the San Andreas fault. For design of the solar lines, associated equipment and structures within the construction laydown area, the table presents seismic design coefficients for the northeast corner of Section 28. Lower values have been provided for structures within the power block, which is further west.

URS Corporation
1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108
Tel: 619.294.9400
Fax: 619.293.7920

Parameter	Value		Reference
	Power Block Area	Solar Lines and Construction Laydown Area	
Site Coordinates Used to Determine Values	35.3810°N, -120.0509°W	35.3806°N, -120.0404°W	Google Maps
Site Class	D	D	2007 CBC Table 1613.5.2
Mapped Spectral Acceleration - Short Period, S_S (g)	1.516	1.575	2007 CBC Figure 1613.5[1]
Mapped Spectral Acceleration - 1 Sec. Period, S_1 (g)	0.739	0.770	2007 CBC Figure 1613.5[1]
Site Coefficient - Short Period, F_a	1.0	1.0	2007 CBC Table 1613.5.3(1)[1]
Site Coefficient - 1 Sec. Period, F_v	1.5	1.5	2007 CBC Table 1613.5.3(2)[1]
MCE[2] Spectral Response Acceleration - Short Period, S_{MS} (g)	1.516	1.575	2007 CBC Equation 16-37, $S_{MS}=F_aS_S$
MCE[2] Spectral Response Acceleration - 1 Sec. Period, S_{M1} (g)	1.108	1.155	2007 CBC Equation 16-38, $S_{M1}=F_vS_1$
Design Spectral Response Acceleration - Short Period, S_{DS} (g)	1.011	1.050	2007 CBC Equation 16-39, $S_{DS}=2/3*S_{MS}$
Design Spectral Response Acceleration - 1 Sec. Period, S_{D1} (g)	0.739	0.770	2007 CBC Equation 16-40, $S_{D1}=2/3*S_{M1}$

Notes:
1. Calculated using the USGS program "Earthquake Ground Motion Parameters" Version 5.0.8.
2. MCE – Maximum Considered Earthquake.

LIMITATIONS

Geotechnical engineering and geologic sciences are characterized by uncertainty. Professional judgments presented herein are based partly on our understanding of the proposed construction and partly on our general experience. Our engineering work and judgments rendered meet current professional standards; we do not guarantee the performance of the project in any respect.

We look forward to continuing to work with you on this project.

Sincerely,

URS CORPORATION

Kelly C. Giesing, G.E. 2749
Project Engineer

KCG:ml

CULTURAL RESOURCES – CONFIDENTIAL

This document is confidential and is not appropriate for public distribution. Copies have been provided to the California Energy Commission under separate cover.

NOISE DATA

Table F-1
Monthly Construction Use for Power Block

Equipment Description	Utilization	HP	Base Sound (SPL at 1m, dBA)	Projected Monthly Construction Equipment Use-Months																																						
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	20%	150	79	4.8	7.2	9.6	14	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	14	14	14	14	14	14	13	13	12
Flatbed - Stake Body Truck (1 ton)	20%	220	108	2.4	4	4	7.2	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	11	11	11	11	10	10	10	10	10	10	9	9	9	9	9
Truck (2.5 ton)	20%	275	114	1.6	1.6	1.6	1.6	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2	2	2	1	1
Dump Truck (15 cy)	20%	275	108	5.6	7.2	8.8	8.8	11	11	11	10	10	10	8	6	6	5	5	5	3	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	20%	275	114	0	0	0.8	0.8	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	0	0
Compactor (Bomag BW211)	50%	130	104	0.8	2.4	3.2	3.2	4	4	4	2	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Excavator (8 ton Case 580)	50%	90	109	0	1.6	1.6	1.6	3	4	4	4	4	4	4	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	50%	135	109	0.8	0.8	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	30%	140	109	0.8	0.8	0.8	0.8	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	30%	300	109	2.4	2.4	2.4	2.4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	30%	330	109	3.2	3.2	3.2	3.2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	30%	125	109	1.6	3.2	3.2	3.2	4	2	2	2	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Backhoe (Cat 225)	50%	135	104	0.8	0.8	0.8	0.8	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	30%	130	111	1.6	2.4	2.4	2.4	3	3	2	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	30%	90	104	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Plate Compactor	50%	5	97	0	0	0	0	3	5	5	5	5	5	5	5	5	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0
Water Truck	20%	220	113	1.6	1.6	1.6	1.6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	0	0	0
Fuel Truck	20%	220	113	0	1.6	1.6	1.6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
Bus (50 seat)	20%	275	114	1.6	1.6	3.2	4	7	6	7	8	8	8	8	9	9	9	9	9	9	9	9	8	8	8	8	8	7	7	7	6	5	5	4	4	3	3
Bus (20 seat)	20%	225	113	1.6	4	4.8	4.8	5	5	5	5	5	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5	3
ATV	20%	10	100	4	8	8	9.6	10	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	10	10	8	8	8	8	8
Pile Driving Hammer (Hyd. Or Pneu.)	50%	n/a	103	0	0	0.8	0.8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	20%	130	111	0	0.8	0.8	0.8	1	1	2	2	2	3	3	3	3	3	4	4	4	4	4	4	4	4	3	3	3	2	2	1	1	1	1	1	1	0	0
Hydraulic Mobile Crane (35 ton)	20%	175	112	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Hydraulic Mobile Crane (50 ton)	20%	250	114	0	0	2.4	2.4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	20%	300	114	0	0	0	2.4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	6%	290	109	0	0	0.8	0.8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	6%	290	109	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	0	0	0	0	0	0	0	0
Crane (200 ton)	6%	340	109	0	0	0	0	0	0	0	0	0	1	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	20%	65	108	0	0	0	0	0	0	0	0	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0
Manlift (scissors)	20%	20	103	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	0
Forklift (6 ton)	20%	75	108	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0

Table F-1
Monthly Construction Use for Power Block

Equipment Description	Utilization	HP	Base Sound (SPL at 1m, dBA)	Projected Monthly Construction Equipment Use-Months																																				
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Forklift (10 ton)	20%	100	110	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
Concrete Pump Truck	20%	250	106	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	20%	75	108	1.6	0.8	0.8	0.8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Telescopic Handler 3 ton	20%	75	108	0	2.4	2.4	4.8	7	11	11	11	11	11	11	11	11	11	11	11	11	7	7	7	7	7	7	7	3	3	3	3	3	3	3	3	3	2	2
Telescopic Handler 4 ton	20%	75	108	0	0.8	1.6	1.6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
EWP 80' boom	20%	75	108	0	0	0	0	1	2	2	2	4	6	6	6	6	6	6	6	6	6	6	6	4	4	2	2	2	2	1	1	1	1	1	1	1	1	1
EWP 135' boom	20%	150	111	0	0	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
Air compressor - Electric (165 CFM)	20%	40	104	0	0.8	0.8	0.8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Air compressor - Electric (250 CFM)	20%	60	104	0.8	0.8	0.8	0.8	1	1	1	1	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	1	1	1	1	1	1	1
Air compressor - Electric (300 CFM)	20%	75	104	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	20%	150	104	0	0	0.8	0.8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Portable Welding Machine	50%	50	107	0.8	0.8	0.8	0.8	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Electric Welding Machine (6 pack)	50%	n/a	79	0	0	0.8	0.8	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
Engine Generator Set (30kVA)	50%	40	106	0	1.6	2.4	4.8	4	4	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	3	3	3	3	3	3	3	3	3	3	3	1	1
Engine Generator Set (350kVA)	50%	680	106	0.8	0.8	0.8	0.8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Portable Generator (4KW)	50%	8	94	0.8	0.8	0.8	0.8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Portable Generator (10KW)	50%	30	94	0.8	0.8	0.8	0.8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Plate Compactor	50%	5	97	0	1.6	3.2	4.8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6	6	6	6	6	4	2	0	0	0
Manlift (60')	20%	65	108	1.6	1.6	1.6	1.6	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	2	2	0	0	0	0	0
Light Plant (6KW)	6%	10	100	0	0.8	0.8	0.8	0	1	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	1	1	1	0	0
Aggregate				42	70	86	104	133	144	150	146	151	158	160	158	158	156	157	156	151	146	146	140	135	132	122	121	114	107	103	95	89	84	77	72	70	60	55

Table F-2
Monthly Construction Use for Onsite Manufacturing Building

Equipment Description	Utilization	HP	Base Sound (SPL at 1m, dBA)	Projected Monthly Construction Equipment Use-Months																																			
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	20%	150	79	1.2	1.8	2.4	3.4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flatbed - Stake Body Truck (1 ton)	20%	220	108	0.6	1	1	1.8																																		
Truck (2.5 ton)	20%	275	114	0.4	0.4	0.4	0.4																																		
Dump Truck (15 cy)	20%	275	108	1.4	1.8	2.2	2.2																																		
Truck Tractor	20%	275	114	0	0	0.2	0.2																																		
Compactor (Bomag BW211)	50%	130	104	0.2	0.6	0.8	0.8																																		
Excavator (8 ton Case 580)	50%	90	109	0	0.4	0.4	0.4																																		
Excavator (25 ton Cat 225)	50%	135	109	0.2	0.2	0.2	0																																		
Dozer (Cat D6)	30%	140	109	0.2	0.2	0.2	0.2																																		
Dozer (Cat D8)	30%	300	109	0.6	0.6	0.6	0.6																																		
Scraper (11 cy or 22 cy)	30%	330	109	0.8	0.8	0.8	0.8																																		
Grader (Cat-12)	30%	125	109	0.4	0.8	0.8	0.8																																		
Backhoe (Cat 225)	50%	135	104	0.2	0.2	0.2	0.2																																		
Wheel Loader (Cat 950)	30%	130	111	0.4	0.6	0.6	0.6																																		
Case Backhoe/Front End Loader (580)	30%	90	104	0	0	0	0																																		
Plate Compactor	50%	5	97	0	0	0	0																																		
Water Truck	20%	220	113	0.4	0.4	0.4	0.4																																		
Fuel Truck	20%	220	113	0	0.4	0.4	0.4																																		
Bus (50 seat)	20%	275	114	0.4	0.4	0.8	1																																		
Bus (20 seat)	20%	225	113	0.4	1	1.2	1.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ATV	20%	10	100	1	2	2	2.4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pile Driving Hammer (Hyd. Or Pneu.)	50%	n/a	103	0	0	0.2	0.2																																		
Hydraulic Mobile Crane (15 ton)	20%	130	111	0	0.2	0.2	0.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hydraulic Mobile Crane (35 ton)	20%	175	112	0	0	0	0																																		
Hydraulic Mobile Crane (50 ton)	20%	250	114	0	0	0.6	0.6																																		
Hydraulic Mobile Crane (80 ton)	20%	300	114	0	0	0	0.6																																		
Crane (100 ton)	6%	290	109	0	0	0.2	0.2																																		
Crane (150 ton)	6%	290	109	0	0	0	0																																		
Crane (200 ton)	6%	340	109	0	0	0	0																																		
Manlift (60')	20%	65	108	0	0	0	0																																		
Manlift (scissors)	20%	20	103	0	0	0	0																																		

Table F-2
Monthly Construction Use for Onsite Manufacturing Building

Equipment Description	Utilization	HP	Base Sound (SPL at 1m, dBA)	Projected Monthly Construction Equipment Use-Months																																			
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Forklift (6 ton)	20%	75	108	0	0	0	0																															
Forklift (10 ton)	20%	100	110	0	0	0	0																															
Concrete Pump Truck	20%	250	106	0	0	0	0																															
Telescopic Handler 2.5 ton	20%	75	108	0.4	0.2	0.2	0.2																															
Telescopic Handler 3 ton	20%	75	108	0	0.6	0.6	1.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Telescopic Handler 4 ton	20%	75	108	0	0.2	0.4	0.4																															
EWP 80' boom	20%	75	108	0	0	0	0																															
EWP 135' boom	20%	150	111	0	0	0	0																															
Air compressor - Electric (165 CFM)	20%	40	104	0	0.2	0.2	0.2																															
Air compressor - Electric (250 CFM)	20%	60	104	0.2	0.2	0.2	0.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Air compressor - Electric (300 CFM)	20%	75	104	0	0	0	0																															
Air compressor - Electric (600 CFM)	20%	150	104	0	0	0.2	0.2																															
Portable Welding Machine	50%	50	107	0.2	0.2	0.2	0.2																															
Electric Welding Machine (6 pack)	50%	n/a	79	0	0	0.2	0.2																															
Engine Generator Set (30kVA)	50%	40	106	0	0.4	0.6	1.2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Engine Generator Set (350kVA)	50%	680	106	0.2	0.2	0.2	0.2																															
Portable Generator (4KW)	50%	8	94	0.2	0.2	0.2	0.2																															
Portable Generator (10KW)	50%	30	94	0.2	0.2	0.2	0.2																															
Plate Compactor	50%	5	97	0	0.4	0.8	1.2																															
Manlift (60')	20%	65	108	0.4	0.4	0.4	0.4																															
Light Plant (6KW)	6%	10	100	0	0.2	0.2	0.2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Aggregate				11	17	22	26	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11

Table F-3
Calculated Construction Levels at SR01

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	12	14	15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Flatbed - Stake Body Truck (1 ton)	38	40	40	43	43	43	43	43	43	43	43	44	44	44	44	44	44	44	44	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43
Truck (2.5 ton)	42	42	42	42	42	42	44	44	44	44	44	44	45	45	45	45	45	45	45	45	45	42	42	42	42	42	42	42	42	42	42	42	42	39	39
Dump Truck (15 cy)	42	43	43	43	44	44	44	43	43	43	42	41	41	40	40	40	38	36	36	36	33	33	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	39	39	39	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	39	39	39	39	0	0	0	0	0	0	0
Compactor (Bomag BW211)	33	38	39	39	39	39	39	36	33	33	33	33	33	33	33	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	33	0
Excavator (8 ton Case 580)	0	41	41	41	43	44	44	44	44	44	44	38	38	38	38	38	38	38	38	38	38	38	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	38	38	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	41	41	41	41	39	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	42	42	42	42	39	39	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	39	42	42	42	42	39	39	39	39	39	39	39	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	36	36	36
Backhoe (Cat 225)	33	33	33	33	33	33	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	41	42	42	42	43	43	41	38	38	38	38	38	38	38	38	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Plate Compactor	0	0	0	0	31	33	33	33	33	33	33	33	33	31	31	31	31	31	31	29	29	29	29	29	29	29	29	29	0	0	0	0	0	0	0
Water Truck	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	38	38	38	0	0	0	0
Fuel Truck	0	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	38	38	38	38	38	38
Bus (50 seat)	42	42	45	46	48	47	48	48	48	48	48	49	49	49	49	49	49	49	49	49	48	48	48	48	48	48	48	48	47	46	46	45	45	44	44
Bus (20 seat)	41	45	46	46	46	46	46	46	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	46	44
ATV	32	35	35	36	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	36	36	35	35	35	35	35	35
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	32	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	36	36	36	39	39	41	41	41	42	42	42	42	42	43	43	43	43	43	43	43	43	42	42	42	41	41	39	39	39	39	39	39	35	35
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	29	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	29	29	29	29	29	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	29	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	29	32	32	32	32	32	32	32	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	33	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	28	28	28	28	28	28	31	31	31	31	31	31	28	28	28	28	28	28	28	28	28	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	37	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Telescopic Handler 3 ton	0	38	38	41	43	44	44	44	44	44	44	44	44	44	44	44	44	43	43	43	43	43	43	43	40	40	40	40	40	40	40	40	40	38	38
Telescopic Handler 4 ton	0	34	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37

Table F-3
Calculated Construction Levels at SR01

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	34	37	37	37	40	41	41	41	41	41	41	41	41	41	41	41	40	40	37	37	37	37	34	34	34	34	34	34	34	34	34
EWP 135' boom	0	0	0	0	0	37	37	37	37	37	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	37	37	37	37	37	37	37	37	37
Air compressor - Electric (165 CFM)	0	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Air compressor - Electric (250 CFM)	29	29	29	29	32	32	32	32	34	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	34	34	32	32	32	32	32	32	32
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Portable Welding Machine	36	36	36	36	39	39	39	39	39	39	39	39	39	39	39	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
Electric Welding Machine (6 pack)	0	0	8	8	8	8	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	8	8	8	8
Engine Generator Set (30kVA)	0	38	40	43	42	42	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42	42	42	42	42	42	42	42	42	39	39
Engine Generator Set (350kVA)	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Portable Generator (4KW)	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Portable Generator (10KW)	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Plate Compactor	0	29	32	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	34	34	34	34	34	32	29	0	0	0
Manlift (60')	36	36	36	36	36	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	36	36	36	0	0	0	0	0	0
Light Plant (6KW)	0	20	20	20	19	22	24	24	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	24	24	24	24	24	24	22	22	22	19	19
Aggregate	52	54	55	56	56	56	57	57	57	57	57	57	57	57	57	57	57	57	57	56	56	56	55	55	55	55	55	54	54	54	53	53	53	52	51

Distance from Power Block to Receiver	2,453 m
Distance from Onsite Manufacturing Building to Receiver	2,676 m

Table F-4
Calculated Construction Levels at SR02

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	11	13	14	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	15	15	15	15	15	15	15	15	15
Flatbed - Stake Body Truck (1 ton)	37	39	39	42	42	42	42	42	42	42	42	43	43	43	43	43	43	43	43	43	43	43	43	43	42	42	42	42	42	42	42	42	42	42	42
Truck (2.5 ton)	41	41	41	41	41	41	43	43	43	43	43	43	44	44	44	44	44	44	44	44	44	41	41	41	41	41	41	41	41	41	41	41	41	38	38
Dump Truck (15 cy)	41	42	43	43	43	43	43	42	42	42	41	40	40	39	39	39	37	35	35	35	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	38	38	38	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	38	38	38	38	0	0	0	0	0	0	0
Compactor (Bomag BW211)	32	37	38	38	38	38	38	35	32	32	32	32	32	32	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	32	0
Excavator (8 ton Case 580)	0	41	41	41	42	43	43	43	43	43	43	37	37	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	37	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	35	35	35	35	35	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	40	40	40	40	38	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	41	41	41	41	38	38	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	38	41	41	41	41	38	38	38	38	38	38	38	35	35	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	35	35	35
Backhoe (Cat 225)	32	32	32	32	32	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	40	42	42	42	42	42	40	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Plate Compactor	0	0	0	0	30	32	32	32	32	32	32	32	32	30	30	30	30	30	30	28	28	28	28	28	28	28	28	28	0	0	0	0	0	0	0
Water Truck	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	37	37	0	0	0	0
Fuel Truck	0	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	37	37	37	37	37
Bus (50 seat)	41	41	44	45	47	46	47	47	47	47	47	48	48	48	48	48	48	48	48	48	47	47	47	47	47	47	47	47	46	45	45	44	44	43	43
Bus (20 seat)	41	45	45	45	45	45	45	45	45	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	45	44
ATV	31	34	34	35	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	35	35	34	34	34	34	34	34
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	31	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	35	35	35	38	38	40	40	40	41	41	41	41	41	42	42	42	42	42	42	42	42	41	41	41	40	40	38	38	38	38	38	38	36	36
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	41	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	28	28	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	28	28	28	28	28	31	31	31	31	31	31	31	31	31	31	31	31	31	31	28	0	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	28	31	31	31	31	31	31	31	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	32	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	27	27	27	27	27	27	30	30	30	30	30	30	27	27	27	27	27	27	27	27	27	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	36	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
Telescopic Handler 3 ton	0	38	38	41	42	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42	42	42	42	42	39	39	39	39	39	39	39	39	39	38	38
Telescopic Handler 4 ton	0	33	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36

Table F-4
Calculated Construction Levels at SR02

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	33	36	36	36	39	40	40	40	40	40	40	40	40	40	40	40	39	39	36	36	36	36	33	33	33	33	33	33	33	33	33
EWP 135' boom	0	0	0	0	0	36	36	36	36	36	36	39	39	39	39	39	39	39	39	39	39	39	39	39	39	36	36	36	36	36	36	36	36	36	36
Air compressor - Electric (165 CFM)	0	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Air compressor - Electric (250 CFM)	28	28	28	28	32	32	32	32	33	33	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	33	33	32	32	32	32	32	32	32	32
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Portable Welding Machine	35	35	35	35	38	38	38	38	38	38	38	38	38	38	38	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Electric Welding Machine (6 pack)	0	0	7	7	7	7	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	7	7	7
Engine Generator Set (30kVA)	0	37	39	42	42	42	43	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41	41	41	41	41	41	41	41	41	39	39
Engine Generator Set (350kVA)	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Portable Generator (4KW)	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Portable Generator (10KW)	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Plate Compactor	0	28	31	33	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	33	33	33	33	33	31	28	0	0	0
Manlift (60')	35	35	35	35	35	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	35	35	35	0	0	0	0	0
Light Plant (6KW)	0	19	19	19	19	22	24	24	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	24	24	24	24	24	24	22	22	22	19	19
Aggregate	51	53	54	55	55	55	56	56	56	56	56	56	56	56	56	56	56	56	56	55	55	55	54	54	54	54	54	53	53	53	52	52	52	51	51

Distance from Power Block to Receiver	2,763 m
Distance from Onsite Manufacturing Building to Receiver	2,579 m

Table F-5
Calculated Construction Levels at SR07

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	4	6	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7
Flatbed - Stake Body Truck (1 ton)	30	32	32	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	34	34	34	34	34
Truck (2.5 ton)	34	34	34	34	34	34	36	36	36	36	36	36	37	37	37	37	37	37	37	37	37	34	34	34	34	34	34	34	34	34	34	34	34	31	31
Dump Truck (15 cy)	33	35	35	35	35	35	35	35	35	35	34	32	32	32	32	32	29	28	28	28	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	31	31	31	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	31	31	31	31	0	0	0	0	0	0	0
Compactor (Bomag BW211)	25	30	31	31	31	31	31	28	25	25	25	25	25	25	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	0
Excavator (8 ton Case 580)	0	33	33	33	35	36	36	36	36	36	36	30	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	28	28	28	28	27	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	32	32	32	32	30	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	34	34	34	34	30	30	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	31	34	34	34	33	30	30	30	30	30	30	30	27	27	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	27	27	27
Backhoe (Cat 225)	25	25	25	25	25	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	33	34	34	34	34	34	32	29	29	29	29	29	29	29	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Plate Compactor	0	0	0	0	22	24	24	24	24	24	24	24	24	22	22	22	22	22	22	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0
Water Truck	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	30	30	30	0	0	0	0
Fuel Truck	0	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	30	30	30	30	30	30
Bus (50 seat)	34	34	37	38	39	39	39	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	39	39	39	39	38	38	37	37	36	36	36
Bus (20 seat)	33	37	38	38	38	38	38	38	38	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	38	36
ATV	24	27	27	27	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	27	27	27	27	27	27	27
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	24	24	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	28	28	28	31	31	33	33	33	34	34	34	34	34	35	35	35	35	35	35	35	35	34	34	34	33	33	31	31	31	31	31	31	29	29
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	0	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	33	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	21	21	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	20	20	20	20	20	23	23	23	23	23	23	23	23	23	23	23	23	23	23	20	0	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	20	23	23	23	23	23	23	23	23	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	25	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	19	19	19	19	19	19	22	22	22	22	22	22	19	19	19	19	19	19	19	19	19	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	0	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	0	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	28	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Telescopic Handler 3 ton	0	30	30	33	34	36	36	36	36	36	36	36	36	36	36	36	36	34	34	34	34	34	34	34	32	32	32	32	32	32	32	32	32	30	30
Telescopic Handler 4 ton	0	25	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28

Table F-5
Calculated Construction Levels at SR07

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	25	28	28	28	31	33	33	33	33	33	33	33	33	33	33	33	31	31	28	28	28	28	25	25	25	25	25	25	25	25	25
EWP 135' boom	0	0	0	0	0	28	28	28	28	28	28	31	31	31	31	31	31	31	31	31	31	31	31	31	31	28	28	28	28	28	28	28	28	28	28
Air compressor - Electric (165 CFM)	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Air compressor - Electric (250 CFM)	21	21	21	21	24	24	24	24	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	26	26	24	24	24	24	24	24	24
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Portable Welding Machine	28	28	28	28	30	30	30	30	30	30	30	30	30	30	30	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Electric Welding Machine (6 pack)	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0
Engine Generator Set (30kVA)	0	30	31	34	35	35	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	34	34	34	34	34	34	34	34	34	34	34	32	32
Engine Generator Set (350kVA)	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Portable Generator (4KW)	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Portable Generator (10KW)	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Plate Compactor	0	21	24	25	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	25	25	25	25	25	23	20	0	0	0	0
Manlift (60')	28	28	28	28	28	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	28	28	28	0	0	0	0	0	0
Light Plant (6KW)	0	11	11	11	13	15	16	16	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	16	16	16	16	16	16	15	15	15	13	13
Aggregate	44	46	47	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	47	47	47	47	46	46	46	46	46	45	45	45	45	44	43

Distance from Power Block to Receiver	6,575 m
Distance from Onsite Manufacturing Building to Receiver	5,619 m

Table F-6
Calculated Construction Levels at SR08

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	4	5	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7
Flatbed - Stake Body Truck (1 ton)	30	32	32	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	34	34	34	34	34
Truck (2.5 ton)	34	34	34	34	34	34	36	36	36	36	36	36	37	37	37	37	37	37	37	37	37	34	34	34	34	34	34	34	34	34	34	34	34	31	31
Dump Truck (15 cy)	33	34	35	35	35	35	35	35	35	35	34	32	32	32	32	32	29	28	28	28	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	31	31	31	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	31	31	31	31	0	0	0	0	0	0	0
Compactor (Bomag BW211)	25	30	31	31	31	31	31	28	25	25	25	25	25	25	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	0
Excavator (8 ton Case 580)	0	33	33	33	35	36	36	36	36	36	36	30	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	28	28	28	28	27	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	32	32	32	32	30	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	34	34	34	34	30	30	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	31	34	34	34	33	30	30	30	30	30	30	30	27	27	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	27	27	27
Backhoe (Cat 225)	25	25	25	25	25	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	32	34	34	34	34	34	32	29	29	29	29	29	29	29	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Plate Compactor	0	0	0	0	22	24	24	24	24	24	24	24	24	22	22	22	22	22	22	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0
Water Truck	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	30	30	30	0	0	0	0
Fuel Truck	0	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	30	30	30	30	30	30
Bus (50 seat)	34	34	37	38	39	39	39	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	39	39	39	39	38	38	37	37	36	36	36
Bus (20 seat)	33	37	38	38	38	38	38	38	38	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	38	36
ATV	24	27	27	27	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	27	27	27	27	27	27	27
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	24	24	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	28	28	28	31	31	33	33	33	34	34	34	34	34	35	35	35	35	35	35	35	35	34	34	34	33	33	31	31	31	31	31	31	28	28
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	33	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	21	21	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	20	20	20	20	20	23	23	23	23	23	23	23	23	23	23	23	23	23	23	20	0	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	20	23	23	23	23	23	23	23	23	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	24	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	19	19	19	19	19	19	22	22	22	22	22	22	19	19	19	19	19	19	19	19	19	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	0	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	28	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Telescopic Handler 3 ton	0	30	30	33	34	36	36	36	36	36	36	36	36	36	36	36	36	34	34	34	34	34	34	34	31	31	31	31	31	31	31	31	31	30	30
Telescopic Handler 4 ton	0	25	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28

Table F-6
Calculated Construction Levels at SR08

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	25	28	28	28	31	33	33	33	33	33	33	33	33	33	33	33	31	31	28	28	28	28	25	25	25	25	25	25	25	25	25
EWP 135' boom	0	0	0	0	0	28	28	28	28	28	28	31	31	31	31	31	31	31	31	31	31	31	31	31	31	28	28	28	28	28	28	28	28	28	28
Air compressor - Electric (165 CFM)	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Air compressor - Electric (250 CFM)	21	21	21	21	24	24	24	24	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	26	26	24	24	24	24	24	24	24
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Portable Welding Machine	28	28	28	28	30	30	30	30	30	30	30	30	30	30	30	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Electric Welding Machine (6 pack)	0	0	0	0	-1	-1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	-1	-1	-1	-1
Engine Generator Set (30kVA)	0	30	31	34	34	34	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	34	34	34	34	34	34	34	34	34	34	34	32	32
Engine Generator Set (350kVA)	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Portable Generator (4KW)	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Portable Generator (10KW)	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Plate Compactor	0	21	24	25	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	25	25	25	25	25	23	20	0	0	0	
Manlift (60')	28	28	28	28	27	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	27	27	27	0	0	0	0	0
Light Plant (6KW)	0	11	11	11	12	15	16	16	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	16	16	16	16	16	16	15	15	15	12	12
Aggregate	44	46	47	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	47	47	47	47	46	46	46	46	45	45	45	45	45	44	43

Distance from Power Block to Receiver	6,598 m
Distance from Onsite Manufacturing Building to Receiver	5,937 m

Table F-7
Calculated Construction Levels at SR09

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	3	5	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	7
Flatbed - Stake Body Truck (1 ton)	29	32	32	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	34	34	34	34	34
Truck (2.5 ton)	34	34	34	34	34	34	35	35	35	35	35	35	37	37	37	37	37	37	37	37	37	34	34	34	34	34	34	34	34	34	34	34	34	31	31
Dump Truck (15 cy)	33	34	35	35	35	35	35	35	35	35	34	32	32	32	32	32	29	28	28	28	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	31	31	31	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	31	31	31	31	0	0	0	0	0	0	0
Compactor (Bomag BW211)	25	29	31	31	31	31	31	28	25	25	25	25	25	25	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25	0
Excavator (8 ton Case 580)	0	33	33	33	35	36	36	36	36	36	36	30	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	27	27	27	27	27	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	32	32	32	32	30	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	33	33	33	33	30	30	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	30	33	33	33	33	30	30	30	30	30	30	30	27	27	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	27	27	27
Backhoe (Cat 225)	25	25	25	25	25	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	32	34	34	34	34	34	32	29	29	29	29	29	29	29	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Plate Compactor	0	0	0	0	22	24	24	24	24	24	24	24	24	22	22	22	22	22	22	20	20	20	20	20	20	20	20	20	0	0	0	0	0	0	0
Water Truck	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	30	30	30	0	0	0	0
Fuel Truck	0	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	30	30	30	30	30	30
Bus (50 seat)	34	34	37	38	39	38	39	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	39	39	39	38	38	38	37	37	35	35
Bus (20 seat)	33	37	38	38	38	38	38	38	38	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	38	36
ATV	23	26	26	27	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	27	26	26	26	26	26	26
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	24	24	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	28	28	28	31	31	32	32	32	34	34	34	34	34	35	35	35	35	35	35	35	35	34	34	34	32	32	31	31	31	31	31	31	28	28
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	33	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	20	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	20	20	20	20	20	23	23	23	23	23	23	23	23	23	23	23	23	23	23	20	0	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	20	23	23	23	23	23	23	23	23	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	24	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	19	19	19	19	19	19	22	22	22	22	22	22	19	19	19	19	19	19	19	19	19	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	0	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	28	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Telescopic Handler 3 ton	0	30	30	33	34	36	36	36	36	36	36	36	36	36	36	36	36	34	34	34	34	34	34	34	31	31	31	31	31	31	31	31	31	30	30
Telescopic Handler 4 ton	0	25	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28

Table F-7
Calculated Construction Levels at SR09

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	25	28	28	28	31	33	33	33	33	33	33	33	33	33	33	33	31	31	28	28	28	28	25	25	25	25	25	25	25	25	25
EWP 135' boom	0	0	0	0	0	28	28	28	28	28	28	31	31	31	31	31	31	31	31	31	31	31	31	31	31	28	28	28	28	28	28	28	28	28	28
Air compressor - Electric (165 CFM)	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Air compressor - Electric (250 CFM)	21	21	21	21	24	24	24	24	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	26	26	24	24	24	24	24	24	24
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Portable Welding Machine	27	27	27	27	30	30	30	30	30	30	30	30	30	30	30	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Electric Welding Machine (6 pack)	0	0	0	0	-1	-1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	-1	-1	-1	-1
Engine Generator Set (30kVA)	0	29	31	34	34	34	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	34	34	34	34	34	34	34	34	34	34	34	32	32
Engine Generator Set (350kVA)	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Portable Generator (4KW)	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Portable Generator (10KW)	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Plate Compactor	0	20	23	25	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	25	25	25	25	25	23	20	0	0	0	
Manlift (60')	28	28	28	28	27	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	27	27	27	0	0	0	0	0
Light Plant (6KW)	0	11	11	11	12	14	16	16	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	16	16	16	16	16	16	14	14	14	12	12
Aggregate	44	46	47	47	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	47	47	47	47	46	46	46	46	45	45	45	45	45	43	43

Distance from Power Block to Receiver	6,666 m
Distance from Onsite Manufacturing Building to Receiver	6,052 m

Table F-8
Calculated Construction Levels at SR10

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	16	17	19	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	19	19	19
Flatbed - Stake Body Truck (1 ton)	42	44	44	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Truck (2.5 ton)	46	46	46	46	45	45	47	47	47	47	47	47	48	48	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45	45	45	45	42	42
Dump Truck (15 cy)	45	46	47	47	46	46	46	46	46	46	45	44	44	43	43	43	41	39	39	39	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	43	43	42	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42	42	0	0	0	0	0	0	0
Compactor (Bomag BW211)	37	42	43	43	42	42	42	39	36	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	36	0
Excavator (8 ton Case 580)	0	45	45	45	46	47	47	47	47	47	47	41	41	41	41	41	41	41	41	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	42	42	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	40	40	40	40	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	44	44	44	44	42	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	46	46	46	46	42	42	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	43	46	46	46	45	42	42	42	42	42	42	42	39	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	39	39	39
Backhoe (Cat 225)	37	37	37	37	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	45	46	46	46	45	45	44	41	41	41	41	41	41	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Plate Compactor	0	0	0	0	34	36	36	36	36	36	36	36	36	34	34	34	34	34	34	32	32	32	32	32	32	32	32	32	0	0	0	0	0	0	0
Water Truck	45	45	45	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41	0	0	0	0
Fuel Truck	0	45	45	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41	41	41	41
Bus (50 seat)	46	46	49	50	51	50	51	51	51	51	51	52	52	52	52	52	52	52	52	52	51	51	51	51	51	51	51	51	50	49	49	48	48	47	47
Bus (20 seat)	45	49	50	50	50	50	50	50	50	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	50	48
ATV	36	39	39	39	39	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	39	39	39	39	39	39	39	39
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	36	36	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	40	40	40	44	44	45	45	45	46	46	46	46	46	47	47	47	47	47	47	47	47	46	46	46	45	45	44	44	44	44	44	44	42	42
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	45	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	33	33	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	32	32	32	32	32	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	32	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	32	35	35	35	35	35	35	35	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	36	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	31	31	31	31	31	31	34	34	34	34	34	34	31	31	31	31	31	31	31	31	31	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	40	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Telescopic Handler 3 ton	0	42	42	45	46	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46	46	46	46	46	44	44	44	44	44	44	44	44	44	43	43
Telescopic Handler 4 ton	0	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40

Table F-8
Calculated Construction Levels at SR10

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	37	40	40	40	43	44	44	44	44	44	44	44	44	44	44	44	43	43	40	40	40	40	37	37	37	37	37	37	37	37	37
EWP 135' boom	0	0	0	0	0	40	40	40	40	40	40	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40	40	40	40	40	40	40	40
Air compressor - Electric (165 CFM)	0	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Air compressor - Electric (250 CFM)	33	33	33	33	37	37	37	37	38	38	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	38	38	37	37	37	37	37	37	37	37
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Portable Welding Machine	40	40	40	40	42	42	42	42	42	42	42	42	42	42	42	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Electric Welding Machine (6 pack)	0	0	12	12	11	11	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	11	11	11	11
Engine Generator Set (30kVA)	0	42	43	46	47	47	48	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	45	45
Engine Generator Set (350kVA)	39	39	39	39	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Portable Generator (4KW)	27	27	27	27	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
Portable Generator (10KW)	27	27	27	27	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
Plate Compactor	0	33	36	37	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	37	37	37	37	37	35	32	0	0	0
Manlift (60')	40	40	40	40	39	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	39	39	39	0	0	0	0	0
Light Plant (6KW)	0	23	23	23	26	27	29	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	29	29	29	29	27	27	27	26	26
Aggregate	56	58	59	60	59	59	60	60	60	60	60	60	60	60	60	60	60	60	60	59	59	59	58	58	58	58	58	58	57	57	57	56	56	55	55

Distance from Power Block to Receiver	1,770 m
Distance from Onsite Manufacturing Building to Receiver	1,237 m

Table F-9
Calculated Construction Levels at ML01

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	13	15	16	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	17	17	17	17	17	17	17	17	17
Flatbed - Stake Body Truck (1 ton)	39	41	41	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Truck (2.5 ton)	43	43	43	43	43	43	45	45	45	45	45	45	46	46	46	46	46	46	46	46	46	43	43	43	43	43	43	43	43	43	43	43	43	40	40
Dump Truck (15 cy)	43	44	45	45	44	44	44	44	44	44	43	42	42	41	41	41	39	37	37	37	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	40	40	40	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40	40	0	0	0	0	0	0	0
Compactor (Bomag BW211)	34	39	40	40	40	40	40	37	34	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	34	0
Excavator (8 ton Case 580)	0	43	43	43	44	45	45	45	45	45	45	39	39	39	39	39	39	39	39	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	37	37	37	37	37	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	42	42	42	42	40	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	43	43	43	43	40	40	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	40	43	43	43	43	40	40	40	40	40	40	40	37	37	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	37	37	37
Backhoe (Cat 225)	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	42	44	44	44	43	43	42	39	39	39	39	39	39	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Plate Compactor	0	0	0	0	32	34	34	34	34	34	34	34	34	32	32	32	32	32	32	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0
Water Truck	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	39	39	39	0	0	0	0
Fuel Truck	0	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	39	39	39	39	39	39
Bus (50 seat)	43	43	46	47	49	48	49	49	49	49	49	50	50	50	50	50	50	50	50	50	49	49	49	49	49	49	49	49	48	47	47	46	46	45	45
Bus (20 seat)	43	47	47	47	47	47	47	47	47	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	46
ATV	33	36	36	37	37	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	37	37	36	36	36	36	36	36
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	33	33	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	37	37	37	41	41	42	42	42	43	43	43	43	43	44	44	44	44	44	44	44	44	43	43	43	42	42	41	41	41	41	41	41	38	38
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	46	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	30	30	30	30	30	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	30	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	30	33	33	33	33	33	33	33	33	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	34	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	29	29	29	29	29	29	32	32	32	32	32	32	29	29	29	29	29	29	29	29	29	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	0	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	38	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Telescopic Handler 3 ton	0	40	40	43	44	45	45	45	45	45	45	45	45	45	45	45	45	44	44	44	44	44	44	44	41	41	41	41	41	41	41	41	41	40	40
Telescopic Handler 4 ton	0	35	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38

Table F-9
Calculated Construction Levels at ML01

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	35	38	38	38	41	42	42	42	42	42	42	42	42	42	42	42	41	41	38	38	38	38	35	35	35	35	35	35	35	35	35
EWP 135' boom	0	0	0	0	0	38	38	38	38	38	38	41	41	41	41	41	41	41	41	41	41	41	41	41	41	38	38	38	38	38	38	38	38	38	38
Air compressor - Electric (165 CFM)	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Air compressor - Electric (250 CFM)	30	30	30	30	34	34	34	34	35	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	35	35	34	34	34	34	34	34	34	34
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Portable Welding Machine	37	37	37	37	40	40	40	40	40	40	40	40	40	40	40	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Electric Welding Machine (6 pack)	0	0	9	9	9	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	9	9	9	9
Engine Generator Set (30kVA)	0	39	41	44	44	44	45	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43	43	43	43	43	43	43	43	43	41	41
Engine Generator Set (350kVA)	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
Portable Generator (4KW)	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Portable Generator (10KW)	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Plate Compactor	0	30	33	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	35	35	35	35	35	33	30	0	0	0	0
Manlift (60')	37	37	37	37	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	37	37	0	0	0	0	0
Light Plant (6KW)	0	21	21	21	22	24	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	26	26	26	26	26	26	24	24	24	22	22
Aggregate	53	55	56	57	57	57	58	57	58	58	58	58	58	58	58	58	58	57	57	57	57	57	56	56	56	56	56	55	55	55	54	54	54	53	53

Distance from Power Block to Receiver	2,225 m
Distance from Onsite Manufacturing Building to Receiver	1,950 m

Table F-10
Calculated Construction Levels at ML02

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	19	21	22	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	23	23	23
Flatbed - Stake Body Truck (1 ton)	45	47	47	50	51	51	51	51	51	51	51	52	52	52	52	52	52	52	52	52	52	52	52	52	51	51	51	51	51	51	51	51	51	51	51
Truck (2.5 ton)	50	50	50	50	50	50	52	52	52	52	52	52	53	53	53	53	53	53	53	53	53	50	50	50	50	50	50	50	50	50	50	50	50	47	47
Dump Truck (15 cy)	49	50	51	51	52	52	52	51	51	51	50	49	49	48	48	48	46	44	44	44	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	47	47	47	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	47	47	47	47	0	0	0	0	0	0	0
Compactor (Bomag BW211)	40	45	46	46	47	47	47	44	41	41	41	41	41	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	41	0
Excavator (8 ton Case 580)	0	49	49	49	51	52	52	52	52	52	52	46	46	46	46	46	46	46	46	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	45	45	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	43	43	43	43	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	48	48	48	48	47	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	49	49	49	49	47	47	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	46	49	49	49	50	47	47	47	47	47	47	47	44	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	44	44
Backhoe (Cat 225)	40	40	40	40	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	48	50	50	50	51	51	49	46	46	46	46	46	46	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Plate Compactor	0	0	0	0	39	41	41	41	41	41	41	41	41	39	39	39	39	39	39	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0	0
Water Truck	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46	0	0	0	0
Fuel Truck	0	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46	46	46	46
Bus (50 seat)	50	50	53	54	56	55	56	56	56	56	56	57	57	57	57	57	57	57	57	57	56	56	56	56	56	56	56	56	55	54	54	53	53	52	52
Bus (20 seat)	49	53	53	53	54	54	54	54	54	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	54	52
ATV	39	42	42	43	43	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	43	43	42	42	42	42	42	42
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	43	43	43	45	45	48	48	48	49	49	49	49	49	50	50	50	50	50	50	50	50	49	49	49	48	48	45	45	45	45	45	45	38	38
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	51	51	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	50	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	36	36	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	37	37	37	37	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	37	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	41	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	36	36	36	36	36	36	39	39	39	39	39	39	36	36	36	36	36	36	36	36	36	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	44	41	41	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Telescopic Handler 3 ton	0	46	46	49	50	52	52	52	52	52	52	52	52	52	52	52	52	50	50	50	50	50	50	50	47	47	47	47	47	47	47	47	47	45	45
Telescopic Handler 4 ton	0	41	44	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45

Table F-10
Calculated Construction Levels at ML02

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	42	45	45	45	48	49	49	49	49	49	49	49	49	49	49	49	48	48	45	45	45	45	42	42	42	42	42	42	42	42	42
EWP 135' boom	0	0	0	0	0	45	45	45	45	45	45	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45	45
Air compressor - Electric (165 CFM)	0	36	36	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Air compressor - Electric (250 CFM)	36	36	36	36	38	38	38	38	41	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	41	41	38	38	38	38	38	38	38
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	36	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Portable Welding Machine	43	43	43	43	47	47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Electric Welding Machine (6 pack)	0	0	15	15	16	16	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	16	16	16	16
Engine Generator Set (30kVA)	0	45	47	50	49	49	51	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	48	48	48	48	48	48	48	48	48	48	48	45	45
Engine Generator Set (350kVA)	42	42	42	42	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
Portable Generator (4KW)	30	30	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Portable Generator (10KW)	30	30	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Plate Compactor	0	36	39	41	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	42	42	42	42	42	40	37	0	0	0
Manlift (60')	43	43	43	43	44	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44	0	0	0	0	0
Light Plant (6KW)	0	27	27	27	22	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	31	31	31	31	31	31	29	29	29	22	22
Aggregate	59	61	62	63	64	64	64	64	64	65	65	65	65	65	65	65	64	64	64	64	64	63	63	63	63	62	62	62	62	61	61	61	61	59	59

Distance from Power Block to Receiver	987 m
Distance from Onsite Manufacturing Building to Receiver	1,921 m

Table F-11
Calculated Construction Levels at ML03

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	13	15	16	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	17
Flatbed - Stake Body Truck (1 ton)	39	42	42	44	45	45	45	45	45	45	45	46	46	46	46	46	46	46	46	46	46	46	46	46	45	45	45	45	45	45	45	45	45	45	45
Truck (2.5 ton)	44	44	44	44	44	44	46	46	46	46	46	46	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44	44	44	44	41	41
Dump Truck (15 cy)	43	44	45	45	46	46	46	45	45	45	44	43	43	42	42	42	40	38	38	38	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	41	41	41	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41	41	0	0	0	0	0	0	0
Compactor (Bomag BW211)	35	39	41	41	41	41	41	38	35	35	35	35	35	35	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	35	0
Excavator (8 ton Case 580)	0	43	43	43	45	46	46	46	46	46	46	40	40	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	37	37	37	37	38	38	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	42	42	42	42	41	38	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	43	43	43	43	41	41	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	40	43	43	43	44	41	41	41	41	41	41	41	38	38	38	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	38	38	38
Backhoe (Cat 225)	35	35	35	35	35	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	42	44	44	44	45	45	43	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
Plate Compactor	0	0	0	0	33	35	35	35	35	35	35	35	35	33	33	33	33	33	33	31	31	31	31	31	31	31	31	31	0	0	0	0	0	0	0
Water Truck	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40	0	0	0	0
Fuel Truck	0	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40	40	40	40
Bus (50 seat)	44	44	47	48	50	49	50	50	50	50	50	51	51	51	51	51	51	51	51	51	50	50	50	50	50	50	50	50	49	48	48	47	47	46	46
Bus (20 seat)	43	47	48	48	48	48	48	48	48	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	48	46
ATV	33	36	36	37	37	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	37	37	36	36	36	36	36	36
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	38	38	38	40	40	42	42	42	43	43	43	43	43	45	45	45	45	45	45	45	45	43	43	43	42	42	40	40	40	40	40	40	34	34
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	45	45	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	30	30	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	31	31	31	31	31	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	31	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	31	34	34	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	35	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	30	30	30	30	30	30	33	33	33	33	33	33	30	30	30	30	30	30	30	30	30	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	38	35	35	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
Telescopic Handler 3 ton	0	40	40	43	44	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44	44	44	44	44	41	41	41	41	41	41	41	41	41	40	40
Telescopic Handler 4 ton	0	35	38	38	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39

Table F-11
Calculated Construction Levels at ML03

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	36	39	39	39	42	43	43	43	43	43	43	43	43	43	43	43	42	42	39	39	39	39	36	36	36	36	36	36	36	36	36
EWP 135' boom	0	0	0	0	0	39	39	39	39	39	39	42	42	42	42	42	42	42	42	42	42	42	42	42	42	39	39	39	39	39	39	39	39	39	39
Air compressor - Electric (165 CFM)	0	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Air compressor - Electric (250 CFM)	31	31	31	31	33	33	33	33	35	35	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	35	35	33	33	33	33	33	33	33
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Portable Welding Machine	37	37	37	37	41	41	41	41	41	41	41	41	41	41	41	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Electric Welding Machine (6 pack)	0	0	10	10	10	10	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	10	10	10	10
Engine Generator Set (30kVA)	0	39	41	44	44	44	45	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43	43	43	43	43	43	43	43	43	40	40
Engine Generator Set (350kVA)	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Portable Generator (4KW)	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Portable Generator (10KW)	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Plate Compactor	0	30	33	35	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	36	36	36	36	36	34	31	0	0	0
Manlift (60')	38	38	38	38	38	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	38	38	38	0	0	0	0	0
Light Plant (6KW)	0	21	21	21	18	23	26	26	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	26	26	26	26	26	26	23	23	23	18	18
Aggregate	54	56	57	57	58	58	58	58	59	59	59	59	59	59	59	59	59	58	58	58	58	57	57	57	57	56	56	56	56	55	55	55	55	54	53

Distance from Power Block to Receiver	1,948 m
Distance from Onsite Manufacturing Building to Receiver	3,009 m

Table F-12
Calculated Construction Levels at LT01

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	12	14	15	17	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Flatbed - Stake Body Truck (1 ton)	38	41	41	43	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	41	41	41	41	41
Truck (2.5 ton)	43	43	43	43	41	41	43	43	43	43	43	43	44	44	44	44	44	44	44	44	44	41	41	41	41	41	41	41	41	41	41	41	41	38	38
Dump Truck (15 cy)	42	43	44	44	42	42	42	42	42	42	41	40	40	39	39	39	37	35	35	35	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	40	40	38	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	38	38	38	38	0	0	0	0	0	0	0
Compactor (Bomag BW211)	34	38	40	40	38	38	38	35	32	32	32	32	32	32	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	32	0
Excavator (8 ton Case 580)	0	42	42	42	42	43	43	43	43	43	43	37	37	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	36	36	36	36	35	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	41	41	41	41	38	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	42	42	42	42	38	38	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	39	42	42	42	41	38	38	38	38	38	38	38	35	35	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	35	35	35
Backhoe (Cat 225)	34	34	34	34	32	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	41	43	43	43	41	41	39	36	36	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Plate Compactor	0	0	0	0	29	31	31	31	31	31	31	31	31	29	29	29	29	29	29	28	28	28	28	28	28	28	28	28	0	0	0	0	0	0	0
Water Truck	42	42	42	42	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	37	37	0	0	0	0
Fuel Truck	0	42	42	42	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	37	37	37	37	37
Bus (50 seat)	43	43	46	47	46	46	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	46	46	46	46	45	45	44	44	43	43	
Bus (20 seat)	42	46	47	47	46	46	46	46	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	46	45	
ATV	32	35	35	36	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	36	36	35	35	35	35	35	35
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	33	33	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	36	36	36	41	41	42	42	42	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	42	42	41	41	41	41	41	40	40		
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	0	0	0	0	
Hydraulic Mobile Crane (50 ton)	0	0	44	44	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	41	38	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hydraulic Mobile Crane (80 ton)	0	0	0	45	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Crane (100 ton)	0	0	29	29	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Crane (150 ton)	0	0	0	0	0	28	28	28	28	28	31	31	31	31	31	31	31	31	31	31	31	31	31	31	28	0	0	0	0	0	0	0	0	0	
Crane (200 ton)	0	0	0	0	0	0	0	0	0	28	31	31	31	31	31	31	31	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Manlift (60')	0	0	0	0	0	0	0	0	32	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	0	0	0	0	0	0	0	
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	27	27	27	27	27	27	30	30	30	30	30	30	27	27	27	27	27	27	27	27	0	
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	0	0	
Forklift (10 ton)	0	0	0	0	0	0	0	0	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	0	0	0	0	
Concrete Pump Truck	0	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	
Telescopic Handler 2.5 ton	37	34	34	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
Telescopic Handler 3 ton	0	39	39	42	43	44	44	44	44	44	44	44	44	44	44	44	44	43	43	43	43	43	43	43	40	40	40	40	40	40	40	40	40	40	
Telescopic Handler 4 ton	0	34	37	37	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	

Table F-12
Calculated Construction Levels at LT01

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	32	35	35	35	38	40	40	40	40	40	40	40	40	40	40	40	38	38	35	35	35	35	32	32	32	32	32	32	32	32	32
EWP 135' boom	0	0	0	0	0	35	35	35	35	35	35	38	38	38	38	38	38	38	38	38	38	38	38	38	38	35	35	35	35	35	35	35	35	35	35
Air compressor - Electric (165 CFM)	0	30	30	30	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Air compressor - Electric (250 CFM)	30	30	30	30	34	34	34	34	35	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	35	35	34	34	34	34	34	34	34	34
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	0	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	30	30	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Portable Welding Machine	36	36	36	36	38	38	38	38	38	38	38	38	38	38	38	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Electric Welding Machine (6 pack)	0	0	8	8	7	7	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	7	7	7
Engine Generator Set (30kVA)	0	38	40	43	44	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	44	44	44	44	44	44	44	44	44	44	44	43	43
Engine Generator Set (350kVA)	36	36	36	36	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Portable Generator (4KW)	24	24	24	24	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Portable Generator (10KW)	24	24	24	24	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Plate Compactor	0	29	32	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	32	32	32	32	32	31	28	0	0	0
Manlift (60')	36	36	36	36	35	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	35	35	35	0	0	0	0	0	0
Light Plant (6KW)	0	20	20	20	24	25	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	25	25	25	24	24
Aggregate	53	55	56	56	55	56	56	56	56	56	56	56	56	56	56	56	56	56	56	55	55	55	54	54	54	54	54	54	53	53	53	53	53	52	52

Distance from Power Block to Receiver	2,882 m
Distance from Onsite Manufacturing Building to Receiver	1,533 m

Table F-13
Calculated Construction Levels at x-quad1

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	27	29	30	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	31
Flatbed - Stake Body Truck (1 ton)	53	56	56	58	59	59	59	59	59	59	59	60	60	60	60	60	60	60	60	60	60	60	60	60	59	59	59	59	59	59	59	59	59	59	59
Truck (2.5 ton)	58	58	58	58	59	59	60	60	60	60	60	60	62	62	62	62	62	62	62	62	62	59	59	59	59	59	59	59	59	59	59	59	59	56	56
Dump Truck (15 cy)	57	58	59	59	60	60	60	59	59	59	58	57	57	56	56	56	54	52	52	52	49	49	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	55	55	56	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	56	56	56	56	0	0	0	0	0	0	0
Compactor (Bomag BW211)	49	53	55	55	55	55	55	52	49	49	49	49	49	49	49	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	49	0
Excavator (8 ton Case 580)	0	57	57	57	59	61	61	61	61	61	61	55	55	55	55	55	55	55	55	55	55	55	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	54	54	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	51	51	51	51	52	52	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	56	56	56	56	55	52	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	57	57	57	57	55	55	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	54	57	57	57	58	55	55	55	55	55	55	55	52	52	52	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	52	52	52
Backhoe (Cat 225)	49	49	49	49	49	49	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	56	58	58	58	59	59	57	54	54	54	54	54	54	54	54	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Plate Compactor	0	0	0	0	47	49	49	49	49	49	49	49	49	47	47	47	47	47	47	45	45	45	45	45	45	45	45	45	0	0	0	0	0	0	0
Water Truck	57	57	57	57	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	55	55	55	0	0	0	0
Fuel Truck	0	57	57	57	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	55	55	55	55	55	55	55
Bus (50 seat)	58	58	61	62	64	63	64	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	64	64	64	63	63	63	62	62	60	60
Bus (20 seat)	57	61	62	62	62	62	62	62	62	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	62	60
ATV	47	50	50	51	51	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	51	51	50	50	50	50	50	50
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	48	48	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	51	51	51	53	53	55	55	55	57	57	57	57	57	58	58	58	58	58	58	58	58	57	57	57	55	55	53	53	53	53	53	53	40	40
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	59	59	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	58	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	60	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	44	44	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	45	45	45	45	45	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	45	48	48	48	48	48	48	48	48	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	49	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	44	44	44	44	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	52	49	49	49	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Telescopic Handler 3 ton	0	54	54	57	58	60	60	60	60	60	60	60	60	60	60	60	60	58	58	58	58	58	58	58	55	55	55	55	55	55	55	55	55	53	53
Telescopic Handler 4 ton	0	49	52	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53

Table F-13
Calculated Construction Levels at x-quad1

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	50	53	53	53	56	58	58	58	58	58	58	58	58	58	58	58	56	56	53	53	53	53	50	50	50	50	50	50	50	50	50
EWP 135' boom	0	0	0	0	0	53	53	53	53	53	53	56	56	56	56	56	56	56	56	56	56	56	56	56	56	53	53	53	53	53	53	53	53	53	53
Air compressor - Electric (165 CFM)	0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
Air compressor - Electric (250 CFM)	45	45	45	45	46	46	46	46	49	49	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	49	49	46	46	46	46	46	46	46
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
Portable Welding Machine	51	51	51	51	55	55	55	55	55	55	55	55	55	55	55	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Electric Welding Machine (6 pack)	0	0	23	23	24	24	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	24	24	24	24
Engine Generator Set (30kVA)	0	53	55	58	57	57	59	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	56	56	56	56	56	56	56	56	56	56	56	52	52
Engine Generator Set (350kVA)	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
Portable Generator (4KW)	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Portable Generator (10KW)	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Plate Compactor	0	44	47	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	50	50	50	50	50	48	45	0	0	0
Manlift (60')	51	51	51	51	52	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	52	52	52	0	0	0	0	0
Light Plant (6KW)	0	35	35	35	24	36	39	39	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	39	39	39	39	39	39	36	36	36	24	24
Aggregate	67	69	71	71	72	72	73	73	73	73	73	73	73	73	73	73	73	73	73	72	72	72	71	71	71	71	70	70	70	69	69	69	69	68	67

Distance from Power Block to Receiver	379 m
Distance from Onsite Manufacturing Building to Receiver	1,557 m

Table F-14
Calculated Construction Levels at x-quad2

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	20	22	23	25	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Flatbed - Stake Body Truck (1 ton)	46	48	48	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	50	50	50	50	50
Truck (2.5 ton)	51	51	51	51	50	50	52	52	52	52	52	52	53	53	53	53	53	53	53	53	53	50	50	50	50	50	50	50	50	50	50	50	50	47	47
Dump Truck (15 cy)	50	51	52	52	51	51	51	51	51	51	50	49	49	48	48	48	46	44	44	44	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	47	47	47	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	47	47	47	47	0	0	0	0	0	0	0
Compactor (Bomag BW211)	41	46	47	47	47	47	47	44	41	41	41	41	41	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	41	0
Excavator (8 ton Case 580)	0	50	50	50	51	52	52	52	52	52	52	46	46	46	46	46	46	46	46	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	49	49	49	49	47	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	50	50	50	50	47	47	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	47	50	50	50	50	47	47	47	47	47	47	47	44	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	44	44
Backhoe (Cat 225)	41	41	41	41	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	49	51	51	51	50	50	49	46	46	46	46	46	46	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Plate Compactor	0	0	0	0	38	41	41	41	41	41	41	41	41	38	38	38	38	38	38	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0	0
Water Truck	50	50	50	50	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46	0	0	0	0
Fuel Truck	0	50	50	50	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46	46	46	46
Bus (50 seat)	51	51	54	54	55	55	55	56	56	56	56	57	57	57	57	57	57	57	57	57	56	56	56	56	56	55	55	55	55	54	54	53	53	52	52
Bus (20 seat)	50	54	54	54	54	54	54	54	54	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	54	53
ATV	40	43	43	44	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	44	44	43	43	43	43	43	43
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	44	44	44	48	48	49	49	49	50	50	50	50	50	51	51	51	51	51	51	51	51	50	50	50	49	49	48	48	48	48	48	48	46	46
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	52	52	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	50	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	53	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	37	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	37	37	37	37	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	37	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	41	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	36	36	36	36	36	36	39	39	39	39	39	39	36	36	36	36	36	36	36	36	36	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	45	42	42	42	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Telescopic Handler 3 ton	0	47	47	50	51	52	52	52	52	52	52	52	52	52	52	52	52	51	51	51	51	51	51	51	48	48	48	48	48	48	48	48	48	47	47
Telescopic Handler 4 ton	0	42	45	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44

Table F-14
Calculated Construction Levels at x-quad2

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	41	44	44	44	47	49	49	49	49	49	49	49	49	49	49	49	47	47	44	44	44	44	41	41	41	41	41	41	41	41	41
EWP 135' boom	0	0	0	0	0	44	44	44	44	44	44	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44	44
Air compressor - Electric (165 CFM)	0	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Air compressor - Electric (250 CFM)	37	37	37	37	41	41	41	41	42	42	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	41	41	41	41	41	41	41
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Portable Welding Machine	44	44	44	44	47	47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Electric Welding Machine (6 pack)	0	0	16	16	16	16	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	16	16	16	16
Engine Generator Set (30kVA)	0	46	48	51	51	51	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	51	51	51	51	51	51	51	51	51	51	51	49	49
Engine Generator Set (350kVA)	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
Portable Generator (4KW)	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Portable Generator (10KW)	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Plate Compactor	0	37	40	42	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	41	41	41	41	41	40	37	0	0	0
Manlift (60')	44	44	44	44	44	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44	0	0	0	0	0
Light Plant (6KW)	0	28	28	28	29	31	33	33	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	31	31	31	29	29
Aggregate	60	62	63	64	64	64	64	64	64	65	65	65	65	65	65	65	64	64	64	64	64	63	63	63	63	63	62	62	62	62	61	61	61	60	60

Distance from Power Block to Receiver	1,011 m
Distance from Onsite Manufacturing Building to Receiver	809 m

Table F-15
Calculated Construction Levels at x-Access Way

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	24	26	27	28	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	28	28	28	28	28	28	28	28	28
Flatbed - Stake Body Truck (1 ton)	50	52	52	55	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	55	55	55	55	55
Truck (2.5 ton)	54	54	54	54	55	55	57	57	57	57	57	57	58	58	58	58	58	58	58	58	58	55	55	55	55	55	55	55	55	55	55	55	55	52	52
Dump Truck (15 cy)	54	55	56	56	56	56	56	56	56	56	55	53	53	53	53	53	50	49	49	49	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	51	51	52	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	52	52	52	52	0	0	0	0	0	0	0
Compactor (Bomag BW211)	45	50	51	51	52	52	52	49	46	46	46	46	46	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	46	0
Excavator (8 ton Case 580)	0	53	53	53	56	57	57	57	57	57	57	51	51	51	51	51	51	51	51	51	51	51	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	48	48	48	48	48	48	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	53	53	53	53	51	48	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	54	54	54	54	51	51	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	51	54	54	54	54	51	51	51	51	51	51	51	48	48	48	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	48	48	48
Backhoe (Cat 225)	45	45	45	45	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	53	55	55	55	55	55	53	50	50	50	50	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
Plate Compactor	0	0	0	0	43	45	45	45	45	45	45	45	45	43	43	43	43	43	43	41	41	41	41	41	41	41	41	41	0	0	0	0	0	0	0
Water Truck	53	53	53	53	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	51	51	51	0	0	0	0
Fuel Truck	0	53	53	53	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	51	51	51	51	51	51
Bus (50 seat)	54	54	57	58	60	60	60	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	60	60	60	60	59	59	58	58	57	57	
Bus (20 seat)	53	57	58	58	58	58	58	58	58	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	58	56	
ATV	44	47	47	48	48	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	48	48	47	47	47	47	47	47	
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	44	44	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hydraulic Mobile Crane (15 ton)	0	48	48	48	50	50	52	52	52	54	54	54	54	54	55	55	55	55	55	55	55	55	54	54	54	52	52	50	50	50	50	50	50	45	45
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	54	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	56	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	41	41	41	41	41	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	41	44	44	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	46	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	40	40	40	40	43	43	43	43	43	43	40	40	40	40	40	40	40	40	40	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	49	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Telescopic Handler 3 ton	0	50	50	53	55	57	57	57	57	57	57	57	57	57	57	57	57	55	55	55	55	55	55	55	52	52	52	52	52	52	52	52	52	50	50
Telescopic Handler 4 ton	0	46	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49

Table F-15
Calculated Construction Levels at x-Access Way

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	46	49	49	49	52	54	54	54	54	54	54	54	54	54	54	54	52	52	49	49	49	49	46	46	46	46	46	46	46	46	46
EWP 135' boom	0	0	0	0	0	49	49	49	49	49	49	52	52	52	52	52	52	52	52	52	52	52	52	52	52	49	49	49	49	49	49	49	49	49	49
Air compressor - Electric (165 CFM)	0	41	41	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Air compressor - Electric (250 CFM)	41	41	41	41	43	43	43	43	46	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	46	46	43	43	43	43	43	43	43
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	41	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Portable Welding Machine	48	48	48	48	51	51	51	51	51	51	51	51	51	51	51	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Electric Welding Machine (6 pack)	0	0	20	20	21	21	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	21	21	21	21
Engine Generator Set (30kVA)	0	50	52	55	54	54	56	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	53	53	53	53	53	53	53	53	53	53	53	50	50
Engine Generator Set (350kVA)	47	47	47	47	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Portable Generator (4KW)	35	35	35	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
Portable Generator (10KW)	35	35	35	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
Plate Compactor	0	41	44	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	46	46	46	46	46	44	41	0	0	0
Manlift (60')	48	48	48	48	49	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	49	49	49	0	0	0	0	0
Light Plant (6KW)	0	32	32	32	28	34	36	36	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	36	36	36	36	36	36	34	34	34	28	28
Aggregate	64	66	67	68	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	68	68	68	68	67	67	67	67	66	66	66	65	65	64	64

Distance from Power Block to Receiver	581 m
Distance from Onsite Manufacturing Building to Receiver	910 m

Table F-16
Calculated Construction Levels at x-quad3

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	23	25	26	27	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	27	27	27	27	27	27	27	27	27
Flatbed - Stake Body Truck (1 ton)	49	51	51	54	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	54	54	54	54	54
Truck (2.5 ton)	53	53	53	53	54	54	56	56	56	56	56	56	57	57	57	57	57	57	57	57	57	54	54	54	54	54	54	54	54	54	54	54	54	51	51
Dump Truck (15 cy)	52	54	54	54	55	55	55	55	55	55	54	53	53	52	52	52	50	48	48	48	45	45	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	50	50	51	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	51	51	51	51	0	0	0	0	0	0	0
Compactor (Bomag BW211)	44	49	50	50	51	51	51	48	45	45	45	45	45	45	45	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	45	0
Excavator (8 ton Case 580)	0	52	52	52	55	56	56	56	56	56	56	50	50	50	50	50	50	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	49	49	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	47	47	47	47	48	48	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	52	52	52	52	51	48	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	53	53	53	53	51	51	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	50	53	53	53	54	51	51	51	51	51	51	51	48	48	48	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	48	48	48
Backhoe (Cat 225)	44	44	44	44	45	45	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	52	53	53	53	54	54	52	49	49	49	49	49	49	49	49	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
Plate Compactor	0	0	0	0	42	44	44	44	44	44	44	44	44	42	42	42	42	42	42	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0
Water Truck	52	52	52	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	50	0	0	0	0
Fuel Truck	0	52	52	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	50	50	50	50
Bus (50 seat)	53	53	56	57	59	59	59	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	59	59	59	59	58	58	57	57	56	56
Bus (20 seat)	52	56	57	57	57	57	57	57	57	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	57	55
ATV	43	46	46	47	47	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	47	47	46	46	46	46	46	46
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	43	43	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	47	47	47	48	48	51	51	51	53	53	53	53	53	54	54	54	54	54	54	54	54	53	53	53	51	51	48	48	48	48	48	48	41	41
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	54	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	55	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	40	40	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	41	41	41	41	41	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	41	44	44	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	45	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	40	40	40	40	43	43	43	43	43	43	40	40	40	40	40	40	40	40	40	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	0	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	48	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
Telescopic Handler 3 ton	0	49	49	52	54	56	56	56	56	56	56	56	56	56	56	56	56	54	54	54	54	54	54	54	50	50	50	50	50	50	50	50	50	49	49
Telescopic Handler 4 ton	0	45	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48

Table F-16
Calculated Construction Levels at x-quad3

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	45	48	48	48	51	53	53	53	53	53	53	53	53	53	53	53	51	51	48	48	48	48	45	45	45	45	45	45	45	45	45
EWP 135' boom	0	0	0	0	0	48	48	48	48	48	48	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	48	48	48	48	48	48	48	48
Air compressor - Electric (165 CFM)	0	40	40	40	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Air compressor - Electric (250 CFM)	40	40	40	40	42	42	42	42	44	44	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	42	42	42	42	42	42	42
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	40	40	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Portable Welding Machine	47	47	47	47	50	50	50	50	50	50	50	50	50	50	50	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Electric Welding Machine (6 pack)	0	0	19	19	20	20	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	20	20	20	20
Engine Generator Set (30kVA)	0	49	51	54	53	53	55	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	52	52	52	52	52	52	52	52	52	52	52	48	48
Engine Generator Set (350kVA)	46	46	46	46	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Portable Generator (4KW)	34	34	34	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Portable Generator (10KW)	34	34	34	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Plate Compactor	0	40	43	45	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	45	45	45	45	45	44	40	0	0	0
Manlift (60')	47	47	47	47	48	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	48	0	0	0	0	0	0
Light Plant (6KW)	0	31	31	31	24	32	35	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	35	35	35	35	35	35	32	32	32	24	24
Aggregate	63	65	66	67	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	67	67	67	67	66	66	66	66	65	65	65	64	64	63	63

Distance from Power Block to Receiver	647 m
Distance from Onsite Manufacturing Building to Receiver	1,436 m

Table F-17
Calculated Construction Levels at x-quad4

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	18	20	21	23	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	21
Flatbed - Stake Body Truck (1 ton)	44	46	46	49	47	47	47	47	47	47	47	48	48	48	48	48	48	48	48	48	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47
Truck (2.5 ton)	49	49	49	49	47	47	48	48	48	48	48	48	50	50	50	50	50	50	50	50	50	47	47	47	47	47	47	47	47	47	47	47	47	44	44
Dump Truck (15 cy)	48	49	50	50	48	48	48	47	47	47	46	45	45	44	44	44	42	40	40	40	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	45	45	44	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44	44	0	0	0	0	0	0	0
Compactor (Bomag BW211)	39	44	45	45	43	43	43	40	37	37	37	37	37	37	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	37	0
Excavator (8 ton Case 580)	0	48	48	48	47	49	49	49	49	49	49	43	43	43	43	43	43	43	43	43	43	43	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	42	42	42	42	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	47	47	47	47	43	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	48	48	48	48	43	43	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	45	48	48	48	46	43	43	43	43	43	43	43	40	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	40	40	40
Backhoe (Cat 225)	39	39	39	39	37	37	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	47	49	49	49	47	47	45	42	42	42	42	42	42	42	42	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Plate Compactor	0	0	0	0	35	37	37	37	37	37	37	37	37	35	35	35	35	35	35	33	33	33	33	33	33	33	33	33	0	0	0	0	0	0	0
Water Truck	48	48	48	48	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43	0	0	0	0
Fuel Truck	0	48	48	48	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43	43	43	43	43
Bus (50 seat)	49	49	52	52	52	51	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	52	52	52	51	50	50	50	50	48	48	
Bus (20 seat)	48	52	52	52	52	52	52	52	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	52	51	
ATV	38	41	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	41	41	41	41	41	41	
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	38	38	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hydraulic Mobile Crane (15 ton)	0	42	42	42	47	47	48	48	48	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	48	48	47	47	47	47	47	47	46	46	
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	0	0	0	0	
Hydraulic Mobile Crane (50 ton)	0	0	50	50	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	43	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hydraulic Mobile Crane (80 ton)	0	0	0	51	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Crane (100 ton)	0	0	35	35	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Crane (150 ton)	0	0	0	0	0	33	33	33	33	33	36	36	36	36	36	36	36	36	36	36	36	36	36	36	33	0	0	0	0	0	0	0	0	0	
Crane (200 ton)	0	0	0	0	0	0	0	0	0	33	36	36	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Manlift (60')	0	0	0	0	0	0	0	0	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0	
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	32	32	32	32	32	32	35	35	35	35	35	35	32	32	32	32	32	32	32	32	0	
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	0	0	
Forklift (10 ton)	0	0	0	0	0	0	0	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	0	0	0	0	0	
Concrete Pump Truck	0	0	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	0	0	0	0	0	0	0	0	0	0	0	0	
Telescopic Handler 2.5 ton	43	40	40	40	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	
Telescopic Handler 3 ton	0	45	45	48	48	50	50	50	50	50	50	50	50	50	50	50	50	48	48	48	48	48	48	48	46	46	46	46	46	46	46	46	46	46	
Telescopic Handler 4 ton	0	40	43	43	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	

Table F-17
Calculated Construction Levels at x-quad4

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	38	41	41	41	44	46	46	46	46	46	46	46	46	46	46	46	44	44	41	41	41	41	38	38	38	38	38	38	38	38	38
EWP 135' boom	0	0	0	0	0	41	41	41	41	41	41	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41	41	41	41	41	41	41	41
Air compressor - Electric (165 CFM)	0	35	35	35	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
Air compressor - Electric (250 CFM)	35	35	35	35	40	40	40	40	41	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	41	41	40	40	40	40	40	40	40
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	35	35	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
Portable Welding Machine	42	42	42	42	43	43	43	43	43	43	43	43	43	43	43	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Electric Welding Machine (6 pack)	0	0	14	14	12	12	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	12	12	12	12
Engine Generator Set (30kVA)	0	44	46	49	50	50	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	49	49	49	49	49	49	49	49	49	49	49
Engine Generator Set (350kVA)	41	41	41	41	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Portable Generator (4KW)	29	29	29	29	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Portable Generator (10KW)	29	29	29	29	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Plate Compactor	0	35	38	40	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	38	38	38	38	38	36	33	0	0	0
Manlift (60')	42	42	42	42	40	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40	0	0	0	0	0
Light Plant (6KW)	0	26	26	26	30	31	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	31	31	31	30	30
Aggregate	58	60	61	62	61	61	61	61	61	62	62	61	62	61	62	62	61	61	61	61	61	60	60	60	60	60	60	59	59	59	59	58	58	58	57

Distance from Power Block to Receiver	1,517 m
Distance from Onsite Manufacturing Building to Receiver	768 m

Table F-18
Calculated Construction Levels at Strobridge

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	19	21	22	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	23	23	23
Flatbed - Stake Body Truck (1 ton)	45	47	47	50	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
Truck (2.5 ton)	49	49	49	49	50	50	52	52	52	52	52	52	53	53	53	53	53	53	53	53	53	50	50	50	50	50	50	50	50	50	50	50	50	47	47
Dump Truck (15 cy)	49	50	51	51	51	51	51	51	51	51	50	49	49	48	48	48	46	44	44	44	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	46	46	47	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	47	47	47	47	0	0	0	0	0	0	0
Compactor (Bomag BW211)	40	45	46	46	47	47	47	44	41	41	41	41	41	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	41	0
Excavator (8 ton Case 580)	0	48	48	48	51	52	52	52	52	52	52	46	46	46	46	46	46	46	46	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	45	45	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	43	43	43	43	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	48	48	48	48	47	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	49	49	49	49	47	47	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	46	49	49	49	50	47	47	47	47	47	47	47	44	44	44	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	44	44
Backhoe (Cat 225)	40	40	40	40	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	48	50	50	50	50	50	49	46	46	46	46	46	46	46	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Plate Compactor	0	0	0	0	39	41	41	41	41	41	41	41	41	39	39	39	39	39	39	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0	0
Water Truck	48	48	48	48	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46	0	0	0	0
Fuel Truck	0	48	48	48	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46	46	46	46
Bus (50 seat)	49	49	52	53	56	55	56	56	56	56	56	57	57	57	57	57	57	57	57	57	56	56	56	56	56	56	56	56	55	54	54	53	53	52	52
Bus (20 seat)	48	52	53	53	53	53	53	53	53	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	53	51
ATV	39	42	42	43	43	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	43	43	42	42	42	42	42	42
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	39	39	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	43	43	43	45	45	47	47	47	49	49	49	49	49	50	50	50	50	50	50	50	50	49	49	49	47	47	45	45	45	45	45	45	36	36
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	51	51	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	50	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	36	36	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	37	37	37	37	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	37	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	41	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	36	36	36	36	36	36	39	39	39	39	39	39	36	36	36	36	36	36	36	36	36	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	44	41	41	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
Telescopic Handler 3 ton	0	45	45	48	50	52	52	52	52	52	52	52	52	52	52	52	52	50	50	50	50	50	50	50	47	47	47	47	47	47	47	47	47	45	45
Telescopic Handler 4 ton	0	41	44	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45

Table F-18
Calculated Construction Levels at Strobridge

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	42	45	45	45	48	49	49	49	49	49	49	49	49	49	49	49	48	48	45	45	45	45	42	42	42	42	42	42	42	42	42
EWP 135' boom	0	0	0	0	0	45	45	45	45	45	45	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45	45
Air compressor - Electric (165 CFM)	0	36	36	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Air compressor - Electric (250 CFM)	36	36	36	36	38	38	38	38	40	40	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	40	40	38	38	38	38	38	38	38
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	36	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Portable Welding Machine	43	43	43	43	47	47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Electric Welding Machine (6 pack)	0	0	15	15	16	16	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	16	16	16	16
Engine Generator Set (30kVA)	0	45	47	50	49	49	51	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	48	48	48	48	48	48	48	48	48	48	48	44	44
Engine Generator Set (350kVA)	42	42	42	42	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
Portable Generator (4KW)	30	30	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Portable Generator (10KW)	30	30	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Plate Compactor	0	36	39	41	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	42	42	42	42	42	40	37	0	0	0
Manlift (60')	43	43	43	43	44	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44	0	0	0	0	0
Light Plant (6KW)	0	27	27	27	19	28	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	31	31	31	31	31	31	28	28	28	19	19
Aggregate	59	61	62	63	64	64	64	64	64	65	65	64	64	64	65	64	64	64	64	64	64	63	63	63	62	62	62	62	61	61	61	61	61	59	59

Distance from Power Block to Receiver	996 m
Distance from Onsite Manufacturing Building to Receiver	2,561 m

Table F-19
Calculated Construction Levels at Bell Future Residence

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	10	11	13	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13
Flatbed - Stake Body Truck (1 ton)	36	38	38	40	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Truck (2.5 ton)	40	40	40	40	40	40	42	42	42	42	42	42	43	43	43	43	43	43	43	43	43	40	40	40	40	40	40	40	40	40	40	40	40	37	37
Dump Truck (15 cy)	39	40	41	41	41	41	41	41	41	41	40	39	39	38	38	38	36	34	34	34	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	37	37	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	37	37	37	37	0	0	0	0	0	0	0
Compactor (Bomag BW211)	31	36	37	37	37	37	37	34	31	31	31	31	31	31	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	31	0
Excavator (8 ton Case 580)	0	39	39	39	41	42	42	42	42	42	42	36	36	36	36	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	38	38	38	38	37	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	40	40	40	40	37	37	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	37	40	40	40	40	37	37	37	37	37	37	37	34	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	34	34	34
Backhoe (Cat 225)	31	31	31	31	31	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	38	40	40	40	40	40	39	36	36	36	36	36	36	36	36	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Plate Compactor	0	0	0	0	29	31	31	31	31	31	31	31	31	29	29	29	29	29	29	27	27	27	27	27	27	27	27	27	0	0	0	0	0	0	0
Water Truck	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	36	36	36	0	0	0	0
Fuel Truck	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	36	36	36	36	36	36
Bus (50 seat)	40	40	43	44	46	45	46	46	46	46	46	47	47	47	47	47	47	47	47	47	46	46	46	46	46	46	46	46	45	44	44	43	43	42	42
Bus (20 seat)	39	43	44	44	44	44	44	44	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	44	42
ATV	30	33	33	33	33	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	34	34	34	36	36	38	38	38	40	40	40	40	40	41	41	41	41	41	41	41	41	40	40	40	38	38	36	36	36	36	36	36	33	33
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	41	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	40	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	27	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	27	27	27	27	27	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	27	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	27	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	31	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	26	26	26	26	26	26	29	29	29	29	29	29	26	26	26	26	26	26	26	26	26	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	34	31	31	31	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Telescopic Handler 3 ton	0	36	36	39	40	42	42	42	42	42	42	42	42	42	42	42	42	40	40	40	40	40	40	40	37	37	37	37	37	37	37	37	37	36	36
Telescopic Handler 4 ton	0	31	34	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35

Table F-19
Calculated Construction Levels at Bell Future Residence

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	32	35	35	35	38	39	39	39	39	39	39	39	39	39	39	39	38	38	35	35	35	35	32	32	32	32	32	32	32	32	32
EWP 135' boom	0	0	0	0	0	35	35	35	35	35	35	38	38	38	38	38	38	38	38	38	38	38	38	38	38	35	35	35	35	35	35	35	35	35	35
Air compressor - Electric (165 CFM)	0	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Air compressor - Electric (250 CFM)	27	27	27	27	30	30	30	30	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	31	31	30	30	30	30	30	30	30	30
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Portable Welding Machine	34	34	34	34	37	37	37	37	37	37	37	37	37	37	37	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Electric Welding Machine (6 pack)	0	0	6	6	6	6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	6	6	6	6
Engine Generator Set (30kVA)	0	36	37	40	40	40	42	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	39	39	39	39	39	39	39	39	39	39	39	37	37
Engine Generator Set (350kVA)	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
Portable Generator (4KW)	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Portable Generator (10KW)	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Plate Compactor	0	27	30	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	32	32	32	30	27	0	0	0
Manlift (60')	34	34	34	34	34	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	34	34	34	0	0	0	0	0
Light Plant (6KW)	0	17	17	17	16	20	22	22	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	22	22	22	22	22	22	20	20	20	16	16
Aggregate	50	52	53	54	54	54	54	54	54	55	55	55	55	55	55	55	54	54	54	54	54	53	53	53	53	52	52	52	52	51	51	51	51	50	49

Distance from Power Block to Receiver	3,147 m
Distance from Onsite Manufacturing Building to Receiver	3,596 m

Table F-20
Calculated Construction Levels at Bell Existing Residence

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Pick-up truck (1/2 ton)	8	10	11	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	12	12	12	12	12	12	12	12
Flatbed - Stake Body Truck (1 ton)	34	36	36	39	39	39	39	39	39	39	39	40	40	40	40	40	40	40	40	40	40	40	40	40	39	39	39	39	39	39	39	39	39	39	39
Truck (2.5 ton)	38	38	38	38	39	39	40	40	40	40	40	40	42	42	42	42	42	42	42	42	42	39	39	39	39	39	39	39	39	39	39	39	39	36	36
Dump Truck (15 cy)	38	39	40	40	40	40	40	39	39	39	38	37	37	36	36	36	34	32	32	32	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Tractor	0	0	35	35	36	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	36	36	36	36	0	0	0	0	0	0	0
Compactor (Bomag BW211)	29	34	35	35	35	35	35	32	29	29	29	29	29	29	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	29	0
Excavator (8 ton Case 580)	0	37	37	37	39	41	41	41	41	41	41	35	35	35	35	35	35	35	35	35	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0
Excavator (25 ton Cat 225)	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D6)	32	32	32	32	32	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dozer (Cat D8)	37	37	37	37	35	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper (11 cy or 22 cy)	38	38	38	38	35	35	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grader (Cat-12)	35	38	38	38	38	35	35	35	35	35	35	35	32	32	32	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	32	32	32
Backhoe (Cat 225)	29	29	29	29	29	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheel Loader (Cat 950)	37	39	39	39	39	39	37	34	34	34	34	34	34	34	34	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Case Backhoe/Front End Loader (580)	0	0	0	0	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Plate Compactor	0	0	0	0	27	29	29	29	29	29	29	29	29	27	27	27	27	27	27	25	25	25	25	25	25	25	25	25	0	0	0	0	0	0	0
Water Truck	37	37	37	37	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	35	35	35	0	0	0	0
Fuel Truck	0	37	37	37	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	35	35	35	35	35	35
Bus (50 seat)	38	38	41	42	44	43	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	44	44	44	43	43	43	42	42	40	40
Bus (20 seat)	37	41	42	42	42	42	42	42	42	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	40
ATV	28	31	31	32	32	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	31	31	31	31	31	31
Pile Driving Hammer (Hyd. Or Pneu.)	0	0	28	28	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (15 ton)	0	32	32	32	35	35	37	37	37	38	38	38	38	38	39	39	39	39	39	39	39	39	38	38	38	37	37	35	35	35	35	35	35	31	31
Hydraulic Mobile Crane (35 ton)	0	0	0	0	0	0	0	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	0	0	0	0
Hydraulic Mobile Crane (50 ton)	0	0	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	38	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic Mobile Crane (80 ton)	0	0	0	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (100 ton)	0	0	25	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane (150 ton)	0	0	0	0	0	25	25	25	25	25	28	28	28	28	28	28	28	28	28	28	28	28	28	28	25	0	0	0	0	0	0	0	0	0	0
Crane (200 ton)	0	0	0	0	0	0	0	0	0	25	28	28	28	28	28	28	28	28	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manlift (60')	0	0	0	0	0	0	0	0	29	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	0	0	0	0	0	0	0	0
Manlift (scissors)	0	0	0	0	0	0	0	0	0	0	0	0	0	24	24	24	24	24	24	27	27	27	27	27	27	24	24	24	24	24	24	24	24	24	0
Forklift (6 ton)	0	0	0	0	0	0	0	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0
Forklift (10 ton)	0	0	0	0	0	0	0	0	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	0	0	0	0	0
Concrete Pump Truck	0	0	0	0	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	0	0	0	0	0	0	0	0	0	0	0	0	0
Telescopic Handler 2.5 ton	33	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Telescopic Handler 3 ton	0	34	34	37	39	41	41	41	41	41	41	41	41	41	41	41	41	39	39	39	39	39	39	39	36	36	36	36	36	36	36	36	36	34	34
Telescopic Handler 4 ton	0	30	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33

Table F-20
Calculated Construction Levels at Bell Existing Residence

Equipment Description	Predicted Sound from Quantity of Equipment During Indicated Month (dBA)																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
EWP 80' boom	0	0	0	0	30	33	33	33	36	38	38	38	38	38	38	38	38	38	38	38	36	36	33	33	33	33	30	30	30	30	30	30	30	30	30
EWP 135' boom	0	0	0	0	0	33	33	33	33	33	33	36	36	36	36	36	36	36	36	36	36	36	36	36	36	33	33	33	33	33	33	33	33	33	33
Air compressor - Electric (165 CFM)	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Air compressor - Electric (250 CFM)	25	25	25	25	28	28	28	28	30	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	28	28	28	28	28	28	28	28
Air compressor - Electric (300 CFM)	0	0	0	0	0	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	0	0	0	0	0	0
Air compressor - Electric (600 CFM)	0	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Portable Welding Machine	32	32	32	32	35	35	35	35	35	35	35	35	35	35	35	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Electric Welding Machine (6 pack)	0	0	4	4	4	4	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	4	4	4	4
Engine Generator Set (30kVA)	0	34	36	39	39	39	40	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	38	38	38	38	38	38	38	38	38	38	38	35	35
Engine Generator Set (350kVA)	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Portable Generator (4KW)	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Portable Generator (10KW)	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Plate Compactor	0	25	28	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	30	30	28	25	0	0	0
Manlift (60')	32	32	32	32	32	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	32	32	32	0	0	0	0	0
Light Plant (6KW)	0	16	16	16	15	19	20	20	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	20	20	20	20	20	20	19	19	19	15	15
Aggregate	48	50	51	52	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	52	52	52	51	51	51	51	51	50	50	50	50	49	49	48	48

Distance from Power Block to Receiver	3,810 m
Distance from Onsite Manufacturing Building to Receiver	4,192 m

GLINT AND GLARE STUDY

During operation, concentrated light from CESF Reflectors will be directed at the absorber pipes in the Receiver structure, which is approximately 60' from ground level. Potential glare from light reflecting off of the absorber pipes is minimal, but will be analyzed below.

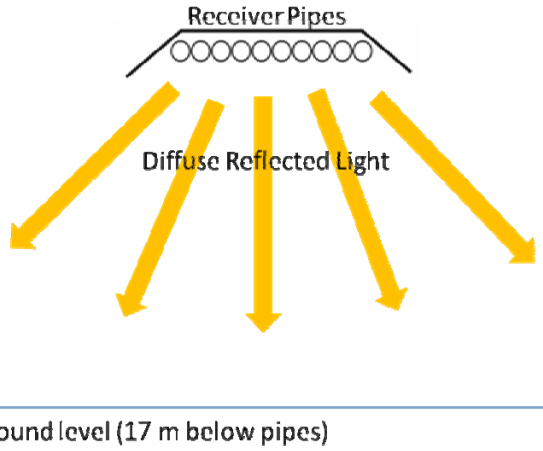

Figure 1: Diffuse reflected light from Receiver pipes spreads out as it travels to ground.

At peak performance, solar intensity on the receiver pipes will approach 30 kW/m2. Pipe absorptivity of the solar spectrum shall be 0.94; thus the intensity of reflected light from the pipes will be 0.06 * 30 kW/m2 = 1.8 kW/m2. The reflected light will be diffuse rather than specular, meaning that light will come off in random, scattered directions. If one approximates the Lambertian scatter as uniform over the half-cylinder formed beneath the receiver, the ability to estimate the intensity in the eyes of an observer at ground level is gained. The intensity drops off as a function of distance from the pipes. Using 0.6 meters as the width of the 10 absorber pipes and the half circumference defined by a radius of 17 m from the absorber pipes, the ratio for intensity decrease is 0.6: 53.4, or 0.011. This means that the intensity of reflected light from receiver pipes is about 0.011 * 1.8 kW/m2 = 0.02 kW/m2, or roughly 50 times less than the intensity of the sun. This solar intensity is not deemed to be a hazard.

As Reflectors move from a stow position into tracking position with light focused on absorber pipes, there is a possibility of a concentrated beam being directed horizontally to the east or west of the CESF boundary or spilling out to the north. The following is meant to clarify the issues of glare and glint off of the Reflectors.

The figure below illustrates the optics from the outside Reflectors in each line. The focal length of the outside Reflectors is about 77', at which point the beam focuses from 7.4' down to 1.0' wide, giving a maximum intensity of 7.4 kW/m2, assuming an zenith angle near 90° (in most conditions, the intensity at the focal length of the Reflector projected horizontally will be significantly less, decreasing by a factor of the sine of the zenith angle). For the sake of this study, the maximum intensity will be used. It becomes apparent by viewing the figure below that beyond the focal length of the Reflector, beam

intensity decreases and by 144' from the Reflector, beam intensity is the equivalent of the incident solar intensity, that is, the beam is no brighter than the sun.

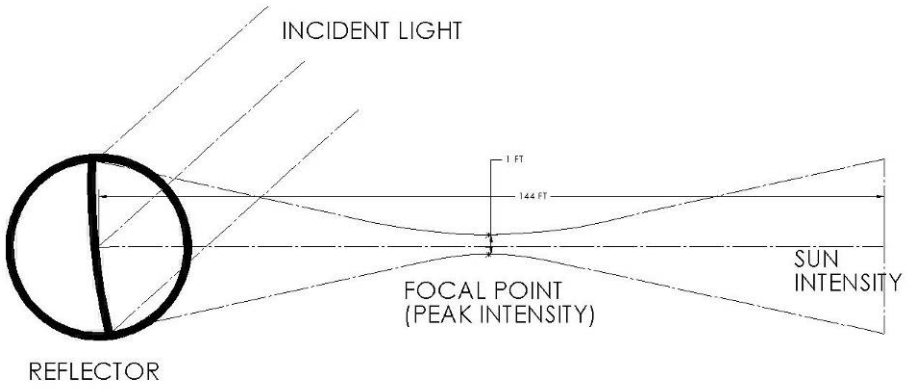

Figure 2: Diagram of convergence and divergence of light beam from outside Reflector.

Beyond 144', beam intensity continues to decrease. For example, at 1000' from the focal point of the Reflector, the beam intensity would be approximately 8% that of the sun intensity. Reflectors on the interior of each Line have shorter and shorter focal lengths, down to approximately 52' for the middle Reflectors. Beams from these Reflectors are highly unlikely to be cast out horizontally to the east or west, as they would be blocked by Reflectors to the outside of them. The beams could, however, spill to the north of the plant boundary when the sun is low in the southern sky.

The intensity of potential spillage to the north in the early morning and late evening and winter season will be diminished because of the decreased solar radiation at those times of day but the possibility does exist. Spilled beam intensity would diverge back out to incident solar intensity at a maximum of 155 ft from the northern plant boundary, assuming the worst case sun position at winter time noon and worst case reflector angle that would direct the incident beam parallel to the ground. Reflected light could focus from 40 – 60 ft north of the plant boundary, based on the different focal lengths of designed reflectors. In the highly unlikely case where multiple reflectors are directing beams parallel to the ground and spilling light to the north, the focused beams could not be additive because only the portions that are not shaded by adjacent reflectors could escape the plant.

While horizontal glare to the East and West are possible any time of day as the reflectors roll from stow into tracking position, the tracking system and operational protocols for the CESF are designed to minimize this. During cleaning activities, adjacent reflector rows will be rolled to face each other, with the outside rows facing inward, both to prevent horizontal glare and also to allow cleaning crews to work on two rows at once and increase efficiency. Reflector rows are stowed facing the ground and thus glare will not be a problem during off hours. During tracking, Reflectors will be oriented to direct light towards the Receiver structure; should the beams just miss the Receiver, by the nature of the system focal distance, the beams will be diverged back to incident solar intensity at 60' above the Receiver structure. There are two conditions identified in which horizontal glare could occur:

1) Reflectors are moving from stow position to tracking position. In this situation, outside Reflectors (FL of 77') could direct the beam to the East or West of the property and any Reflector could cast a low intensity spilled beam to the North of the property.

2) Tracking system malfunction or failure, where Reflector rows go to an incorrect position or freeze up while directing a beam horizontally.

Condition (1) may occur every time the plant starts and finishes operations. It is believed that Condition (2) will be a rare occurrence and will be mitigated by full time maintenance crews who will repair stalled motors. Glare potential from Condition (1) and its effect on surrounding roads, public access areas, and structures will be considered.

Structures and areas near the CESF plant and their distance from plant boundaries are given below. The reference for these distances is given to the right of the distance.

Item	Distance from plant boundary	Reference
State Hwy 58	>200 ft to the South, no glare potential because sun is always in southern sky in northern hemisphere	Fig. No. 3.2-1, AFC submission
Tracy Lane	>200 ft East	Fig. No. 3.2-1, AFC submission
Nearest North residence	~1400 ft	Fig. No. 5.13-13, AFC submission
Nearest West residence	~1150 ft	Fig. No. 5.13-15, AFC submission

Table 1: Distances of structures and public access roadways from plant boundaries

In addition to these structures and locations, there may be pedestrians who venture closer to the property line. The following table shows the calculated beam intensity at a given distance from the plant boundary and also the time it would take the beam to move across 6', the estimated height of a man, at that distance with the motor rotating the Reflector at 0.2 RPM. Note that these estimates are assuming 1 kW/m^2 sun intensity.

Distance from Plant Boundary (ft)	Beam intensity (kW/m2)	6' travel time (s)	Affected party, location
0	3.67	9.5	-
20	5.44	5.7	-
40	7.22	4.1	-
60	4.00	3.2	-
80	1.89	2.6	-
100	1.24	2.2	-
200	0.46	1.2	Tracy Lane
1150	0.06	0.2	West Residence
1400	0.05	0.2	North Residence

Table 2: Computed beam intensity and speed at various distances from plant boundary

Glare on drivers on Tracy Lane will be less than half of the glare from the sun. Conservatively estimating the aperture of a driver's eye to be 1", glare would move across the eye in less than 1/100 of a second. Because Highway 58 is to the south of the plant and the reflectors are unable to direct sunlight to the south given the constant location of the sun in the southern half of the sky, it will be physically impossible to direct a beam to Highway 58.

It should be noted that pedestrians who are standing within 60' of the outside of the CESF perimeter fence to the North, East, or West may see a beam intensity as high or higher than what is recommended as a safe level on the human retina. A level deemed safe for the human eye is 4.5 kW/m2[1]. For this reason, the CESF will install privacy slats in the perimeter fence to ensure that pedestrians are not exposed.

Vertical glare from the Reflectors was addressed earlier during operation. Vertical glare may also be possible during construction, when Reflectors are stored with glass facing upward. However, as seen in the table above, the beam intensity at 200' high is less than that of the sun. The risk to passing planes is considered to be negligible.

Additional glare may occur off of standard construction equipment such as cranes, trucks, or forklifts, but this would not be expected to exceed the intensity of incident sunlight.

[1] 10 MWe Solar Thermal Central Receiver Pilot Plant: Beam Safety Tests and Analyses, pp. 26-31: SAND83-8035

The possibility of dust drifting in between the receiver and reflector and being illuminated by light rays coming from the reflectors and focusing down does exist. But if a dust particle is illuminated, it will reflect light diffusely, in random directions. There is no possibility of a specular (mirror-like reflection) light ray bouncing off of such a particle and creating hazards for viewers. If a large amount of dust drifted into the area above the mirrors during operation, it would indeed become illuminated and possibly brighten. However, such a dust cloud would also dim the light reaching the reflectors, and thus the brightened dust would be tempered by the decreased solar input.

The frequency of illuminated dust particles is expected to be rare and will not be a safety risk to either workers on site or passers by.

PUBLIC HEALTH AND SAFETY DATA

Appendix H
Diesel Firewater Pump Emissions

CESF

Emissions from Emergency Diesel Firewater Pump

Rated Horsepower	**300**	**BHP**
Testing duration	**30**	**min/week**
Yearly testing	**52**	**week/year**
Expected non-emergency usage	**30**	**hr/yr**

Pollutant	Emision Factor	Emission Rate per Testing	Yearly Emission Rate	Hourly Emission Rate	Annual Emission Rate
	g/HP/Hr	lb/hr	lb/yr	g/s	g/s
NO_X	4.27	1.41	42.36	0.178	6.10E-04
CO	0.33	0.11	3.27	0.014	4.71E-05
VOC (Total Hydrocarbons)	0.32	0.11	3.17	0.013	4.57E-05
SO_X		0.001	0.04	0.0002	6.44E-07
PM_{10}	0.14	0.05	1.39	0.006	2.00E-05

Note: SO_2 emission calculated from spec sheet gpm of fuel usage and sulfur content of 15 ppm in fuel.

Engine parameters

Flow Rate (acfm)	1740	64.825	m/s
Exhaust Temp (degrees F)	770	683.15	K
Stack Diameter (feet)	0.4167	0.127	m
Stack height (feet) above ground	18	5.486	m
fire pump building height (ft)	15	4.572	m
fuel usage (gal/hr)	14		
diesel density (lb/gal)	7.1		

Data from Vendor Clarke JW6H-UF40
Stack diameter determined from the CARB "Risk Management Guidance for the Permitting of New Stationary Diesel-Fueled Engines" Oct 2000

Appendix H
Emergency Generator Emissions

CESF

Emissions from Emergency Diesel Generator

Rated Horsepower	**1341**	**BHP**			
Testing duration	**30**	**min/week**			
Yearly testing	**52**	**week/year**			
Expected non-emergency usage	**30**	**hr/yr**			
Pollutant	Emision Factor	Emission Rate per Testing	Yearly Emission Rate	Hourly Emission Rate	Annual Emission Rate
	g/HP/Hr	lb/hr	lb/yr	g/s	g/s
NO_X	4.82	7.13	213.75	0.899	3.08E-03
CO	0.19	0.28	8.43	0.035	1.21E-04
VOC (Total Hydrocarbons)	0.01	0.01	0.44	0.002	6.38E-06
SO_X		0.008	0.24	0.0010	3.42E-06
PM_{10}	0.02	0.03	1.02	0.004	1.47E-05

Note: SO_2 emission calculated from spec sheet gpm of fuel usage and sulfur content of 15 ppm in fuel.

Engine parameters

Flow Rate (acfm)	8387.2	122.060	m/s
Exhaust Temp (degrees F)	964.9	791.43	K
Stack Diameter (feet)	0.6667	0.2032	m
Stack height (feet) above ground	18	5.486	m
generator building height (ft)	15	4.572	m
fuel usage (gal/hr)	74.3		
diesel density (lb/gal)	7.1		

Data from Vendor CAT diesel generator set standby 1000ekW 1250 kVA

Carrizo Energy Solar Farm HRA Calculations
For diesel fire water pump and emergency generator

Cancer Risk Calculations	**fire water pump**	**emergency generator**	**Both engines combined**	
PM_{10} annual emission rate	1.99952E-05	1.47E-05		g/s
SCREEN3 maximum modeled 1-hour ?/Q value using 1 gram/second emission rate	589.25	612.9		$(\mu g/m^3)/(g/s)$
SCREEN3 maximum modeled annual ?/Q value using 1 gram/second emission rate	47.14	49.032		$(\mu g/m^3)/(g/s)$
Maximum annual PM_{10} concentration using actual emission rate	0.00094	0.00072		$\mu g/m^3$
Inhalation Cancer Potency Factor for diesel particulate matter (from OEHHA) is	1.10E+00	1.10E+00		$(mg/kg\text{-}day)^{-1}$
Inhalation dose (mg/kg-day) = (Annual conc) * DBR * A * EF * ED * 1e-6 / AT				
DBR = daily breathing rate (L/kg-day), used 95th percentile	393	393		L/kg-day
A = Inhalation absorption factor (fraction of chemical absorbed), default	1	1		
EF = Exposure frequency (days/year)	52	52		days/year
ED = Exposure duration (years), default	70	70		years
AT = Averaging time period over which exposure is averaged (days), default (e.g., 25,550 days for 70 year cancer risk)	25550	25550		days
Inhalation dose (mg/kg-day) =	5.27739E-08	4.0311E-08		mg/kg-day
Inhalation cancer risk = (Inhalation dose) * (cancer potency factor)	5.81E-08	4.43E-08		
Inhalation cancer risk =	0.058	0.044	0.102	in a million
Cancer risk significance threshold			1	in a million
Chronic Non-cancer Hazard Index Calculations				
PM_{10} annual emission rate	2.00E-05	1.47E-05		g/s
SCREEN3 maximum modeled 1-hour ?/Q value using 1 gram/second emission rate	589.25	612.9		$(\mu g/m^3)/(g/s)$
SCREEN3 maximum modeled annual ?/Q value using 1 gram/second emission rate	47.14	49.032		$(\mu g/m^3)/(g/s)$
Maximum annual PM_{10} concentration using actual emission rate	0.00094	0.00072		$\mu g/m^3$
Diesel particulate matter chronic reference exposure level (REL) from OEHHA	5	5		$\mu g/m^3$
Chronic Non-cancer Hazard Index (HI)	0.00019	0.00014	0.00033	
Chronic Non-cancer Hazard Index (HI) significance threshold			1	