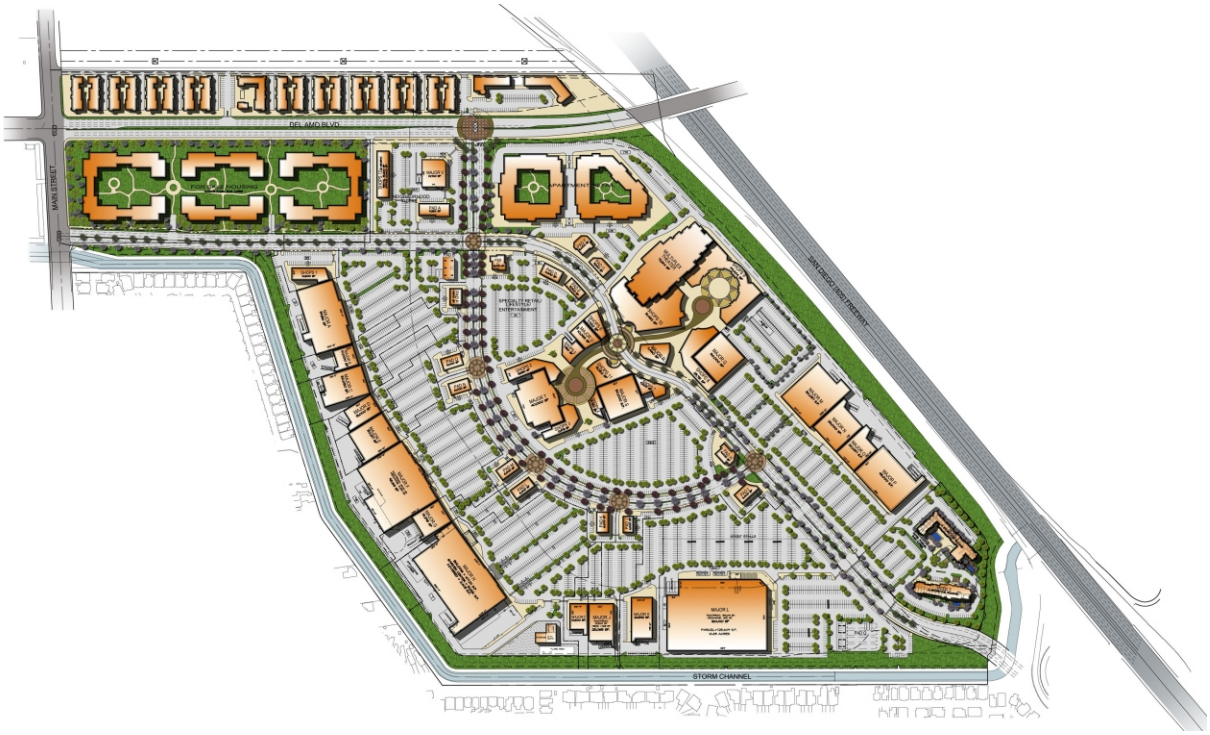
AVALON AT SOUTH BAY PROJECT

Deep Dynamic Compaction Vibration Monitoring Plan



For

Avalon at South Bay
(Formerly Carson Marketplace)
Carson, California

April 9, 2008

Prepared by:

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Prepared for:

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DEEP DYNAMIC COMPACTION
VIBRATION MONITORING PLAN

FOR

AVALON AT SOUTH BAY
(FORMERLY CARSON MARKETPLACE)
20300 MAIN STREET
CARSON, CA

Prepared for:

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DEFINITIONS

Allowable PPV: Allowable Peak Particle Velocity of 0.2 inches per second (in/sec) measured at the monitoring location to the south / southwest of the Channel (Location III in Table 2).

Construction Manager: Tetra Tech personnel authorized to manage and oversee the construction activities. This person will have the ability to stop work as needed to ensure compliance with project requirements, both regulatory and non-regulatory in nature.

Construction Relations Officer: Person or firm, as defined by EIR, charged by Tetra Tech to facilitate communication between the construction activities and the general public.

Deep Dynamic Compaction (DDC): Process of densifying subgrade soils in place using a heavy tamper that is repeatedly raised and dropped by a DD rig to impact the ground.

g (gravitational acceleration): A unit of force equal to the force exerted by gravity on a body at rest and used to indicate the force to which a body is subjected when accelerated (1g = 32.17 feet per seconds squared (ft/sec^2) or 9.80665 m/sec^2 meters per seconds squared)

Geophone: An electronic receiver/sensor designed to measure ground vibrations on or below the ground surface and to convert them into electric impulses that are proportional to the displacement, velocity, and acceleration of ground movement. Geophones are usually used in groups of at least 3, oriented at different angles, so that a three-dimensional record of ground movement can be obtained. Geophone is attached to a seismograph.

Peak Particle Velocity (PPV): The maximum rate of change of particle movement with respect to time measured on the ground.

Protected Structures: Structures, for which vibration monitoring is performed to mitigate the potential for vibration-induced damage. For this project, the Los Angeles County Flood Control District channel (Torrance Lateral); structures within the residential development to the south and southwest of Torrance Lateral; structures along Highway 405 adjacent to the Site; and the curb, gutter, and street along Del Amo Boulevard and Main Street adjacent to the Site are considered the Protected Structures.

Seismograph: A device designed to collect and present ground motion data obtained from a geophone(s).

Vibration Monitor: Person or firm responsible for performing vibration monitoring.

Vibration Monitoring Array: A configuration of one or more geophone/seismograph units to monitor construction vibrations.

SECTION 1.0 INTRODUCTION

This Deep Dynamic Compaction Vibration Monitoring Plan (Plan) applies to the Avalon at South Bay development project (Site), which was previously named Carson Marketplace. This proposed brownsfield restoration involves the development of the former Cal Compact landfill into multiple land uses, including commercial, entertainment, big-box retail stores, restaurants, hotels, and residential. During construction of the Site, the use of Deep Dynamic Compaction (DDC) is planned to consolidate refuse and cover soil in the planned open areas at the Site. The DDC activities have the potential to generate vibrations which could have the potential to travel outside the Site boundaries and affect structures located there. This Plan is prepared to discuss the procedures and methods that will be used to monitor vibrations from DDC at the Site.

1.1. Site Description and Scope

Carson Marketplace, LLC (Developer) has proposed to develop the Site. The Site comprises approximately 168 acres of land located at 20300 Main Street in Carson, California. The main property (157 acres) is bounded on the east/northeast by the San Diego Freeway (I-405), on the north by Del Amo Boulevard, on the west by Main Street and single family residences and mobile home development, and on the south by single family residences and mobile home development (Figure 1). A strip of vacant land to the north across Del Amo Boulevard, which comprises 11 acres, is also within the overall scope of the Site. This portion of the property was not part of the former landfill and the development activities planned for it are, therefore, not included in the provisions of this Plan.

The former Cal Compact landfill consists of five separate landfill cells numbered A1 through A5 separated by the Site boundaries on the outer perimeter and by two interior roadways on the interior perimeter (Lenardo Drive and Stamps Drive). A Los Angeles County Flood Control channel (Torrance Lateral) is located adjacent to the south and west sides of the Site and serves to separate the Site from the adjacent residential neighborhood (Figure 2).

This Site involves the development of the former Cal Compact landfill into the following land uses: neighborhood commercial, regional commercial, commercial entertainment, big-box retail stores, restaurants, hotels, and residential (Figure 3). The construction phases of this Site will begin with mass grading of the former landfill area and removal of some of the clean soil covering the landfill cells. This will be done to establish a uniform grade and minimize the thickness of suitable soil overlying the refuse so that compaction of the landfill cells may commence. Soil removed in the grading process will be temporarily stockpiled onsite until it is reused. Compaction of refuse will be done using DDC to consolidate the refuse and soil below future parking and open areas to minimize future settling (Figure 4). The refuse under future building locations will not be compacted. Once all compaction is complete, a landfill gas collection system with horizontal collection wells throughout the site and vertical gas collection wells below future building locations will be installed. This gas collection system will be connected to a gas flare treatment system with a landfill operations center which will have controls and integral monitoring to detect any leakage or system failure. The landfill cells and gas

AVALON AT SOUTH BAY

Vicinity Map

Jan. 2008 | TETRA TECH | Figure 1


X:\GIS\CARSON-AVALON\SITE.MXD
Del Amo Blvd.
A1
A2
A3
A4
A5
Former
Cal Compact
Landfill
(Site)
Main St.
Lenardo Dr.
Stamps Dr.
405
Dominguez Channel
Torrance Lateral
N
W
E
S
0
200
400
600
Feet
AVALON AT SOUTH BAY
Site Map
Jan.
2008
TETRA TECH
Figure
2

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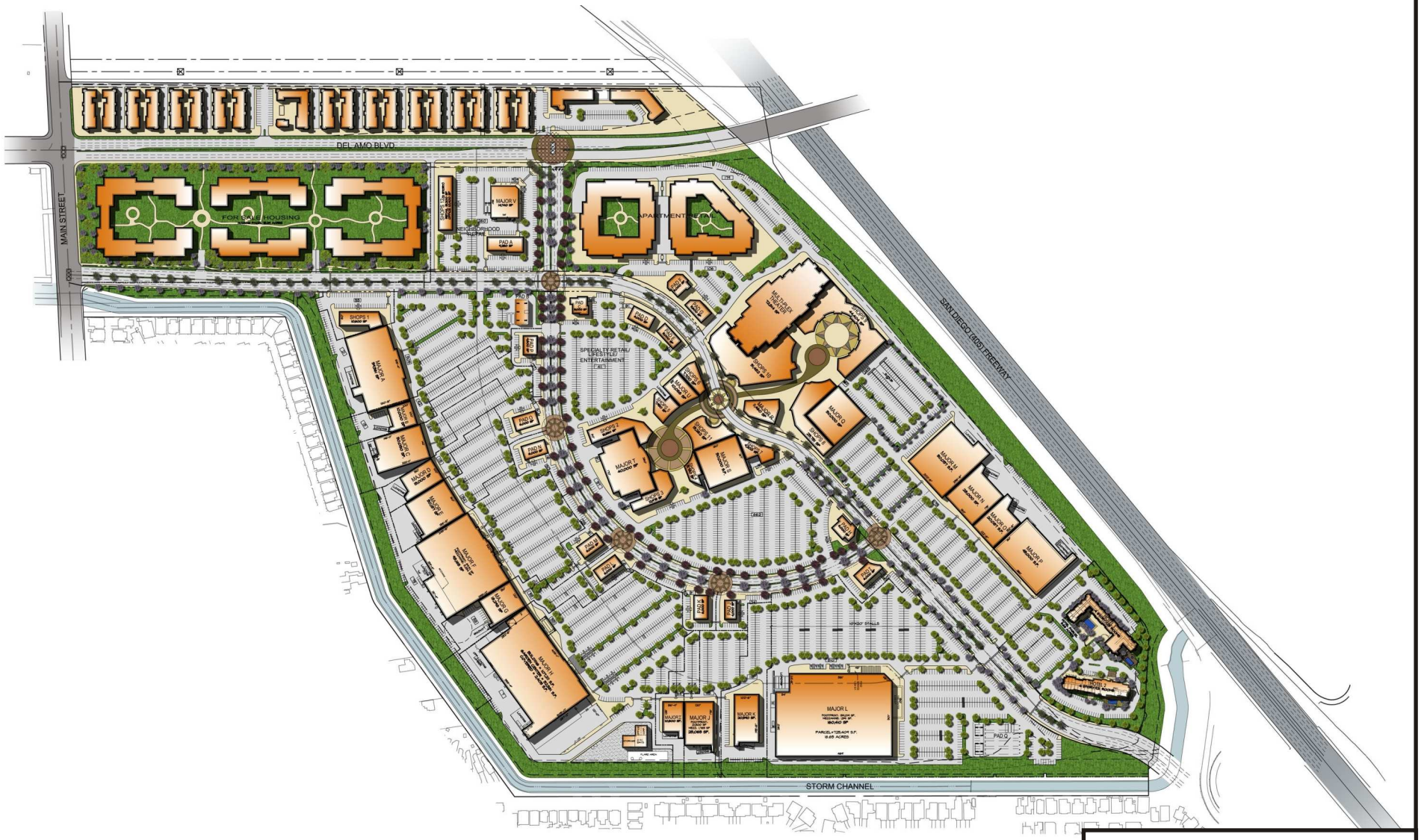

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Development Plan Date: September 17, 2007

Ref. Nadel 2005.

AVALON AT SOUTH BAY

Development Plan

Jan. 2008

TETRA TECH

Figure 3

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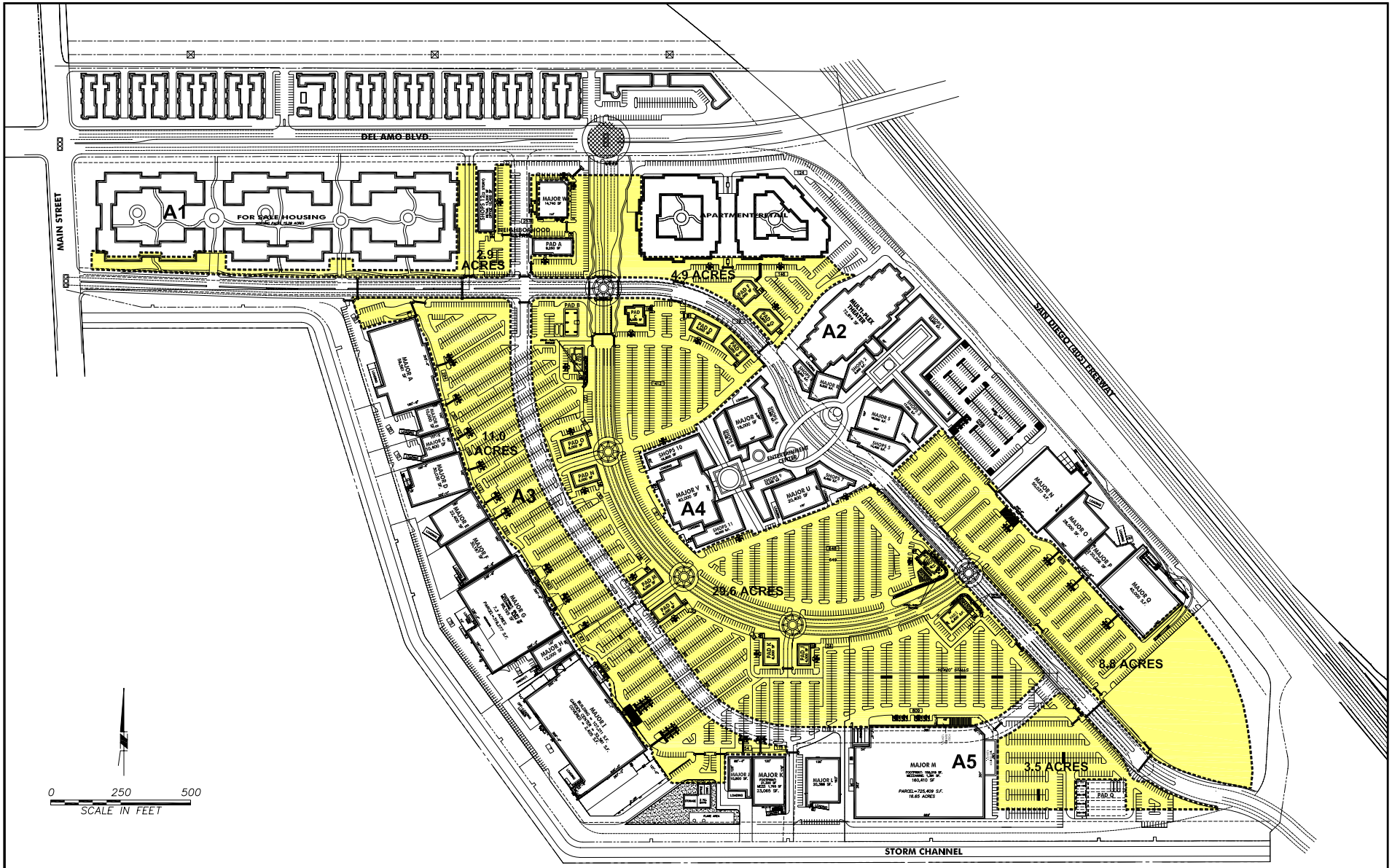

Source: Nadel 9/17/2007

LEGEND

DDC Area

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AVALON AT SOUTH BAY

Figure 4
Deep Dynamic Compaction Areas

collection system will then have a multi-component landfill cap installed. The first layer of this cap will be the installation of a continuous layer of linear low density polyethylene (LLDPE) geomembrane which will serve as the primary impermeable layer of the cap system. This LLDPE geomembrane will then have drainage strips installed on top of it that will direct water off of the landfill cap so that it does not accumulate. These drainage strips will be covered by a geotextile fabric layer to prevent the accumulation of silt and clogging of the drainage system. This layer will then be covered with suitable soil.

All future buildings will be supported on driven piles. Piles will be driven through the refuse until competent native soil is reached. Pile caps will be installed and the concrete building slabs will be poured on top. The LLDPE geomembrane will be sealed to the pile caps where they penetrate it using an expansion boot to allow expansion and movement while remaining sealed.

A building protection system will be installed below all building locations to serve as a backup in case of landfill cap or primary gas collection system failure. This system will include the installation of a membrane attached to the underside of the concrete slab. The space between this membrane and the LLDPE geomembrane will have a passive gas venting system installed and will also include methane detection sensors to provide notification of system failure. All buildings will be built aboveground.

The Site will also include the installation of a groundwater extraction and treatment system along the southern boundary to contain and treat impacted groundwater underlying the Site. Some refuse in the landfill cells may need to be excavated and moved to facilitate the installation of site utilities and the landfill gas collection system. Tetra Tech is the environmental engineer and general contractor responsible for the design and installation of these remedial systems. Tetra Tech is not, however, responsible for the design and installation of the driven piles, pile caps, and building slabs that make up the building foundations.

1.2. Site History

Land use of the property prior to landfill operations was primarily agricultural, including grazing, dairy, feedlot, and cropland (Brown & Root 1995a). Prior to the 1930s, the land immediately surrounding the property was also used primarily for agriculture, with some limited residential development. During the 1940s, industry was introduced to the area and residential areas also became more extensive. The current light industry, commercial, and residential mix of land uses was fully developed by the 1970s (Brown & Root 1995a).

Between 1959 and 1964, the property was used as a Class II landfill and is currently covered by a layer of soil that varies from 4 to 32 feet in thickness. According to Los Angeles County records, Cal Compact, Inc. (Cal Compact), a California corporation, was issued an industrial waste disposal permit on July 17, 1959, which authorized Cal Compact to operate a Class II landfill on the property (Brown & Root 1995b). Landfill operations began on this property in April 1959 and continued until December 1964 (McLaren/Hart 1992). The landfill operations consisted of the placement and cover of wastes in excavated trenches. All wastes were placed in trenches that were excavated adjacent to the interior haul roads. The haul road locations have

remained unchanged throughout the time the landfill was in operation and are underlain by native soil materials (Brown & Root 1995b).

The landfill was permitted to accept both municipal solid waste and specified industrial liquid wastes. During the life of the landfill, approximately 6 million cubic yards of solid municipal waste and 6.3 million gallons of industrial liquid waste were received at the landfill (Brown & Root 1995c). Available records indicate that over 65 percent of the liquid wastes were drilling fluids that consisted primarily of water and clay mixtures, with minor heavy metal additives and oily residue. Other wastes received included solvents, oils, sludges, heavy metals, paint sludges, and inorganic salts.

On March 18, 1988, Remediation Action Order Number HSA87/88-040 was issued, requiring investigation of contamination at the landfill site and preparation of a remedial action plan (RAP). A RAP was prepared and approved by the Department of Toxic Substances Control (DTSC) in 1995. The objective is to develop the Project for mixed uses that benefit the surrounding community. At the same time, the RAP will be implemented to protect human health and the environment during construction and after the Project development is complete and operating.

1.3. Purpose and Scope of Plan

This Plan describes the Vibration Monitoring Program for DDC activities which will be implemented as part of the site development work planned for the Site. The development of the Site has been reviewed for compliance with the California Environmental Quality Act (CEQA) and an Environmental Impact Report (EIR) has been prepared (PCR Services 2006a). As part of the EIR process a Mitigation, Monitoring, and Reporting Program (MMRP) has been prepared in accordance with Section 21081.6 of the Public Resources Code and Section 15097 of the CEQA Guidelines (PCR Services, 2006b). The MMRP describes the procedures for the implementation of mitigation measures identified in the project. Two of the mitigation measures which apply to this Plan include:

Mitigation Measure H-2: The Applicant, prior to initiating DDC or pile driving activities on a site-wide basis, shall conduct a pilot program (Pilot Program). The Pilot Program shall be implemented via the following guidelines:

- Prior to the initiation of the Pilot Program, the Applicant shall locate vibration monitors at the following locations: (1) along the Site's fenceline opposite the off-site residential uses located to the south and southwest of the Site (i.e., within the Site), and (2) along the far side of the Torrance Lateral Channel in line with the monitors placed within the Site itself.

- Continuous monitoring shall be conducted on an ongoing basis during the Pilot Program. All vibration levels measured by the monitors shall be logged with documentation of the measurements provided to the City.

- Initial DDC drops shall be limited in weight, height and/or location dictated by calculations which demonstrate that the potential vibration levels are below the 0.2 inches per second PPV threshold limit.

- Increases in DDC weight, height and/or location shall incur in small increments, with continuous monitoring to assure compliance with the 0.2 inches per second PPV threshold limit.

- If vibration levels at any time during the Pilot Program exceed the 0.2 inches per second PPV threshold level, DDC or pile driving activity shall immediately stop, until new drop parameters are established that would reduce the vibration levels to less than the 0.2 inches per second PPV threshold level.

Mitigation Measure H-3: The monitors located on the far side of the Torrance Lateral Channel as part of the Pilot Program shall remain in place throughout the DDC and pile driving phase of Project construction. Continuous monitoring shall be conducted on an ongoing basis. All vibration levels measured by the monitors shall be logged with documentation of the measurements provided to the City. If DDC or pile driving vibration levels at any time exceed the 0.2 inches per second PPV threshold level, DDC or pile driving activity shall immediately stop, until new drop parameters are established that would reduce the vibration levels to less than the 0.2 inches per second PPV threshold level.

The primary purpose of the DDC Vibration Monitoring Program is to help ensure that these mitigation measures are implemented according to the MMRP. The objectives of the program are to:

- Establish vibration action levels which will guide the DDC Pilot Test and the monitoring of full scale DDC activities;

- Guide the DDC Pilot Test to ensure that DDC is effective and determine DDC procedures which do not produce vibrations which would have negative effects on the protected structures surrounding the Site;

- Monitor vibration levels during full scale DDC activities to ensure that protected structures are not adversely affected; and

- Document all vibration monitoring activities to show that the required mitigation measures have been complied with in completion of DDC activities.

The guidelines provided in this document are intended to facilitate an accurate and consistent collection of the vibration data and to establish a protocol for reporting the results of the monitoring.

1.4. Plan Content and Organization

This Plan presents the general work to be completed at the Site, the order the work will be completed, pre-construction surveys which will be conducted to document existing conditions, vibration monitoring procedures, a description of vibration monitoring to be conducted during the DDC pilot test, and a description of the vibration monitoring to be conducted during full scale DDC activities. The vibration monitoring procedures will contain a description of the types of monitoring equipment to be used, the monitoring equipment setup, and monitoring protocols and procedures.

SECTION 2.0 PRE-CONSTRUCTION NOTIFICATION AND SURVEY

All properties and structures surrounding the Site have a potential to be negatively affected due to the vibration from DDC activities. Therefore, all of these properties and structures have been designated as protected structures (Figure 5). The goal of the vibration monitoring program is to ensure that these protected structures are not negatively affected by vibrations from the DDC activities. In order to document the existing conditions of the protected structures surveys will be conducted before the start of construction activities on the Site. Notifications will also be made so that residents in the protected structures will be aware of the Site activities and will know what to expect when construction commences. The following describe tasks associated with conducting the pre-construction notification and survey.

a) A preconstruction visual survey of the Los Angeles County Flood Control's "Torrance Lateral" flood control channel shall be undertaken prior to the start of any vibration-inducing activities on the Site, including the Pilot Test program. This survey shall be conducted using photographs and video. Additionally, this survey will include neighborhood structures (including mobile homes) if the structure is located within 20 feet of the southern and western boundaries of the Torrance Lateral right-of-way.

b) The objective of the pre-construction survey is to document any pre-existing conditions or damage and to determine the susceptibility of Torrance Lateral and nearest residential structures to disruption or damage from construction vibrations. The entire length of the Torrance Lateral and surrounding structures shall be inspected and documented by photographs and/or video. This visual documentation will have a date and time stamp recorded or superimposed on the photo/video. Detail photographs and measurements of any pre-existing cracks will be taken.

c) Notification will be made by Tetra Tech (Construction Relations Officer) to the owners and residents of Protected Structures surrounding the Site on the south and southwest sides of the Site. This notification will alert residents of the upcoming construction, provide them with the proposed activities schedule, give a general explanation of the activities to be performed, and supply them with contact information in case they have concerns or require more information. Separate notifications will also be provided prior to initiation of the Pilot Test program and prior to initiation of full construction activities on the Site.

d) The Construction Relations Officer will make periodic inquiry to the owners and residents of the Protected Structures during the duration of the DDC operations to timely address any concerns.

e) Surveys of the protected structures will again be conducted after the DDC Pilot Test and again at the completion of DDC activities to document any changes to the protected structures. The surveys will be conducted using the same procedures as in the pre-construction surveys.

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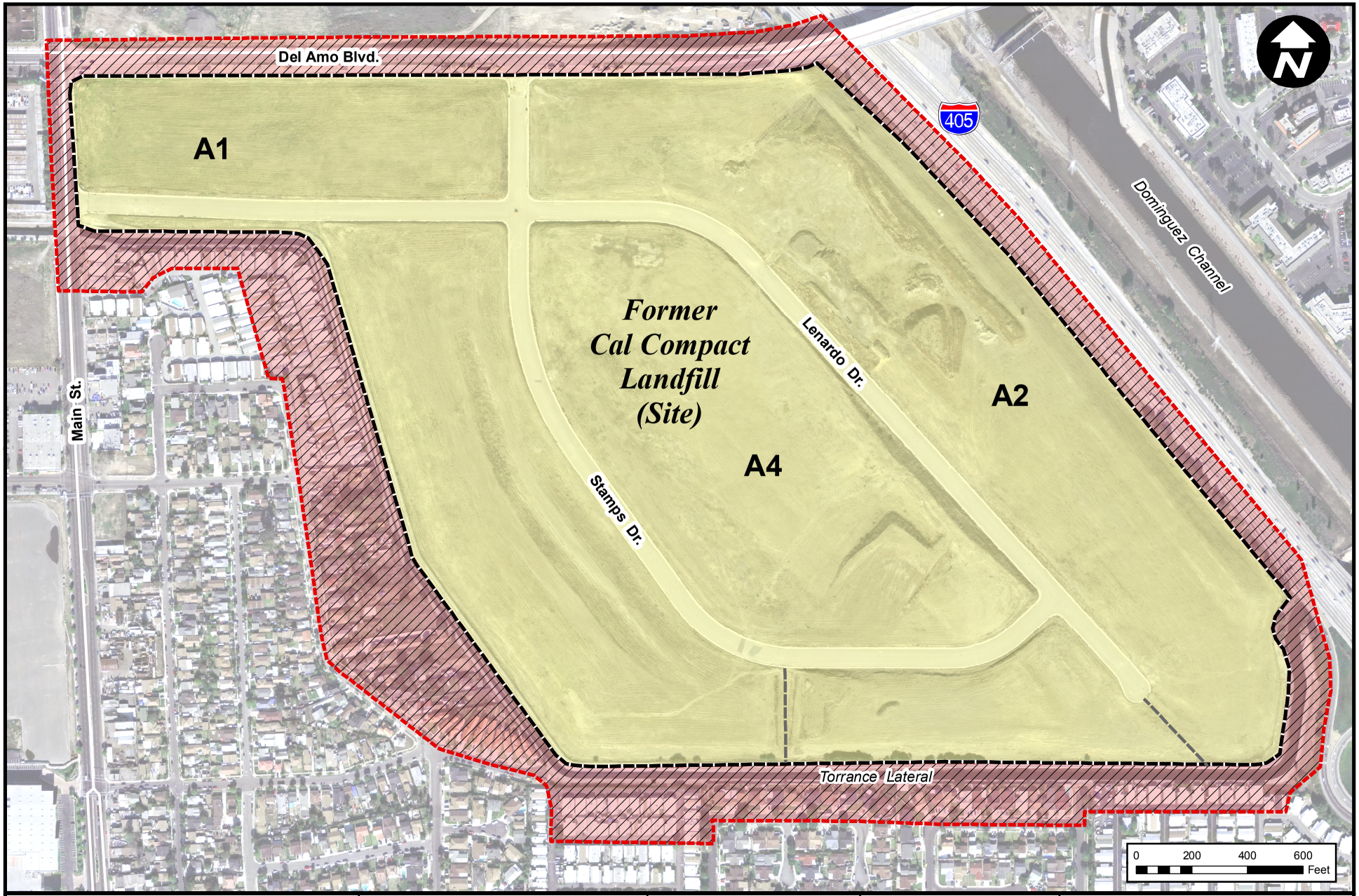

LEGEND

- Structure Protection Area
- Site Boundary

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AVALON AT SOUTH BAY

Figure 5
Protected Structures

SECTION 3.0 VIBRATION MONITORING PROCEDURES

The following sections describe the general procedures which will be utilized to conduct the vibration monitoring. These include a general description of the equipment used to conduct vibration monitoring, the general provisions for use of these monitoring instruments, and the general procedures for collection of monitoring data. Specific vibration monitoring procedures to be utilized during the DDC Pilot Test and full scale DDC operations will be discussed in subsequent sections.

3.1 General Vibration Monitoring Guidelines

Vibration monitoring is performed utilizing seismographs placed at strategic locations between the source of the vibrations and the area of interest, e.g., residential development, and then monitoring the peak particle velocity levels. These general guidelines define the Vibration Monitor responsibilities when deploying seismographs in the field.

a) Vibration monitoring shall be performed continuously and at all times when DDC is carried out, including during the DDC pilot test. This will include monitoring of background vibration levels prior to each DDC advancement.

b) All activities for vibration monitoring shall be performed under supervision of a Civil Engineer registered in the State of California.

c) Vibration Monitoring Array shall be set up for each simultaneously performing DDC location in accordance with the layouts shown in Sections 7 and 8 of this document. A separate vibration monitoring array will be set up for each DDC rig.

d) Vibration Monitor shall maintain a detailed daily log of the monitoring activities as outlined in Sections 4 and 5 of this document.

e) Monitoring shall be performed utilizing a seismograph with a triaxial geophone (e.g., Blastmate III or equivalent).

f) Only seismographs and geophones with current calibration, i.e., no older than 1 year, shall be used for the vibration monitoring.

3.2 Geophone Placement and Ground Coupling

Placement of the geophone and coupling it with the ground surface are the two most important factors to ensure accurate ground motion data collection.

a) The geophone shall be placed as close as possible to the shortest line connecting the DDC location and the Protected Structures. Under no circumstance shall the geophone be placed more than 30 feet off such a line. Consequently, the Vibration Monitoring Array may need to be repositioned during the day as the DDC operation advances along the site boundary.

b) The geophone shall be placed on level ground following removal of any sod/debris to expose native competent soil. Placement on driveways, walkways, and slabs must be avoided due to potential vibration amplification or diminution effects.

c) The density of the soil under the geophone should be greater than or equal to the geophone density. Uncompacted fill material, loose sand, unconsolidated soils, flower-bed mulch or other unusual media shall be avoided as they may have an adverse influence on the recording accuracy.

d) The placement of geophones in the landfill cover soil may at times be unavoidable. The cover soil may not act as "native competent soil" due to its potential unconsolidated nature. Data collected from these locations may need to be qualified to adjust for this.

e) The geophone shall be oriented in the direction towards the DDC operation according to the manufacturer's recommendations. Typically, an arrow or longitudinal channel needs to be oriented directly at the vibration source to collect correct directional ground motion data.

f) For measured accelerations less than 1g (gravitational acceleration g = 32.17 ft/sec^2), the geophones shall be coupled with the ground surface using sand bagging and spiking. Spiking entails firmly pressing the sensor with the attached tapered spike(s) into the prepared level ground surface. Sand bagging consists of placing the sensor on the exposed native competent soil with a sand bag(s) over top. Sand bags shall be sufficiently large to be loosely filled with about 10 pounds of sand. When placed over the sensor the sand bag profile should be as low and wide as possible with a maximum amount of firm contact with the ground.

g) All cables shall be secured to prevent geophone movement from the wind or other extraneous sources.

3.3 Data Acquisition Programming

The data shall be acquired continuously at a sensitivity and sampling rate determined during the Pilot Test. Peak values shall be recorded for a time interval determined during the Pilot Test. Generally, a "sensitive" mode suitable for measuring PPV of less than 1 inch/sec and time interval encompassing duration of work at one DDC drop location (i.e., 5 to 10 minutes) are anticipated, and will be suitably sensitive to accurately and reproducibly measure 0.2 in/sec PPV.

SECTION 4.0 VIBRATION MONITORING DURING PILOT DDC TEST

To help guide the DDC process and to determine the initial vibration effects from the DDC, a pilot test will be conducted. The vibration monitoring data from the pilot test will be used to determine if adjustments need to be made to the DDC parameters to minimize vibration effects before normal DDC effort commence. The DDC Pilot Test is intended to evaluate the vibration effects on the Protected Structures and to determine the appropriate DDC equipment for the Site conditions and procedural DDC parameters, i.e., tamper weight, shape, and size, drop height, spacing, and number of drops to stay within the Allowable PPV. The following describe the procedures which will be followed to conduct vibration monitoring during the DDC pilot test and the documentation of the monitoring.

a) Vibration monitoring shall be performed during the DDC Pilot Test.

b) Contact information for the Construction Relations Officer, and Construction Manager shall be provided to the Vibration Monitor prior to the start of the DDC Pilot Test.

c) Vibration Monitoring Array shall consist of 4 geophones located on the line connecting the DDC location and the Protected Structures as outlined in Table 1 and shown in Figure 6.

Table 1
Vibration Monitoring Array for the Pilot Test

Location #	Geophone Location Description	Purpose
1	50 to 100 feet from DDC drop zone	Evaluate vibrations within the immediate vicinity of DDC
2	Top of slope along the site perimeter above the Channel	Evaluate propagation of vibrations to the edge of the elevated portion of the site
3	North / northeast edge of the Channel at the toe of slope	Evaluate vibrations affecting the Channel
4	South / southwest edge of the Channel within LAC Flood Control right-of-way	Evaluate vibrations adjacent/approaching the residential development

d) The Vibration Monitoring Array shall be re-positioned every time the DDC operation advances so that the Vibration Monitoring Array is offset no more than 15 feet from the line connecting the DDC operation and the Protected Structures (see Figure 6). A sufficient amount of monitoring of background vibration levels, as determined by the vibration monitor, will be conducted prior to re-positioning of the monitoring array while the DDC operation is advancing.

e) If at any time the Allowable PPV of 0.2 inches/second is exceeded at Location #4, as specified in Table 1 (see Figure 5), the Vibration Monitor shall immediately notify the Construction Manager so that the DDC operation can be ceased and actions can be taken

to modify the DDC operation to reduce vibrations to allowable levels. The Vibration Monitor will also notify the Construction Relations Officer who will in turn be responsible for determining the appropriate level of community relations response. Tetra Tech will be responsible for implementing any DDC changes and to interface with the community or owners of Protected Structures.

Figure 6: Vibration Monitoring Array for DDC Pilot Test

f) A detailed record of the DDC activities and measured vibrations shall be maintained by the Vibration Monitor during the Pilot Test. The record shall include the following:

- Date and time;
- Vibration Monitor's name;
- Weather and temperature;
- Seismograph and geophone brand, model, serial number, and calibration;
- Seismograph measurement programming (sensitivity, sampling frequency) and method of recording (recording interval, histogram);

- Detailed description of DDC operation (contractor, equipment, tamper size, shape, weight and material, drop height);
- GPS coordinate locations of all seismograph monitoring locations;
- Seismograph location description including ground surface type and preparation description, method of coupling), and distance to DDC operation, and sketch of location on a site area plan;
- Record of PPV for each DDC operation variation;
- Unusual or remarkable events.

g) Upon completion of the Pilot Test, a report shall be prepared summarizing the collected data, presenting measured PPV readings, and recommending seismograph programming (sensitivity, sampling frequency, and recording interval) and site- and equipment-specific attenuation curves.

The pilot test vibration data will be reviewed while the pilot test is being conducted to determine whether changes to DDC parameters are needed to decrease vibration effects. As the parameters are adjusted throughout the pilot test, the vibration data will continue to be collected to ensure that the final selected DDC parameters do not cause exceedence of vibration level thresholds. By conducting the pilot test and determining the vibration effect of the DDC before normal DDC operations commence, it can be reasonable assured that as long as the approved DDC procedures determined in the pilot test are followed, vibration level thresholds should never be exceeded while conducting the normal DDC operations.

SECTION 5.0 VIBRATION MONITORING DURING DDC OPERATION

The following section describes the vibration monitoring procedures and documentation of the monitoring which will be conducted once full scale DDC operations commence. The results of the DDC pilot test and vibration monitoring conducted during the pilot test will help guide the full scale DDC operations.

a) Vibration monitoring shall be performed during all DDC activities at the site based on the results of the DDC pilot test.

b) Contact information for the Construction Relations Officer, and Construction Manager will be provided to the Vibration Monitor before DDC operation begins.

c) Vibration Monitoring Array shall initially consist of 3 geophones, located on the line connecting the DDC location and the Protected Structures as outlined in Table 2 and shown in Figure 7. Upon initiation of DDC production and confirming the findings and recommendations from the DDC pilot test, the Vibration Monitoring array may be reduced based on the Vibration Monitor recommendation up to only one geophone installed at Location III. Such a modification of the vibration monitoring plan shall follow the guidelines provided in Section 6 – Vibration Monitoring Plan Modification of this document.

Table 2
Vibration Monitoring Array for the DDC Operation

Location #	Geophone Location Description	Purpose
I	Top of slope along the site perimeter above the Channel	Evaluate propagation of vibrations to the edge of the elevated portion of the site
II	North / northeast edge of the Channel at the toe of slope	Evaluate vibrations affecting the Channel
III	South / southwest edge of the Channel	Evaluate vibrations adjacent/approaching the Protected Structures

d) The Vibration Monitoring Array shall be re-positioned every time the DDC operation advances so that the Vibration Monitoring Array is offset more than 30 feet from the line connecting the DDC operation and the Protected Structures (see Figure 7). A sufficient amount of monitoring of background vibration levels, as determined by the vibration monitor, will be conducted prior to re-positioning of the monitoring array while the DDC operation is advancing.

e) If at any time 85 percent of the Allowable PPV of 0.2 inches/second is exceeded (i.e., 0.17 inches/second) at Location III, as specified in Table 2 and shown in Figure 7, the Construction Manager shall immediately be notified so that the DDC procedures can be modified, as required, to avoid exceeding the Allowable PPV. The Vibration Monitor

should also notify the Construction Relations Officer. A copy of the DDC vibration monitoring record (as defined in paragraph 5f below) will be provided to the Construction Relations Officer and the Construction Manager.

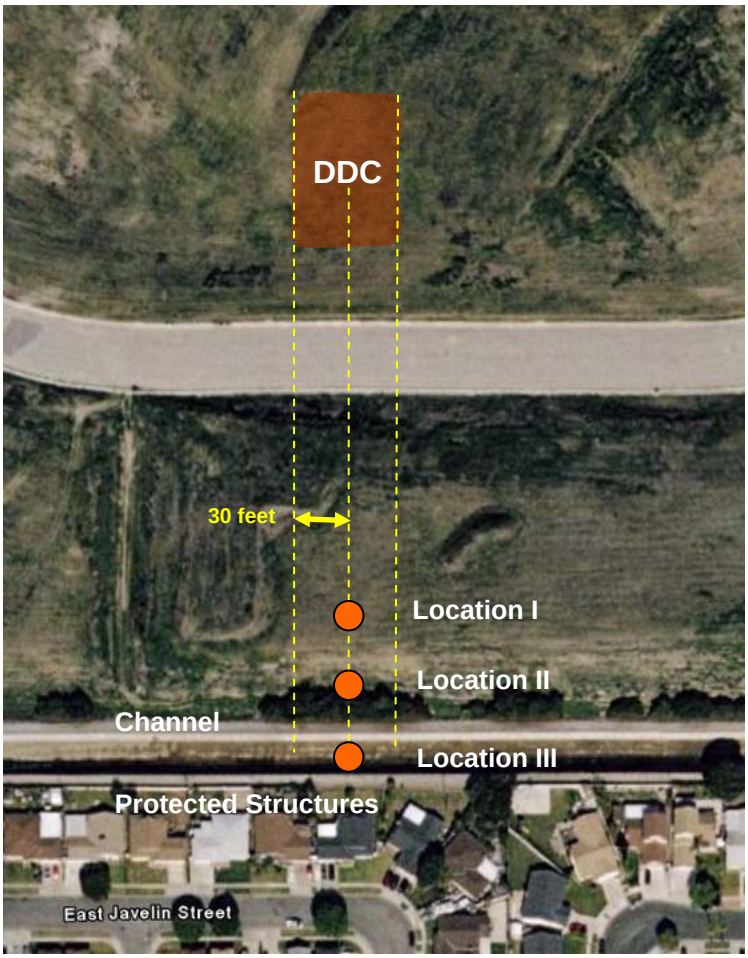

Figure 7: Vibration Monitoring Array during DDC Operation

e) (continued) If the Allowable PPV of 0.2 inches/second is exceeded at Location III, as specified in Table 2 and shown in Figure 7, the Vibration Monitor shall immediately notify the Construction Manager so that the DDC operation can be ceased and actions can be taken to modify the DDC operation to reduce vibrations to allowable levels. The Vibration Monitor will also notify the Construction Relations Officer who will in turn be responsible for determining the appropriate level of community relations response. A copy of the DDC vibration monitoring record (as defined in paragraph 5f below) will be provided to the Construction Relations Officer and the Construction Manager. The area of the Torrance Lateral and any protected structures within 20 foot of the south boundary of the Torrance Lateral right-of-way adjacent to the DDC location where the threshold was exceeded will be surveyed for any potential damage resultant from the vibration effect. This inspection should be documented both in writing and through the use of video or photography.

f) A detailed record of the DDC activities and measured vibrations shall be maintained during the DDC operations on an ongoing daily basis. The record shall include the following:

- Date and time;
- Vibration Monitor's name;
- Weather and temperature;
- Seismograph and geophone brand, model, serial number, and calibration;
- Seismograph measurement programming (sensitivity, sampling frequency) and method of recording (recording interval, histogram);
- Detailed description of DDC operation (contractor, equipment, tamper size, shape, weight and material, drop height);
- GPS coordinate locations of all seismograph monitoring locations;
- Seismograph location description including ground surface type and preparation description, method of coupling), and distance to DDC operation and distance to the Torrance Lateral and the nearest residential structure (Protected Structure), and a sketch of the Vibration Monitoring Array on a site area plan;
- Record of PPV for each recording interval;
- Unusual or remarkable events.
- Indicate the time of the maximum PPV measured during the day.

An example of a daily record log is attached to this document in Appendix A.

g) A compilation of all daily reports shall be submitted weekly to the Construction Manager for further distribution to the City of Carson Department of Development Services and as-needed.

h) At the completion of the DDC activities a Final Vibration Monitoring Report compiling collected data shall be prepared and submitted to the Construction Manager for inclusion in the project closeout documentation.

SECTION 6.0 VIBRATION MONITORING PLAN MODIFICATION

This Vibration Monitoring Plan and the procedures described within may be modified only based on written recommendation of the Vibration Monitor and subsequent approval of the Construction Manager, Construction Relations Officer, Project Manager, City of Carson, and the California EPA, Department of Toxic Substances Control.

SECTION 7.0 REFERENCES

Brown & Root Environmental. 1995a. Final Baseline Risk Assessment for Cal Compact Landfill, Carson, California. August.

Brown & Root Environmental. 1995b. Final Remedial Action Plan, Cal Compact Landfill, Carson, California. October.

Brown & Root Environmental. 1995c. *Final Remedial Investigation for Cal Compact Landfill, Carson, California.* July.

McLaren Hart. 1992. *Final Report Baseline Risk Assessment of the Cal Compact Landfill, Carson, California.* December

PCR Services Corporation. 2006a. *Final Environmental Impact Report.* January

PCR Services Corporation. 2006b. *Mitigation, Monitoring, and Reporting Program.* January

Appendix A

Example of Daily Record of Vibration Monitoring

TETRA TECH KFM GEOSCIENCE	**DAILY RECORD OF DDC VIBRATION MONITORING**	Date:	Daily No:
Recorder's Name:		Daily Maximum PPV:	Page ____ of _____

DDC Operation Parameters						**Seismograph Settings**	
Time from - to	Crane Model	Tamper Weight	Tamper Size / Material	Drop Height	Number of Drops per Location	Sensitivity	Recording Interval

Notes:

Vibration Monitoring

Monitoring Array Sketch:		Location ID _____		Location ID _____		Location ID _____	
		Seismograph ID:		Seismograph ID:		Seismograph ID	
		Geophone ID:		Geophone ID:		Geophone ID	
Time	Weather / Temperature	Distance to DDC / Channel / Protected Structures (feet)	PPV (in/sec) per Recording Interval	Distance to DDC / Channel / Protected Structures (feet)	PPV (in/sec) per Recording Interval	Distance to DDC / Channel / Protected Structures (feet)	PPV (in/sec) per Recording Interval
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