URS

November XX, 2013

Mr. Emmanuel Martin
City of Torrance - Department of Public Works
20500 Madrona Avenue
Torrance, California 90503

Re: Drilling/Testing results for pilot boring #12
(185th Street west of Van Ness Avenue)

Dear Mr. Martin:

URS Corporation (URS) is submitting the enclosed drilling/testing results for a pilot boring (#12) recently completed at the terminus of 185th Street east of Van Ness Avenue in Torrance, California. The pilot boring is currently secured with a steel plate welded to the surface conductor casing as performed by Southwest Pump and Drilling.

As always, we enjoyed working with your team on this project and look forward to any additional assignments you may have for us in the future. If you have any questions please do not hesitate to contact the undersigned at (714) 835-6886.

Sincerely,
URS Corporation

Brian Partington, PG, CHg
Project Manager / Principal Hydrogeologist
California Professional Geologist No. 7612
California Certified Hydrogeologist No. 883

cc: John Dettle (City of Torrance – Department of Public Works)
Project Files (URS – Santa Ana, CA)

DRAFT REPORT

DRILLING / TESTING RESULTS FOR PILOT BORING #12

185TH STREET (WEST OF VAN NESS AVE.) TORRANCE, CALIFORNIA

Prepared for

City of Torrance
Department of Public Works
20500 Madrona Avenue
Torrance, California 90504

November XX, 2013

URS

2020 East First Street, Suite 400
Santa Ana, California 92705

29869072

DRILLING/TESTING RESULTS FOR PILOT BORING #12
CITY OF TORRANCE – PUBLIC WORKS DEPARTMENT
185TH STREET (WEST OF VAN NESS AVE.) - TORRANCE, CALIFORNIA

NOVEMBER XX, 2013
PROJECT NO. 29869072

This report provides a summary of drilling/testing results for a pilot boring (#12) completed at the terminus of 185th Street west of Van Ness Avenue in Torrance, California (the Site). URS conducted the work described in this report under a consultant services agreement signed with the City of Torrance (C2013-080 executed on April 23, 2013).

These recommendations in this report have been prepared for the City of Torrance with specific application to a potential water production well at pilot boring #12 in Torrance, California. These recommendations have been prepared in accordance with the care and skill generally exercised by reputable professionals, under similar circumstances, in this or similar localities. No other warranty, expressed or implied, is made as to the professional opinions presented herein. No other party, known or unknown to URS Corporation is intended as a beneficiary of this work product, its content or information embedded therein. Third parties use this report at their own risk. URS Corporation assumes no responsibility for the accuracy of information obtained from, compiled or provided by outside sources.

Changes in site use and conditions of the proposed well design may occur with reduction in specific capacity, groundwater elevations, pumping operations, and maintenance procedures. The estimated production rate assumes there will be adequate yield from the formation material to produce approximately 1800 to 2500 gallons per minute (gpm). The assumptions were made prior to conducting a groundwater pumping test and with only limited zone testing data per direction from the City of Torrance.

This report was prepared under the technical direction of the undersigned.

Brian Partington, PG, CHg
Project Manager / Principal Hydrogeologist
California Professional Geologist No. 7612
California Certified Hydrogeologist No. 883

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1.0 INTRODUCTION

URS Corporation (URS) has prepared this report for field oversight activities and preliminary well design services associated with a recently completed pilot boring (#13) located at 185th Street west of Van Ness Avenue) in Torrance, California (the Site). The assessor identification number for the property is 4095-019-901. The well is located at an approximate latitude of 33° 51' 42.57"N and longitude of 118° 18' 55.61"W. The site location is shown on Figure 1. A site plan with the pilot boring location is shown on Figure 2.

A well installation permit was obtained from the Los Angeles County Drinking Water Program located at 5050 Commerce Drive in Baldwin Park, California. The permit application was prepared by South West Pump & Drilling located in Coachella, California (SWPD). A copy of the well permit is provided in Appendix A.

URS conducted the work described in this report under a consultant services agreement signed with the City of Torrance (C2013-080 executed on April 23, 2013). The scope of services included in the contract is summarized as follows:

- Task 1 – Inspect conductor casing installation (full-time).
- Task 2 – Oversee drilling / sampling (part-time) and geophysical logging (full-time).
- Task 3 – Conduct mechanical grading analysis of formation materials (up to 8).
- Task 4 – Evaluate geophysical logs and select zones for isolated aquifer testing (up to 3).
- Task 5 – Oversee isolated aquifer zone testing (part-time).
- Task 6 – Observe boring backfill (including verifying a welded cap on the casing).
- Task 7 – Prepare a summary letter report for submittal to the City of Torrance.
- Task 8 – Prepare a Drinking Water Source Assessment and Protection (DWSAP) Report.
- Task 9 – Attend a pre-construction meeting with the driller and City of Torrance.

The only item not completed during this phase of work was Task 8. The DWSAP will be completed when a well is installed and the estimated pumping conditions are known as discussed during a meeting held on November XX, 2013. The meeting was attended by the City of Torrance (Emmanuel Martin and John Dettle) and URS (Brian Partington).

The major fieldwork milestones completed during the pilot boring activity are summarized as follows:

Task Description	Date Started	Date Completed
Notice to Proceed Received by the City of Torrance	05/07/13	05/07/13
Kickoff meeting with the City of Torrance	06/19/13	06/19/13
Conductor Casing / Sanitary Seal	08/23/13	08/23/13
Pilot Boring Drilling	09/05/13	09/09/13
Isolated Aquifer Zone Testing	09/09/13	09/13/13

2.0 Pilot Boring Operations

The pilot boring operations commenced on August 23, 2013. This activity included the installation of a shallow steel conductor casing, drilling a pilot boring to a client specified total depth, and conducting geophysical borehole logging. The drilling services for conductor casing installation were provided by Barney's Hole Digging Service (Barney's) located in Long Beach, California. The remaining drilling services were provided by SWPD. The geophysical logging services were provided by Pacific Surveys, LLC. (Pacific Survey) located in Claremont, California.

2.1 Conductor Casing Installation

The conductor casing was installed using a bucket auger drilling rig to provide a sanitary seal prior to advancing the pilot boring. The conductor casing also helps minimize the potential for washouts while drilling the boring. A 44-inch bucket auger was used to install a 36-inch diameter carbon steel conductor casing to a depth of approximately 50 feet below ground surface (ft bgs). The conductor casing material consisted of steel with a wall thickness of approximately 3/8-inch. Steel centralizers were welded to the casing exterior to center the conductor within the boring. Upon achieving the anticipated depth, the conductor casing was suspended within the boring while cement was placed within the annual space outside of the conductor casing using a 2-inch diameter steel tremie pipe placed at a depth of approximately 40 ft bgs. Fourteen (14) cubic yards of cement was used to seal the conductor casing annulus to ground surface and was allowed to cure undisturbed for approximately 13 days. A copy of the cement delivery sheet is provided in Appendix B.

2.2 Pilot Boring

The pilot boring commenced using a reverse rotary drilling rig on September 5, 2013. A bentonite gel based drilling fluid was used to maintain borehole stability during drilling operations. A 17 ½-inch diameter tricone drilling bit was used to advance the pilot boring to a depth of approximately 774 ft bgs. The original specification was for a pilot boring depth of 920 ft bgs. However, the total depth was reduced based on the presence of fine-grained sediments (silt and clay) identified in a recently completed nearby pilot boring #12. The City approved the revised drilling depth in an email dated August 14, 2013.

The SWPD field personnel collected representative soil samples at depth intervals of approximately 10 feet. URS classified each soil sample in general accordance with the Unified Soils Classification System (USCS). A color designation was also recorded using a Munsell Color Chart. The soil descriptions were recorded by field personnel on soil borings logs. In addition, SWPD prepared daily drilling logs that were provided to URS. The soil boring log is provided in Appendix C. The daily driller logs (prepared by SWPD) are included in Appendix D.

Five (5) soil samples were submitted for physical testing at depths of approximately 180, 400, 520, 640, and 730 ft bgs. A sieve analysis (i.e., particle size distribution) was conducted on each soil sample in general accordance with ASTM D422. URS performed the analysis in their geotechnical testing laboratory located in Santa Ana, California. The sieve analysis results are provided in Appendix E.

2.3 Geophysical Borehole Logging

The geophysical borehole logging was conducted on September 9, 2013. The geophysical logging was performed to assist with observations recorded by field personnel during the pilot boring (i.e., soil sampled collected by SWPD). The borehole drilling fluid was thinned using potable water while circulating for approximately four hours before introducing geophysical logging tools to the total depth of the open boring, which was confirmed at a total depth of approximately 774 ft bgs. The following geophysical methods were conducted for pilot boring #13:

- Resistivity (Short-Normal [16-inch] and Long-Normal [64-inch])
- Spontaneous Potential
- Laterolog3 for Focused Resistivity (guard)
- Natural Gamma-Ray
- Full waveform sonic with apparent porosity

The geophysical logging results were compared against the soil cutting samples collected by SWPD. In some cases, the soil cutting samples were off by several feet and did not match the geophysical logging interpretations, requiring minor adjustments to the soil boring logs prepared by URS (Appendix C). In general, the sediments encountered during drilling consisted of inter-bedded fine- to coarse-grained sediments to a depth of approximately 774 ft bgs. Coarse-grained sediments (sands and limited gravel) were identified at 100 to 200 (presumed to be the Gardena Aquifer), 260 to 515 (presumed to be the Lynwood Aquifer), and 630 to 750 (presumed to be the Silverado Aquifer). A fine-grained (silt to clay) sedimentary layer was identified at the bottom of the pilot boring starting at a depth of approximately 750 ft bgs. The subsurface interpretations are consistent with those reported by the California Department of Water Resource (DWR) in a document entitled “Planned Utilization of Ground Water Basins - Coastal Plain of Los Angeles County – Bulletin 104” (DWR, 1961). The geophysical logs are provided in Appendix F.

3.0 Isolated Aquifer Zone Testing

Isolated aquifer zone testing commenced on September 9, 2013. The isolated aquifer zone testing allows the collection of depth-specific groundwater samples for analysis to determine water quality at discrete intervals within the aquifer. In addition, pumping conducted during individual zone testing allows field personnel to evaluate the potential yield of the specific zone being tested. The zone testing results also provide valuable input for the well designer to determine the appropriate screened intervals for the final well design.

Three (3) zone tests were selected for testing based on observations recorded by field personnel (confirmed by geophysical logging) during the pilot boring operations and were recommended in a memorandum submitted to the city on September 9, 2013.

The proposed zone depths were adjusted in the field based on the available piping lengths supplied by SWPD. The final zone testing depths were 660 to 680 ft bgs (Zone #1), 419 to 439 ft bgs (Zone #2), and 157 to 177 ft bgs (Zone #3).

3.1 Well Construction

The isolated aquifer zone testing well construction was completed within the open pilot boring discussed in the previous section. A 20-foot section of perforated pipe was used as a zone testing tool, which was bounded above and below by hydrated bentonite chips within the annulus of the pilot boring. The perforated pipe was completed to the surface using drilling pipe. A gravel pack was placed around the zone testing tool to limit the amount of formation material entering the temporary well screen interval during well development. The bentonite seals were allowed to hydrate for a minimum of four hours before developing the screen interval for each zone. Table 1 includes a summary of zone testing construction details including results from Water Well No. 9. The isolated aquifer zone testing construction details are shown on Figures 3 through 5, respectively.

The isolated zone testing well construction details are summarized below:

Well Construction Detail Summary for Isolated Aquifer Zone Testing

Zone	Screen Interval (ft bgs)	Upper Bentonite Seal (ft bgs)	Gravel Pack Interval (ft bgs)	Lower Bentonite Seal (ft bgs)
#1	660 to 680	630 to 650	650 to 690	690 to 710
#2	419 to 439	389 to 409	409 to 450.5	450.5 to 470
#3	157 to 177	127 to 147	147 to 187	187 to 208

3.2 Well Development

The well screens for each zone test were developed by airlifting sediment from the well screen until the discharged water was observed to be relatively clean prior to installing a submersible pump at approximately 640 ft bgs (Zone #1), 400 ft bgs (Zone #2), and 135 ft bgs (Zone #3). The average pumping rate for each zone during development was approximately 60 gallons per minute (gpm), 220 gpm, and 200 gpm, respectively. During development, water quality parameters were recorded by field personnel that included total dissolved solids reported in parts per million (ppm) and turbidity reported in nephelometric turbidity units (NTUs).

3.3 Sample Collection

Per the contract, URS field personnel verified that each zone was pumped until the water quality turbidity reading was 10 NTUs (as recorded by SWPD). The final field measurements recorded before collecting the groundwater sampling is summarized as follows:

Final Field Measurement Summary for Isolated Aquifer Zone Testing

Zone	Final Pumping Rate (gpm)	Final Pumping Water Level (ft bgs)	Drawdown During Pumping (ft)	Specific Capacity (gpm/ft)	Total dissolved solids (ppm)	Turbidity (NTU)
#1	60	117.5	6.5	9.2	479	0.74
#2	220	92	14	16	336	2.64
#3	200	88	18	11	660	6.94

3.4 Analytical Testing Results

Chemical testing was conducted on one groundwater sample collected from Zone #1 (09/11/13), Zone #2 (09/12/13), and Zone #3 (09/13/13). URS field personnel collected the groundwater samples in containers supplied by the laboratory and transported them in a chilled cooler under chain-of-custody documentation to Calscience Environmental Laboratories, Inc. (Calscience).

The laboratory analytical results were compared to the maximum contaminant levels (MCLs) as defined in Title 22 of the California Code of Regulations (CCR). The Zone #3 analytical results exceeded the secondary standard for specific conductance (910 micromhos per centimeter [µmhos/cm]) and total dissolved solids (TDS) (630 milligrams per liter [mg/L]). The specific conductance standard is 900 µmhos/cm. The TDS standard is 500 mg/L. The secondary standard was also exceeded in each zone for the emergent chemical 1,2,3-Tricholoropropane (1,2,3-TCP) (Zone #3 had the highest detection of 0.0059 micrograms per liter [µg/L]). The 1,2,3-TCP public health goal is 0.0007 µg/L and has a notification limit of 0.005 µg/L.

The analytical testing results for the isolated aquifer zone testing are summarized in Table 2. The laboratory analytical reports (including chain-of-custody documentation) are provided in Appendix G.

4.0 Preliminary Well Design

A preliminary well design was prepared based on data collected during pilot testing activities overseen by URS. The construction details were also based on a nearby operating water supply well completed in similar formation materials (i.e., Well No. 9). The preliminary well design is summarized in Table 3 and shown on Figure 6.

The well construction details are summarized as follows:

Construction Parameter	Depth (ft bgs)	Description	
BORING DETAILS			
Conductor Casing (completed)	0 to 50	Diameter Composition Length Type Thickness	36" Outside Diameter (OD) Carbon Steel 50' Minimum Welded Steel 5/16"
Reamed Borehole	0 to 50 min. 50 to 130 130 to 750	44" diameter (completed) 32" diameter (to allow room for gravel chute) 28" diameter (sufficient to allow sounding tubes)	
CASING AND SCREEN			
Blank Casing Roscoe Moss Company	0 to 140 190 to 270 500 to 640 730 to 740	Diameter Composition Thickness	18" OD Stainless Steel 304L 5/16"
Well Screen: Ful-Flo Louver Roscoe Moss Company	140 to 190 270 to 500 640 to 730	Diameter Composition Slot Thickness	18" OD Stainless Steel 316L 0.060 5/16"
Bottom Cap Roscoe Moss Company (or equivalent)	740	Shape Composition	Semi-Elliptical Stainless Steel 304L
Cement Seal	0 to 100	Per specifications provided by City of Torrance	
Bentonite Seal (3/8" Chip)	100 to 110	Preventative Measure for Potential Grout Migration (minimum hydration 4 hours)	
Gravel Envelope Oglebay Norton Industrial Sands	110 to 750	Size Distribution Uniformity Coefficient Thickness (minimum)	6 x 16 2.0 – 3.0 5''

Construction Parameter	Depth (ft bgs)	Description	
ANCILLARY EQUIPMENT			
Vent Tubes (two)	0 to 6.5 (each)	Diameter Composition Connections Orientation	2" Standard Stainless Steel 304L Threaded & Coupled Opposite Corners
Sounding Tubes (two)	0 to 498 (each)	Diameter Composition Connections Orientation	2" Standard Stainless Steel 304L Welded Collar-Interior Opposite Corners
Gravel Chute (one)	0 to 120	Diameter Composition Orientation Connections Orientation	3" Standard Stainless Steel 304L Opposite of Discharge Welded Collars Opposite of Discharge

The well design was based on soil descriptions from the pilot boring (Appendix C), sieve analysis performed on the finest-grained sediments present with the proposed screen interval (Attachment E), geophysical logging that confirmed subsurface stratigraphy (Appendix F), and water quality results for isolated aquifer zone testing (Attachment G).

URS identified three potential water bearing zones that generally correlate with the aquifer depths anticipated beneath the Site. The aquifers listed in order of depth (shallow to deep) presumably include the Gardena, Lynwood, and Silverado. An abundance of fine-grained sediments (i.e., silty sands) were identified within the water bearing zones, most notably the upper portion of the Lynwood and lower portion of the Silverado. As such, a conservative filter pack material was selected to minimize the entry of fine-sands / silty-sands and was confirmed with the recommended screen manufacture (Roscoe Moss Company).

A screen interval was proposed for the upper most water bearing zone tested to maximize the well yield (assumed to be the Gardena Aquifer). However, the installation of the shallow screen interval and gravel envelope placement may need to be discussed further due local groundwater impacts associated with nearby contaminated properties, most notably Honeywell. The Regional Water Quality Control Board (RWQCB) approved a work plan to delineate at least one nearby groundwater plumes as shown in Appendix H.

5.0 PRELIMINARY ANALYSIS OF POTENTIAL WELL YIELD

An analysis of the potential well yield was performed by URS. The estimate was based on the vertical thickness of suitable coarse-grained sediments that could be screened (i.e., total proposed screen intervals), potential drawdown during pumping, and data provided by the city for a nearby operating water supply well No. 9. URS also reviewed testing data for Well No. 9 (Geoscience Support Services, 2009). The zone testing data was considered during the analysis, but only qualitatively due to the (1) limited pumping duration, (2) efficiency limitations associated with the zone testing tool construction (i.e., mill slots), (3) potential transient conditions, and (4) potential losses associated with bentonite infiltration during the drilling process (i.e. plugging of the formation). The well yield values presented below are theoretical and may not be achievable due to the limited amount of data available to URS.

The Thiem equation was used to calculate the well yield (or pumping rate) for a well screened in a confined aquifer as described by Bear (1979). The equation is as follows:

$$Qw = \frac{2\,\pi\,T\,Sw}{\ln(\frac{R}{rw})}$$

Where:

Q_w = Well yield or pumping rate, in gpm.
T = Transmisivity calculated from aquifer thickness (b) and hydraulic conductivity (Kr), in ft^2/day.
Sw = Drawdown, in ft.
R = Radius of cone of depression calculated by (3000) (Sw) ($K^{1/2}$) after Siechardt (Chertousov, 1962).
r_w = Well radius, in ft.

Well yield (Q_w) versus drawdown (S_w) values were graphed to evaluate various hydraulic conductivity (K_r) values against actual pumping conditions at Well No. 9. The best-fit line through actual pumping conditions resulted in an estimated hydraulic conductivity of approximately 23 ft/day. This value is less than, but within the same order-of-magnitude reported for constant-rate testing that resulted in a calculated hydraulic conductivity of approximately 46 ft/day (Geoscience, 2009). The graphs are included in Appendix H.

The best-fit-line hydraulic conductivity value was used to estimate the potential yield for a similarly constructed water supply well at pilot boring #12 (as compared to Well No. 9). It was assumed the total screen length was approximately 400 ft. A screen ratio was used to account for the fully penetrating assumption in the groundwater flow equation, which resulted in a ratio of 0.67 (i.e., 400 ft / 600 ft). The upper end results under ideal conditions assuming similar drawdown conditions for a nearby water well indicate there is a possibility of producing up to approximately 3,800 gpm. However, after applying the screen ratio the estimated production rate drops to approximately 2,500 gpm. A 25% safety factor was applied to provide a range of potential pumping between 1,800 gpm to 2,500 gpm.

The preliminary well design screen length was reduced slightly to avoid zones that may have an increased likelihood of fine-grained sediments (silts or clays). The screen length was reduced to 370 feet (Table 3).

6.0 References

Bear, J. (1979). *Hydraulics of Groundwater.* 1979.

California Department of Water Resources (1961). *Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County: Bulletin 104.* June 1961.

Chertousov (1962). *Engineering Hydraulics.* 1962.

Geoscience Support Services (2009). *Results of Drilling, Construction, Development, and Testing Well No. 9.* May 29, 2009.

Tables

TABLE 1

Summary of Zone Testing (including results from Water Well No. 9)
Pilot Boring #12 - (185th Street west of Van Ness Avenue)
City of Torrance - Department of Public Works

Zone	Zone Tool Screen Interval (feet)	Final Pumping Rate (gpm)	Pumping Duration (minutes)	Static Water Level (feet)	Pumping Water Level (feet)	Drawdown (feet)	Specific Capacity (gpm/ft)
Pilot Boring No. 12							
1	660 - 680	60	225	111	117.5	6.5	9.2
2	419 - 439	220	165	78	92	14	16
3	157 - 177	200	150	70	88	18	11
Water Well No. 9							
1	751 - 773	200	N/A	95	251	156	1.3
2	529 - 551	264	N/A	76	124	48	5.5
3	371 - 393	282	N/A	72	96	24	12
4	188 - 210	269	N/A	75	95	20	13

Notes:
- gpm = gallons per minute
- ft = feet
- N/A = Not Available

TABLE 2

Analytical Results for Zone Testing (including results from Water Well No. 9)
Pilot Boring #12 - (185th Street west of Van Ness Avenue)
City of Torrance - Department of Public Works

Compound	Analytical Method	Units	Zone 1 (660 to 680)	Zone 2 (419 to 439)	Zone 3 (157 to 177)	Primary MCL	PHG	NL	Secondary MCL
Aggressive Index	---	---	12.21	11.42	11.86	---	---	---	---
Langlier Index	---	---	0.66	-0.12	0.33	---	---	---	---
3-Hydroxycarbofuran	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Aldicarb	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Aldicarb Sulfone	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Aldicarb Sulfoxide	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Carbaryl	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Carbofuran	EPA 531.1	ug/L	<2.0	<2.0	<2.0	18	1.7	---	---
Methiocarb	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Methomyl	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Oxamyl	EPA 531.1	ug/L	<2.0	<2.0	<2.0	50	26	---	---
Propoxur (Baygon)	EPA 531.1	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Glyphosate	EPA 547	ug/L	<5.0	<5.0	<5.0	700	900	---	---
Diquat	EPA 549.2	ug/L	<4.0	<4.0	<4.0	20	15	---	---
Chromium, Hexavalent	EPA 218.6	ug/L	<0.20	<0.20	<0.20	---	0.02	---	---
Fluoride	EPA 300.0	mg/L	**0.26**	**0.31**	**0.38**	2	1	---	---
Chloride	EPA 300.0	mg/L	**29**	**22**	**190E**	---	---	---	250, 500, 600
Nitrite (as N)	EPA 300.0	mg/L	<0.10	<0.10	<0.10	1	1	---	---
Nitrate (as N)	EPA 300.0	mg/L	<0.10	<0.10	<0.10	10	10	---	---
Sulfate	EPA 300.0	mg/L	**1.6**	**0.60J**	**41**	---	---	---	250, 500, 600
Perchlorate	EPA 331.0 (M)	ug/L	**0.041J**	**0.071J**	**0.033J**	6	6	---	---
Color	SM 2120 B	Color unit	**5.0**	**5.0**	**5.0**	---	---	---	15
Turbidity	SM 2130 B	NTU	**0.070**	**0.050**	<0.050	---	---	---	5
Odor	SM 2150 B	TON	<2.0	<2.0	2.0	---	---	---	3
Alkalinity, Total (as CaCO3)	SM 2320B	mg/L	**281**	**202**	**236**	---	---	---	---
Bicarbonate (as CaCO3)	SM 2320B	mg/L	**281**	**202**	**236**	---	---	---	---
Carbonate (as CaCO3)	SM 2320B	mg/L	<1.0	<1.0	<1.0	---	---	---	---
Hydroxide (as CaCO3)	SM 2320B	mg/L	<1.0	<1.0	<1.0	---	---	---	---
Hardness, Total (as CaCO3)	SM 2340C	mg/L	**68**	**100**	**300**	---	---	---	---
Specific Conductance	SM 2510 B	umhos/cm	**570**	**430**	**910**	---	---	---	900, 1600, 2200
Solids, Total Dissolved	SM 2540 C	mg/L	**425**	**280**	**630**	---	---	---	500, 1000, 1500
pH	SM 4500 H+ B	pH units	**7.63BV,BU**	**7.69BV,BU**	**7.56BV,BU**	---	---	---	---
MBAS	SM 5540C	mg/L	<0.10	<0.10	<0.10	---	---	---	0.5
Nitrate as NO3	Total Nitrate by Calc	mg/L	<0.44	<0.44	<0.44	45	45	---	---
Potassium	EPA 200.7	mg/L	**11.0**	6.75	**5.08**	---	---	---	---
Boron	EPA 200.7	mg/L	**0.456**	**0.135B**	**0.124**	---	---	1	---
Silicon	EPA 200.7	mg/L	**14.2**	**12.8**	**13.7**	---	---	---	---
Total Silica	EPA 200.7	mg/L	**30.4**	**27.4**	**29.3**	---	---	---	---
Arsenic	EPA 200.8	mg/L	<0.00100	<0.00100	**0.00187**	0.01	0.000004	---	---
Chromium	EPA 200.8	mg/L	**0.000801J**	**0.000711J**	<0.00100	0.05	withdrawn	---	---
Copper	EPA 200.8	mg/L	**0.000351J**	**0.000295J**	**0.000329J**	1.3	0.3	---	1
Vanadium	EPA 200.8	mg/L	**0.000969J**	**0.000170J**	**0.000746J**	---	---	0.05	---
Zinc	EPA 200.8	mg/L	**0.00858**	**0.0208**	**0.0115**	---	---	---	5
Aluminum	EPA 200.8	mg/L	**0.0110J**	**0.0126J**	**0.0103J**	1	0.6	---	0.2
Calcium	EPA 200.8	mg/L	**136**	**26.4**	**89.6**	---	---	---	---
Iron	EPA 200.8	mg/L	**0.134**	**0.0560**	**0.0518**	---	---	---	0.3
Magnesium	EPA 200.8	mg/L	**70.1**	**11.6**	**21.2**	---	---	---	---
Manganese	EPA 200.8	mg/L	**0.0154**	**0.0190**	**0.0398**	---	---	0.5	0.05
Sodium	EPA 200.8	mg/L	**1120**	**62.5**	**88.0**	---	---	---	---
1,2-Dibromoethane	EPA 504.1	ug/L	<0.010	<0.010	<0.010	0.05	0.01	---	---
1,2-Dibromo-3-Chloropropane (DBCP)	EPA 504.1	ug/L	<0.010	<0.010	<0.010	0.2	0.0017	---	---
4,4'-DDD	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
4,4'-DDE	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
4,4'-DDT	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Aldrin	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Alpha-BHC	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Beta-BHC	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Chlordane	EPA 508	ug/L	<0.10	<0.10	<0.10	0.1	0.03	---	---
Delta-BHC	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Dieldrin	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Endosulfan I	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Endosulfan II	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Endosulfan Sulfate	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Endrin	EPA 508	ug/L	<0.010	<0.010	<0.010	2	1.8	---	---
Endrin Aldehyde	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Gamma-BHC	EPA 508	ug/L	<0.010	<0.010	<0.010	---	---	---	---
Heptachlor	EPA 508	ug/L	<0.010	<0.010	<0.010	0.01	0.008	---	---
Heptachlor Epoxide	EPA 508	ug/L	<0.010	<0.010	<0.010	0.01	0.006	---	---
Methoxychlor	EPA 508	ug/L	<0.010	<0.010	<0.010	30	0.9	---	---
Toxaphene	EPA 508	ug/L	<1.0	<1.0	<1.0	3	0.03	---	---
Aroclor-1016	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1221	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1232	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1242	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1248	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1254	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
Aroclor-1260	EPA 508	ug/L	<0.10	<0.10	<0.10	---	---	---	---
2,4,5-T	EPA 515.1	ug/L	<0.12	<0.12	<0.12	---	---	---	---
2,4,5-TP (Silvex)	EPA 515.1	ug/L	<0.12	<0.12	<0.12	50	25	---	---
2,4-D	EPA 515.1	ug/L	<0.50	<0.50	<0.50	---	---	---	---
2,4-DB	EPA 515.1	ug/L	<0.50	<0.50	<0.50	---	---	---	---
3,5-Dichlorobenzoic Acid	EPA 515.1	ug/L	<0.25	<0.25	<0.25	---	---	---	---
Acifluorfen	EPA 515.1	ug/L	<0.25	<0.25	<0.25	---	---	---	---
Bentazon	EPA 515.1	ug/L	<0.50	<0.50	<0.50	18	200	---	---
Chloramben	EPA 515.1	ug/L	<0.25	<0.25	<0.25	---	---	---	---
DCPA	EPA 515.1	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Dalapon	EPA 515.1	ug/L	<0.50	<0.50	<0.50	200	790	---	---
Dicamba	EPA 515.1	ug/L	<0.25	<0.25	<0.25	---	---	---	---

TABLE 2

Analytical Results for Zone Testing (including results from Water Well No. 9)
Pilot Boring #12 - (185th Street west of Van Ness Avenue)
City of Torrance - Department of Public Works

Compound	Analytical Method	Units	Zone 1 (660 to 680)	Zone 2 (419 to 439)	Zone 3 (157 to 177)	Primary MCL	PHG	NL	Secondary MCL
Dichlorprop	EPA 515.1	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Dinoseb	EPA 515.1	ug/L	<0.50	<0.50	<0.50	7	14	---	---
Pentachlorophenol	EPA 515.1	ug/L	<0.050	<0.050	<0.050	---	---	---	---
Picloram	EPA 515.1	ug/L	<0.25	<0.25	<0.25	500	500	---	---
2,4-Dinitrotoluene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
2,6-Dinitrotoluene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Acenaphthylene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Alachlor	EPA 525.2	ug/L	<0.50	<0.50	<0.50	2	4	---	---
Ametryn	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Anthracene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Atraton	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Atrazine	EPA 525.2	ug/L	<0.50	<0.50	<0.50	1	0.15	---	---
Benzo (a) Anthracene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Benzo (a) Pyrene	EPA 525.2	ug/L	<0.10	<0.10	<0.10	2	0.007	---	---
Benzo (b) Fluoranthene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Benzo (g,h,i) Perylene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Benzo (k) Fluoranthene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Bis(2-Ethylhexyl) Phthalate	EPA 525.2	ug/L	**0.19J**	<2.0	<2.0	---	---	---	---
Bromacil	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Butachlor	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Butyl Benzyl Phthalate	EPA 525.2	ug/L	**0.18B,J**	**0.10B,J**	**0.11B,J**	---	---	---	---
Butylate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Chlorpropham	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Chrysene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Cyanazine	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Cycloate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Di(2-ethylhexyl)adipate	EPA 525.2	ug/L	<2.0	<2.0	<2.0	400	200	---	---
Di-n-Butyl Phthalate	EPA 525.2	ug/L	**0.33B,J**	**0.50B,J**	**2.0B**	---	---	---	---
Dibenz (a,h) Anthracene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Diethyl Phthalate	EPA 525.2	ug/L	<2.0	<2.0	**0.076J**	---	---	---	---
Dimethyl Phthalate	EPA 525.2	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Diphenamid	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
EPTC	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Fenarimol	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Fluorene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Fluridone	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Hexachlorobenzene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	1	0.03	---	---
Hexachlorocyclopentadiene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	50	50	---	---
Hexazinone	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Indeno (1,2,3-c,d) Pyrene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Isophorone	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
MGK-264	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Metolachlor	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Molinate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	20	1	---	---
Napropamide	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Norflurazon	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Pebulate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Pentachlorophenol	EPA 525.2	ug/L	<2.0	<2.0	<2.0	1	0.3	---	---
Phenanthrene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Prometon	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Prometryn	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Pronamide	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Propachlor	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	9	---
Propazine	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Pyrene	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Simazine	EPA 525.2	ug/L	<1.0	<1.0	<1.0	4	4	---	---
Simetryn	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Tebuthiuron	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Terbacil	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Terbutryn	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Thiobencarb	EPA 525.2	ug/L	<1.0	<1.0	<1.0	70	70	---	1
Triadimefon	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Tricyclazole	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Trifluralin	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Vernolate	EPA 525.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Endothall	EPA 548.1	ug/L	<45	<45	<45	100	580	---	---
Dichlorodifluoromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	1	---
Chloromethane	EPA 524.2	ug/L	<0.50	**0.30J**	**0.27J**	---	---	---	---
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	1200	4000	---	---
Vinyl Chloride	EPA 524.2	ug/L	<0.50	<0.50	<0.50	0.5	0.05	---	---
Bromomethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Chloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Trichlorofluoromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	150	700	---	---
Diethyl Ether	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
1,1-Dichloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	6	10	---	---
Iodomethane	EPA 524.2	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Acetone	EPA 524.2	ug/L	**2.6B,J**	**2.6B,J**	2.2B,J	---	---	---	---
Carbon Disulfide	EPA 524.2	ug/L	<0.50	<0.50	**0.046J**	---	---	160	---
Allyl Chloride	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Methylene Chloride	EPA 524.2	ug/L	<0.50	<0.50	**0.15J**	5	4	---	---
Acrylonitrile	EPA 524.2	ug/L	<2.0	<2.0	<2.0	---	---	---	---
Methyl-t-Butyl Ether (MTBE)	EPA 524.2	ug/L	<0.50	<0.50	<0.50	0.013	13	---	0.005
t-1,2-Dichloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	10	60	---	---
1,1-Dichloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	3	---	---
2-Butanone	EPA 524.2	ug/L	<2.0	<2.0	<2.0	---	---	---	---
c-1,2-Dichloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	6	100	---	---
2,2-Dichloropropane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Methacrylonitrile	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---

TABLE 2

Analytical Results for Zone Testing (including results from Water Well No. 9)
Pilot Boring #12 - (185th Street west of Van Ness Avenue)
City of Torrance - Department of Public Works

Compound	Analytical Method	Units	Zone 1 (660 to 680)	Zone 2 (419 to 439)	Zone 3 (157 to 177)	Primary MCL	PHG	NL	Secondary MCL
Bromochloromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Tetrahydrofuran	EPA 524.2	ug/L	<5.0	<5.0	<5.0	---	---	---	---
Chloroform	EPA 524.2	ug/L	<0.50	<0.50	**0.24J**	---	---	---	---
1,1,1-Trichloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	200	1000	---	---
1,1-Dichloropropene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Carbon Tetrachloride	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	0.1	---	---
1,2-Dichloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	0.5	0.4	---	---
Benzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	1	0.15	---	---
Trichloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	1.7	---	---
1,2-Dichloropropane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	0.5	---	---
Methyl Methacrylate	EPA 524.2	ug/L	<5.0	<5.0	<5.0	---	---	---	---
Dibromomethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Bromodichloromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
c-1,3-Dichloropropene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
4-Methyl-2-Pentanone	EPA 524.2	ug/L	<5.0	<5.0	<5.0	---	---	---	---
Toluene	EPA 524.2	ug/L	**3.2**	**0.39J**	**0.33J**	150	150	---	---
t-1,3-Dichloropropene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Ethyl Methacrylate	EPA 524.2	ug/L	<2.0	<2.0	<2.0	---	---	---	---
1,1,2-Trichloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	3	---	---
1,3-Dichloropropane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	0.5	0.2	---	---
Tetrachloroethene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	0.06	---	---
2-Hexanone	EPA 524.2	ug/L	<5.0	<5.0	<5.0	---	---	---	---
Dibromochloromethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
1,2-Dibromoethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Chlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
1,1,1,2-Tetrachloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Ethylbenzene	EPA 524.2	ug/L	<0.50	<0.50	**0.032J**	300	300	---	---
p/m-Xylene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	1750	1800	---	---
o-Xylene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	1750	1800	---	---
Styrene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	100	0.5	---	---
Bromoform	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Isopropylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	770	---
1,1,2,2-Tetrachloroethane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	1	0.1	---	---
t-1,4-Dichloro-2-Butene	EPA 524.2	ug/L	<5.0	<5.0	<5.0	---	---	---	---
1,2,3-Trichloropropane	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	0.0007	0.005	---
Bromobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
n-Propylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	260	---
2-Chlorotoluene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	140	---
4-Chlorotoluene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	140	---
1,3,5-Trimethylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	330	---
tert-Butylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	260	---
1,2,4-Trimethylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	330	---
sec-Butylbenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	260	---
p-Isopropyltoluene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
1,3-Dichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
1,4-Dichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	6	---	---
n-Butylbenzene	EPA 524.2	ug/L	**0.089B,J**	**0.039B,J**	**0.069B,J**	---	---	260	---
1,2-Dichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	600	600	---	---
1,2-Dibromo-3-Chloropropane	EPA 524.2	ug/L	<2.0	<2.0	<2.0	0.2	0.0017	---	---
1,2,4-Trichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	5	5	---	---
Hexachloro-1,3-Butadiene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Naphthalene	EPA 524.2	ug/L	**0.076B,J**	<0.50	<0.50	---	---	17	---
1,2,3-Trichlorobenzene	EPA 524.2	ug/L	<0.50	<0.50	<0.50	---	---	---	---
Ethanol	EPA 524.2	ug/L	<50	<50	**48J**	---	---	---	---
1,2,3-Trichloropropane	SRL 524M-TCP	ug/L	**0.0036J**	**0.0047J**	**0.0059**	---	0.0007	0.005	---

Notes:
MCL = Maximum Contaminant Level (Last updated January 30, 2013).
PHG = Public Health Goal
NL = Notification Limit (Last updated December 14, 2010).

TABLE 3

Proposed Screen Intervals for a Water Supply Well
Pilot Boring #12 - Pilot Boring #12 - (185th Street west of Van Ness Avenue)
City of Torrance - Department of Public Works

Aquifer	Water Well No. 9 (actual)				Pilot Boring No. 12 (preliminary)			
	Screen Interval (feet)			Screen Length (feet)	Screen Interval (feet)			Screen Length (feet)
Silverado	500	to	550	50	640	to	730	90
Lynwood	330	to	470	140	270	to	500	230
Gardena	190	to	310	120	140	to	190	50
Totals	310				370			

Notes:

1) URS tentatively proposed well screens in the Gardena Aquifer. However, to avoid cascading water the screen interval may be adjusted / eliminated pending further discussion with the City of Torrance.

2) Well No. 9 data obtained from a report entitled "Results of Drilling, Construction, Development, and Testing" prepared by Geoscience Support Services (2009). May 29, 2009.

3) A screen interval was proposed for the upper most water bearing zone tested to maximize the well yield (assumed to be the Gardena Aquifer). However, the installation of the shallow screen interval and gravel envelope placement may need to be discussed further due local groundwater impacts associated with nearby contaminated properties, most notably Honeywell.

Figures

Source: ESRI, Bing Maps Aerial, 2011.

N

0 250 500
Feet

City of Torrance
Site Map
Figure 1 Well #12

September 2013

URS

Source: ESRI, Bing Maps Aerial, 2011.

N

0 200 400
Feet

City of Torrance
Site Map
Figure 2 Well Locations

September 2013

URS

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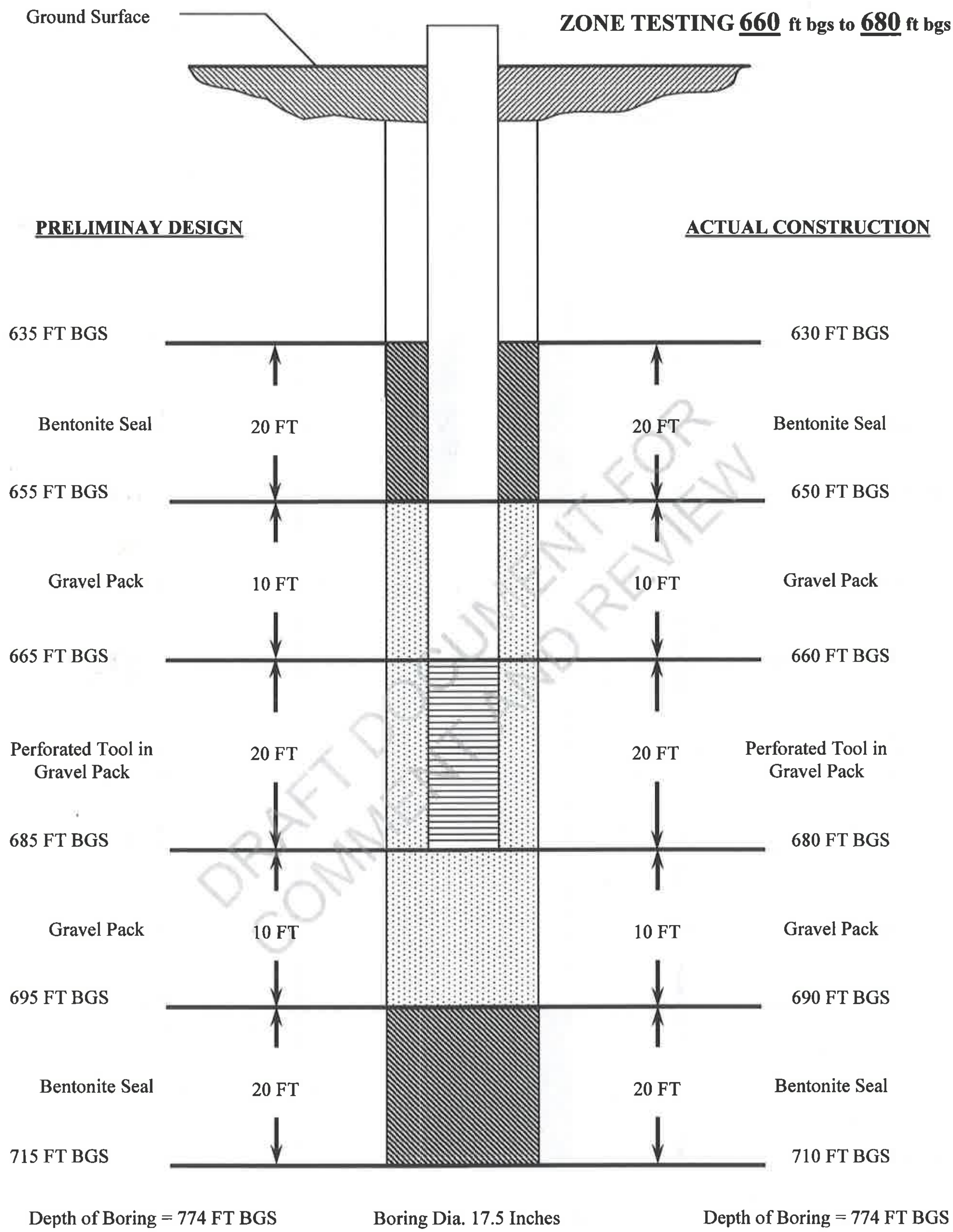
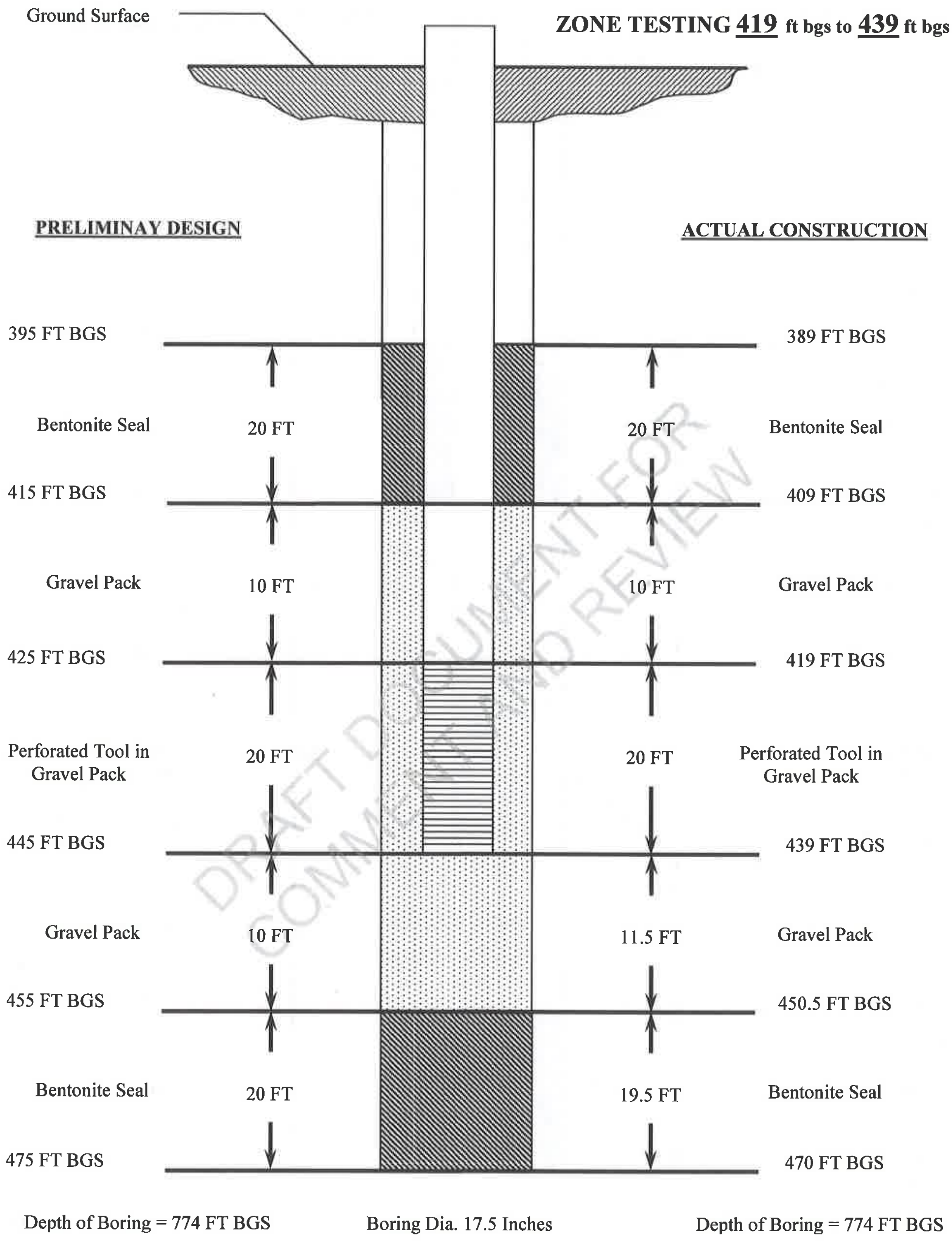


URS

Construction Details for Isolated Aquifer Zone Testing Zone #1 – COT Pilot Boring #12

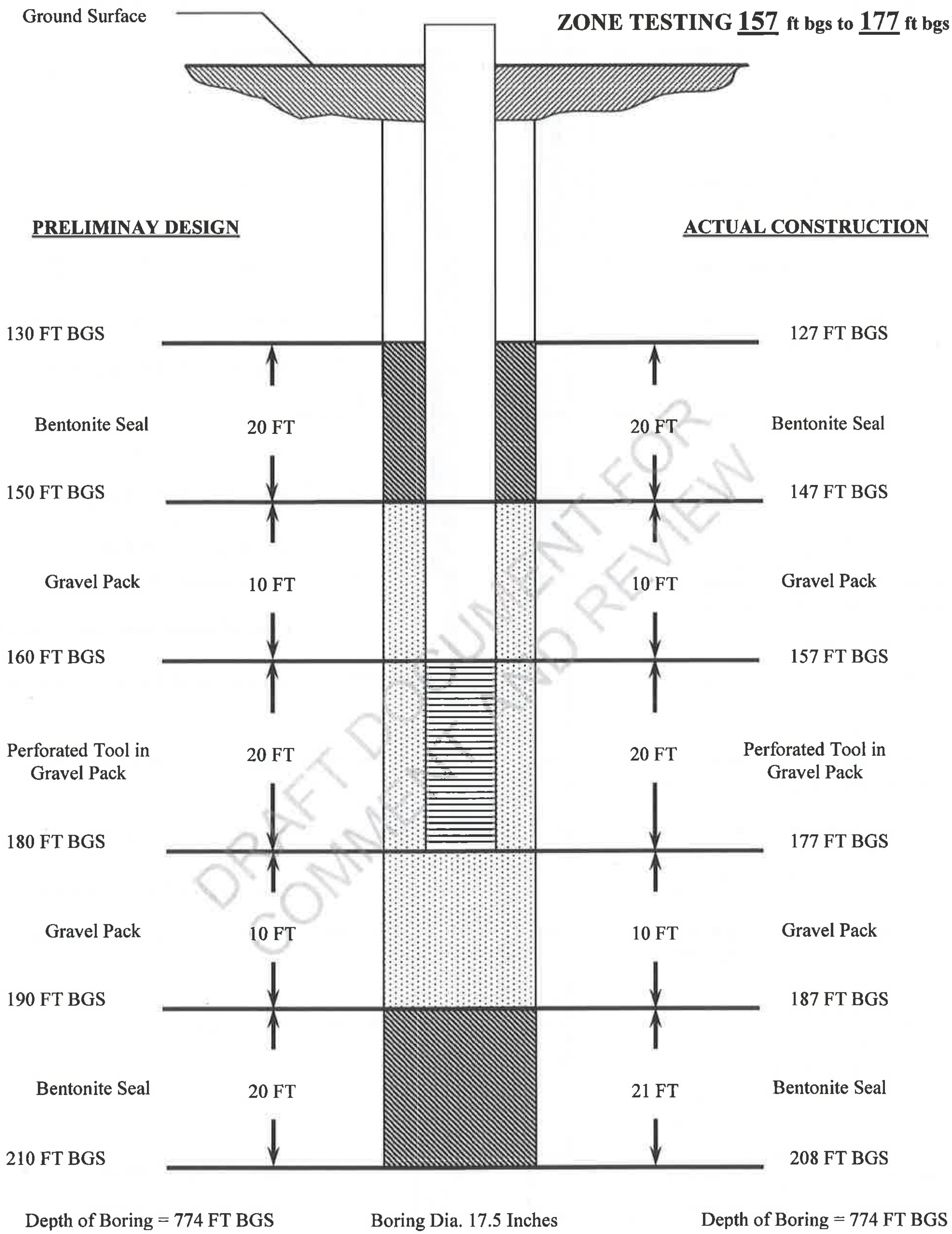
Figure 3



URS

Construction Details for Isolated Aquifer Zone Testing Zone #2 – COT Pilot Boring #12

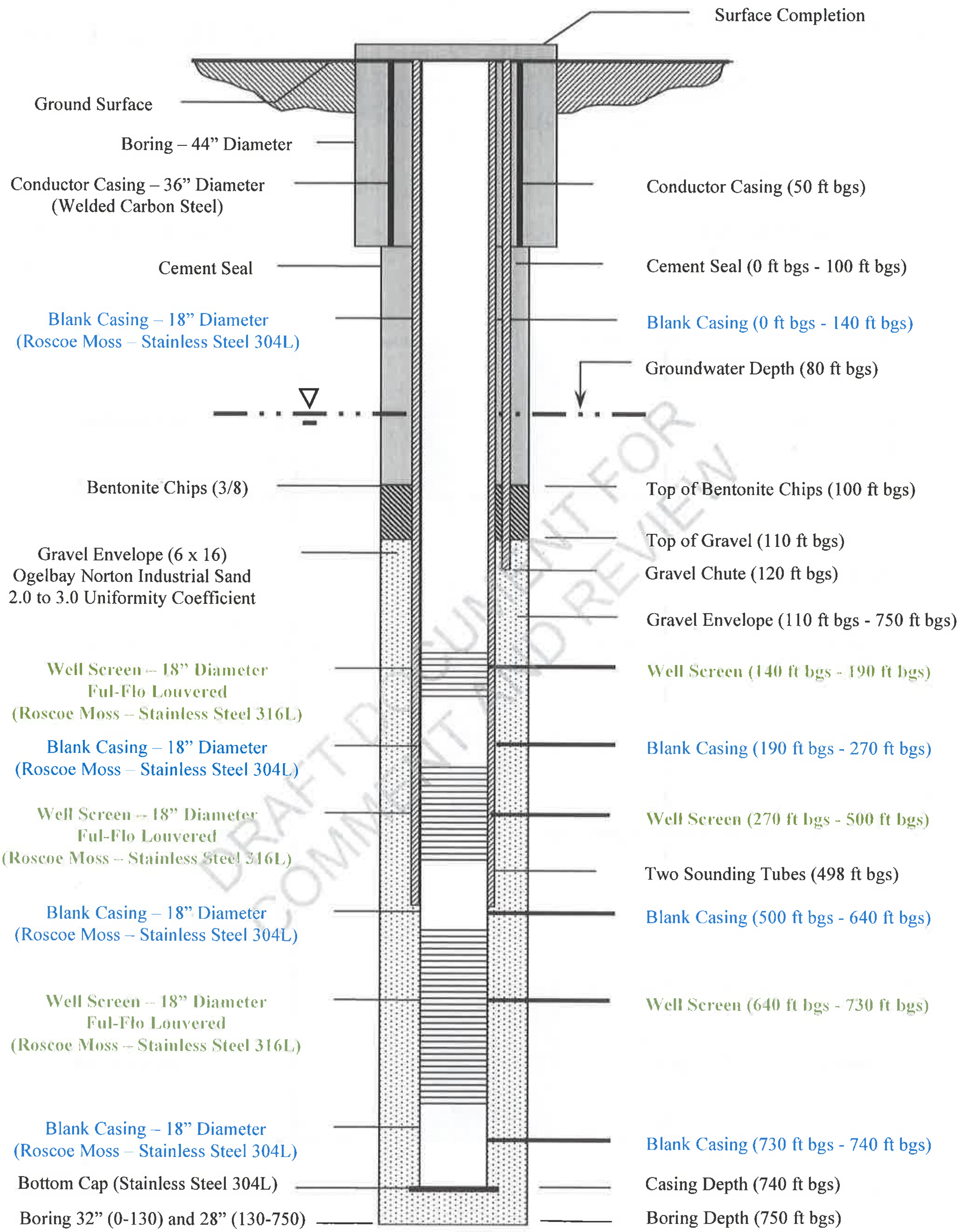
Figure 4



URS

Construction Details for Isolated Aquifer Zone Testing Zone #3 – COT Pilot Boring #12

Figure 5



URS	Preliminary Construction Details for Well #12 (185th Street west of Van Ness Avenue)	Figure 6

Appendix A

Well Drilling Permit

Appendix B

Cement Delivery Tickets

Appendix C

Soil Boring Log

Appendix D

Daily Drillers Log

Appendix E

Formation Sieve Analysis and Gravel Pack Gradation Analysis

Appendix F

Down-hole Geophysical Log

Appendix G

Laboratory Analytical Reports for Zone Testing

Appendix H

Work Plan to Delineate Groundwater Plume (Honeywell Facility)

Appendix I

Estimated Yield Graphs for Proposed Water Well #12