39TH AVENUE RESERVOIR REPLACEMENT PROJECT

4290 Maybelle Avenue, Oakland, California

Concept Design Process and Recommendations

Prepared for

EAST BAY MUNICIPAL UTILITY DISTRICT

By

SIEGFRIED

Landscape Architecture, Engineering, and Planning

AUGUST 2012

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1 INTRODUCTION

1.1 EXECUTIVE SUMMARY

This report summarizes the process and recommendations for the preferred landscape alternative for the 39th Avenue Replacement Reservoir project. Key findings relative to, EBMUD Staff input, public input, site limitations, and cost control will be outlined.

1.2 PROJECT OVERVIEW

East Bay Municipal Utility District's (EBMUD) water distribution system provides water service to 20 incorporated cities and 15 unincorporated areas in Alameda and Contra Costa Counties (**Figure 1.1)**. In addition to water supply and six treatment facilities, there are over 4,000 miles of potable (treated water) distribution and transmission pipes, 16 tunnels, 175 potable water reservoirs, 130 pumping plants, and numerous other facilities that together provide water service to EBMUD's customers.

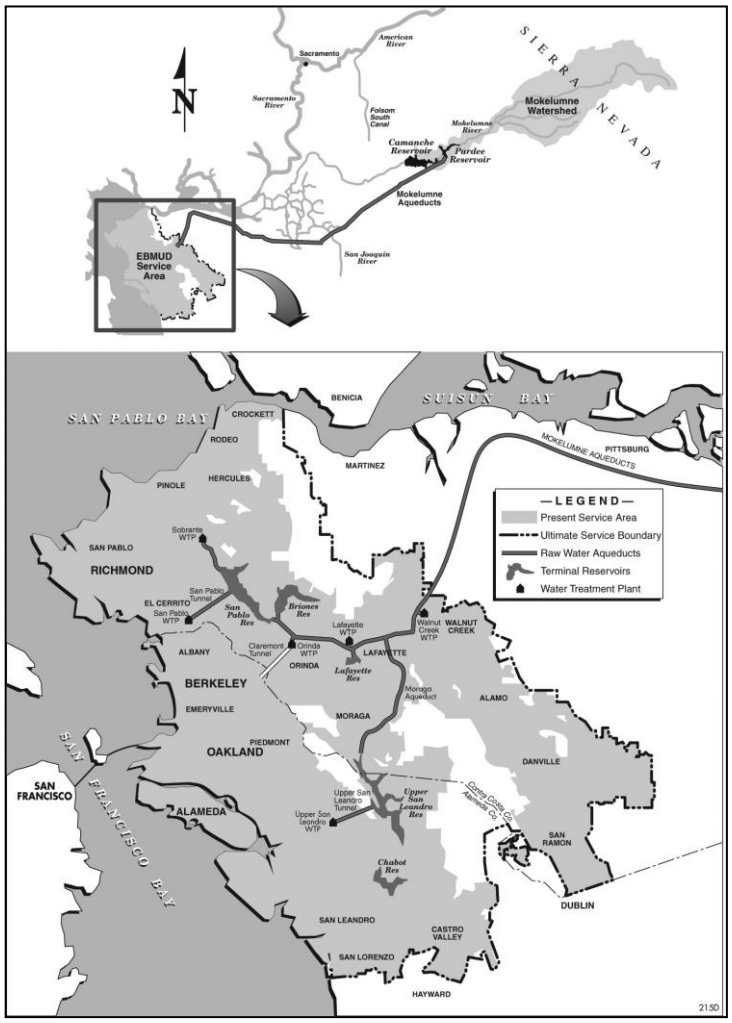


Figure 1.1 - EBMUD Service Boundaries

Portions of the EBMUD storage system are ageing and have become outdated. One such facility is the 39th Ave Reservoir which was first constructed in the 1920's.

The 39th Avenue Reservoir Replacement Project is part of a planned system of improvements located in the Oakland Hills service area (south of Highway 24 north of the Oakland/San Leandro border). The overall Project intends to replace the aging facility and increase system reliability, to improve water quality, and improve operating efficiency by removing excess, inefficient storage.

To accomplish this, the existing concrete lined and covered rectangular reservoir will be removed and a new prestressed concrete cylindrical tank will be constructed on a portion of the former reservoir footprint. Section 2 of this report will further detail the site conditions and constraints while subsequent sections will address design considerations, public input, and ultimately final design recommendations.

The 39th Avenue Reservoir is located at 4290 Maybelle Road in the City of Oakland; east of Interstate 580 and west of State Route 13. The property lies between 39th Avenue, Maybelle Avenue and Reinhardt Road.

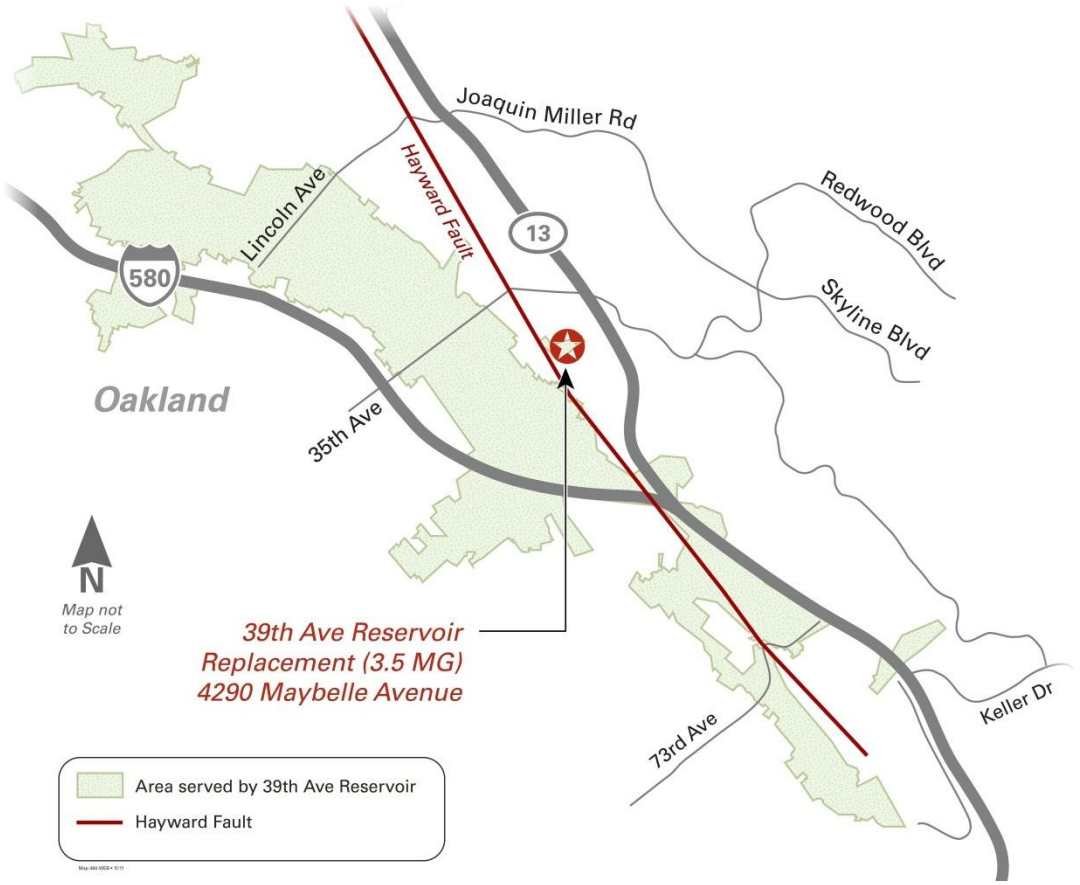


Figure 1.2 - Vicinity Map

Figure 1.3 - Aerial Photo - Bing Maps, 2010

1.3 PROJECT OBJECTIVE

The overall project time line for the 39th Avenue Reservoir design process spans a 10 year period between 2010 and 2020, with construction scheduled to take place between 2019 and 2020.

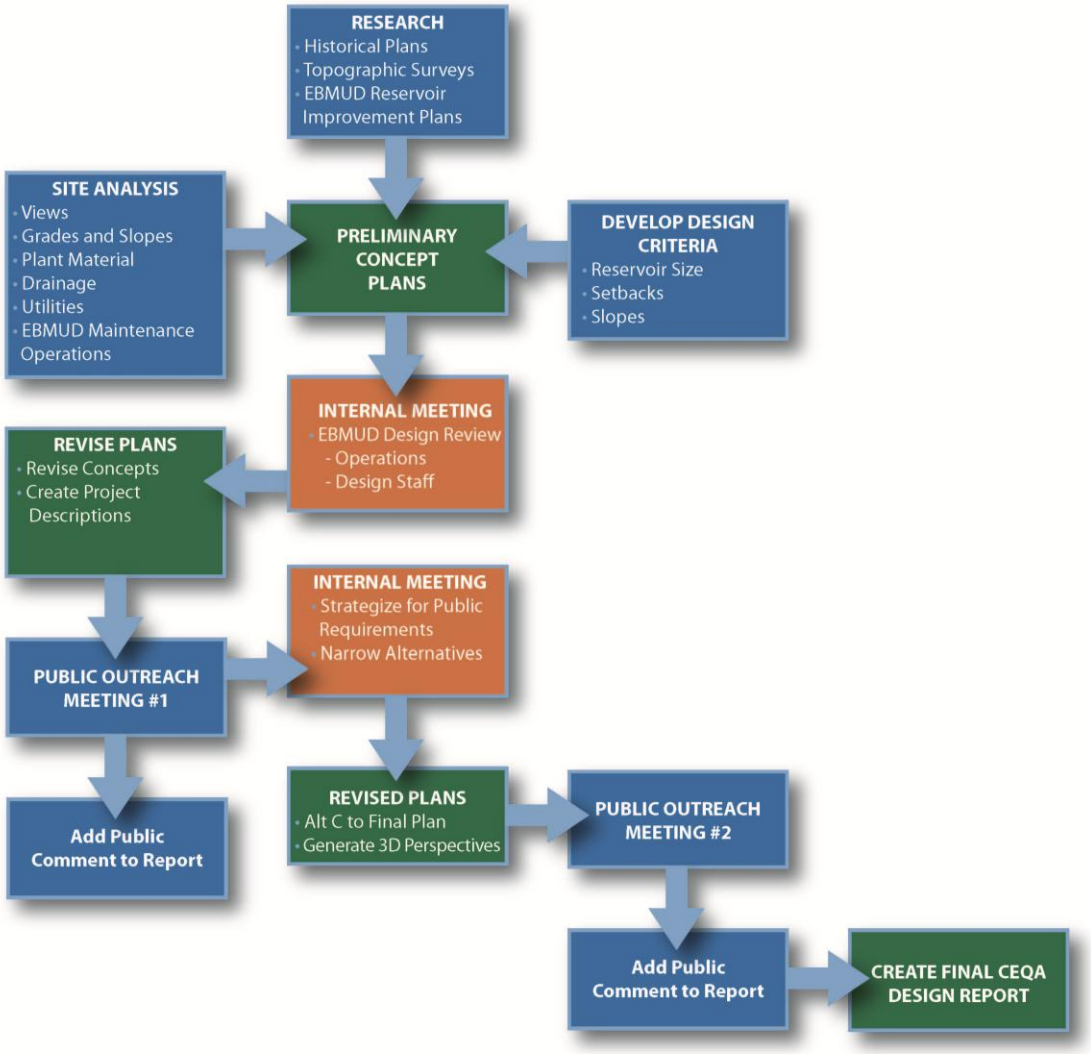
EBMUD had followed a conceptual design and public outreach meeting process with previous reservoir improvement projects. During recent projects, there was a considerable outpouring of opinions from the neighboring community. EBMUD took this under consideration when putting together the design team for the 39th Avenue project. Based on this experience, EBMUD retained a consultant that would take on the project with creative, yet cost effective solutions, with the highest sensitivity to the adjacent homeowners and community. In 2010, EBMUD retained design consultant SIEGFRIED, which consists of Landscape Architects and Civil Engineers. The design team was tasked with creating concept designs that meets EBMUD's technical requirements as well as the communities' aesthetic goals; in addition Siegfried helped facilitate the public process. The project schedule is shown in Figure 1.4.

SCHEDULE

SITE DEVELOPMENT	
PROJECT START	2010
DEVELOP SITE CONSTRAINTS	OCT 2011
PUBLIC MEETING No. 1	JAN 2012
PUBLIC MEETING No. 2	MAR 2012
PUBLIC MEETING No. 3	MAY 2012
CIRCULATE PROJECT IMPACTS	LATE SUMMER 2012
BOARD APPROVED	FALL 2012
DESIGN (IMPROVEMENT PLANS)	2017-2018
CONSTRUCTION	2019-2020

Figure 1.4 - Project Schedule

To properly and effectively engage the public and meet EBMUDS's technical requirements, the following flow chart was developed and followed throughout the project.



Note: A 3rd Public Outreach was planned but deemed unnecessary due to public support.

Figure 1.5 - Design Process Diagram

2 DATA COLLECTION & SITE ANALYSIS

2.1 SITE HISTORY

39th Avenue Reservoir is a 10.2-MG open-cut reservoir that was constructed in 1920. The reservoir has two dams but is not under the jurisdiction of DSOD (Division of Safety of Dams). The main dam is located at the west side of the reservoir while the auxiliary dam is located at the east end. A roof enclosure was installed in 1933, retrofitted in 1961 and a portion patched in 2010.

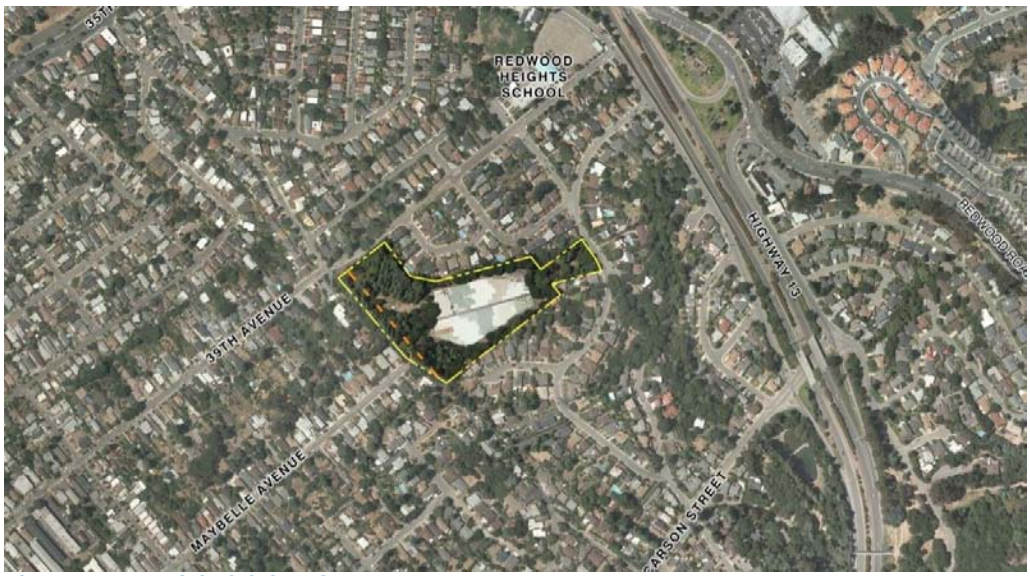


Figure 2.1 - Aerial Vicinity Photo

2.2 SITE CONTEXT

The 39th Avenue Reservoir provides a portion of the distribution in the 39th Avenue Pressure Zone. It is located in the Oakland hills and fronts public right of ways on 39th Avenue, Maybelle Avenue, and Reinhardt Drive. It is surrounded with residences on the north, west and south boundaries. There are presently EBMUD vehicular maintenance access gates located on 39th Avenue and Maybelle Avenue.

Figure 2.2 - Aerial Site Photo

2.3 SITE ANALYSIS AND EXISTING RESERVOIR ISSUES

Reservoir issues include:

- The reservoir is sized approximately 3 times larger than required by EBMUD's Engineering Standard Practices (ESP) 492.2, which leads to water quality operational challenges.
- There is no underdrain present at the reservoir.
- The Hayward Fault Zone lies on the south west portion of the reservoir.
- Existing roofing material is reaching the end of its useful life. A portion had to be replaced during the winter of 2010/2011, and is considered a short term patch.
- The roof structure does not meet current seismic codes.
- The roof's Galbestos section contains asbestos that required past remediation. The asbestos sources, if disturbed, are subject to Required Safety Practice 3700, Restricted Work Authorization requires Workplace Health Safety notification.
- The Remote Terminal Unit (RTU) is obsolete and is recommended for replacement under the RTU replacement Program.

An overall site analysis reveals the following (Also see figures 2.3 through 2.8):

Existing dense stands of trees onsite surrounding the facility providing some view screening.
Asphalt access roads from two existing access gates.
Slopes and contouring exists around the reservoir as well as an earth dam.
Perimeter chain-link fencing.
Perimeter of reservoir contained by asphalt loop road and v-ditch drainage system.
Existing valve pit and equipment in redwood clearing visible from 39th Avenue.
Majority of landscape areas are exposed dirt or low maintenance ivy groundcovers.
Reservoir roof is visible from homes on Gregory Place, Maybelle Avenue and Selkirk Street.

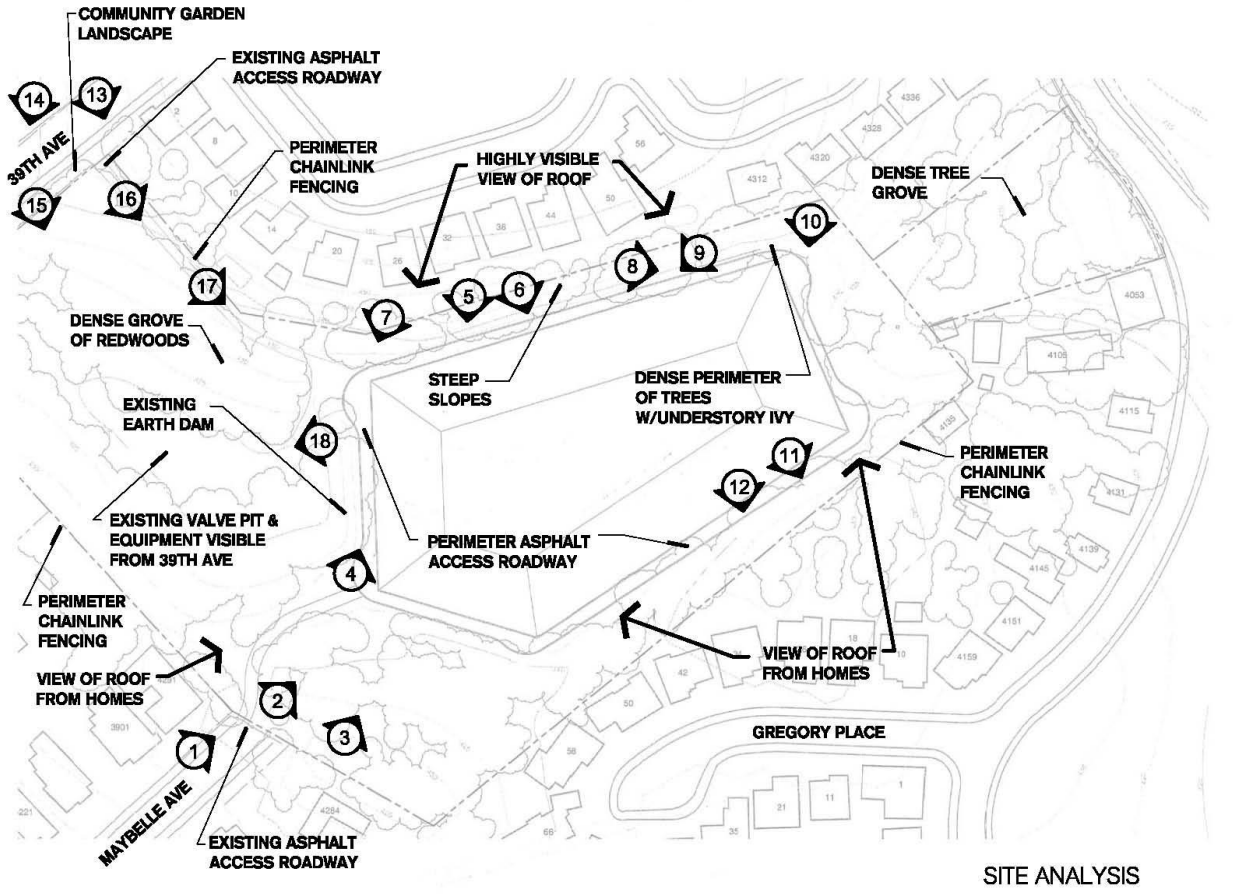


Figure 2.3 - Site Analysis Diagram - Siegfried 2010

1 Access gate at Maybelle Ave

2 Reservoir from Maybelle entry

3 View from homes to the south

4 Reservoir roof

5 View from homes to the north

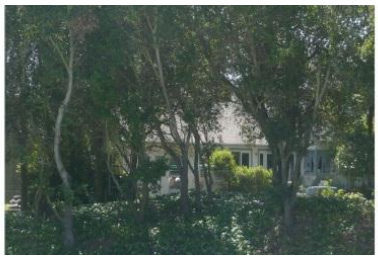
6 Roof view from homes to the north

7 Roof view from homes to the north

8 Roof view from homes to the north

9 Roof view from homes to the north

10 Maintenance access roadway



11 Homes along southern property line

12 Homes along southern property line

13 Access gate at 39th Ave

14 Community garden at 39th Ave

15 Redwood grove from 39th Ave

16 Access roadway at 39th Ave

17 Access roadway at 39th Ave

18 Utility vault in redwood grove

Figure 2.4 - Existing Site Photos - Siegfried, 2010

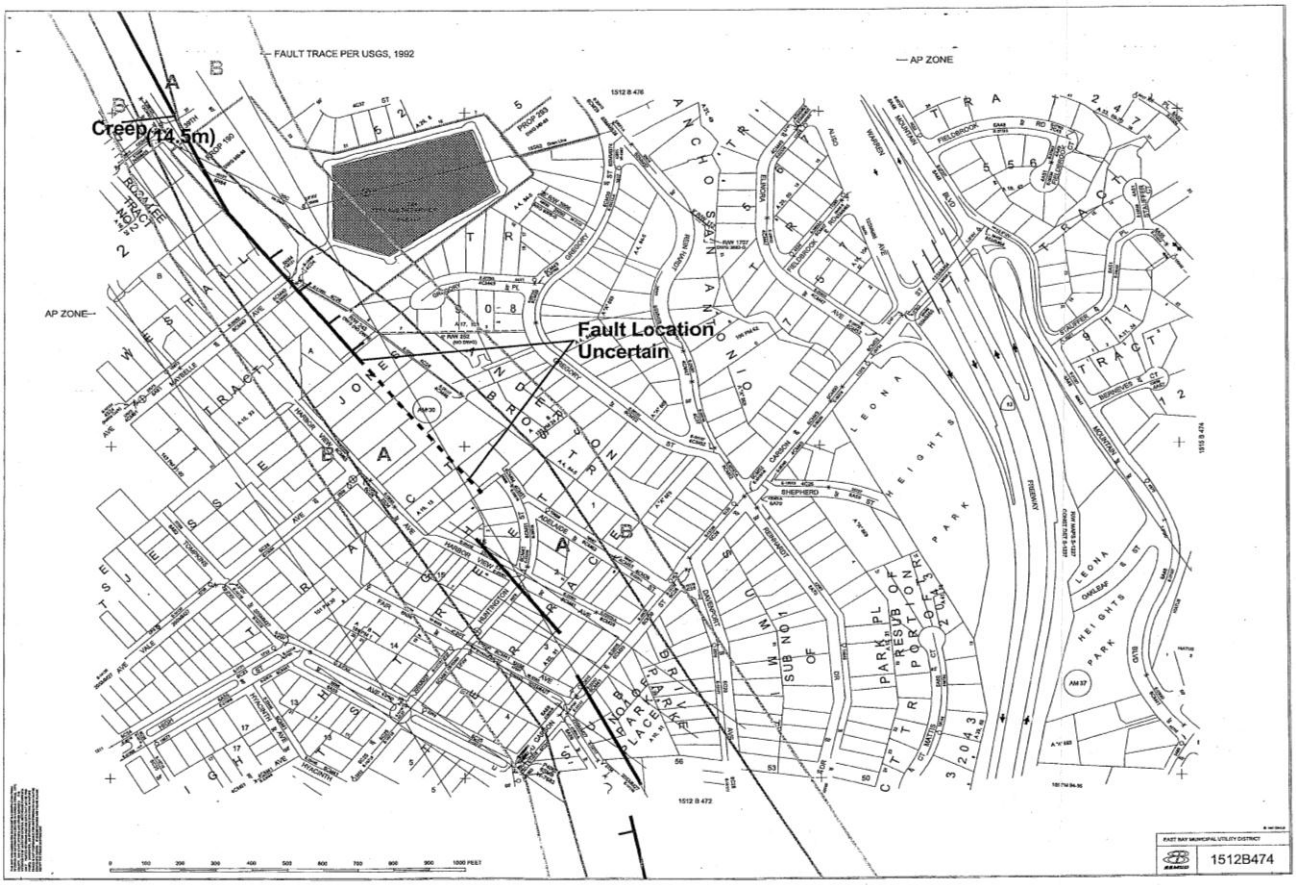


Figure 2.5 - Existing Conditions 1: Fault Location

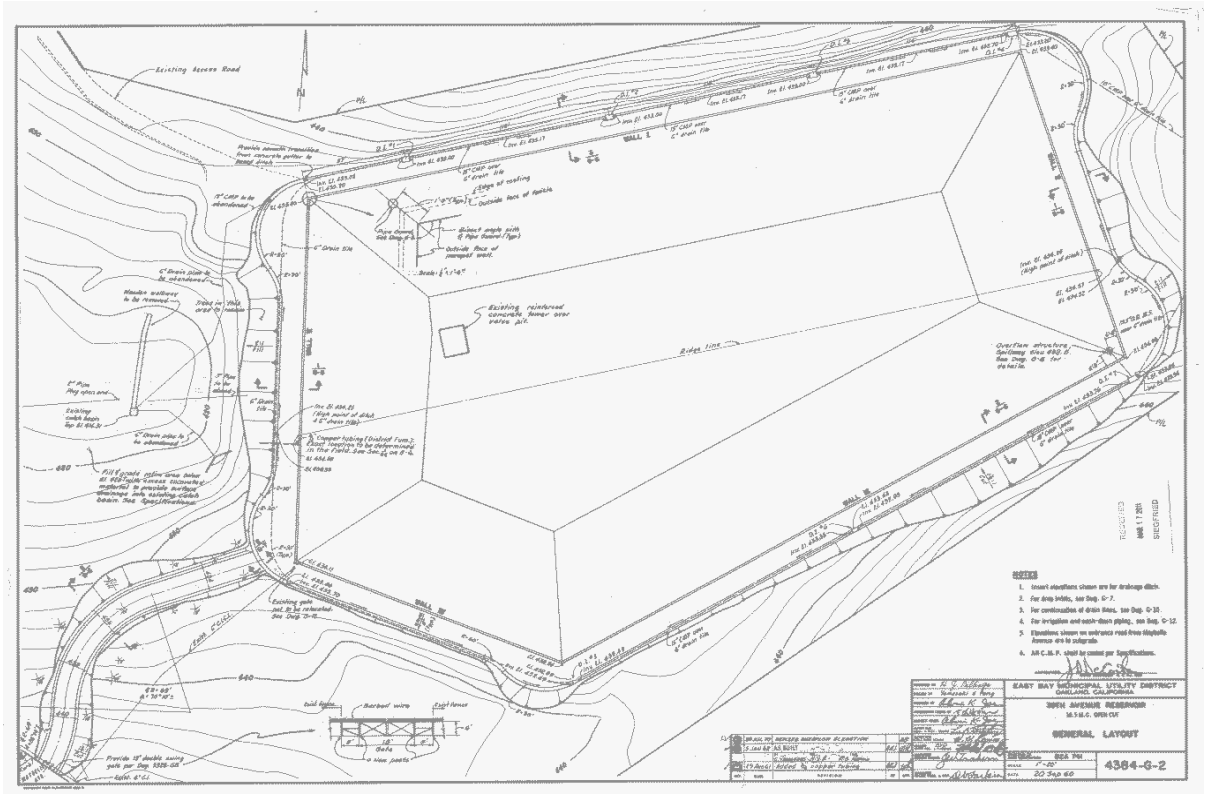


Figure 2.6 - Existing Conditions 2: General Layout

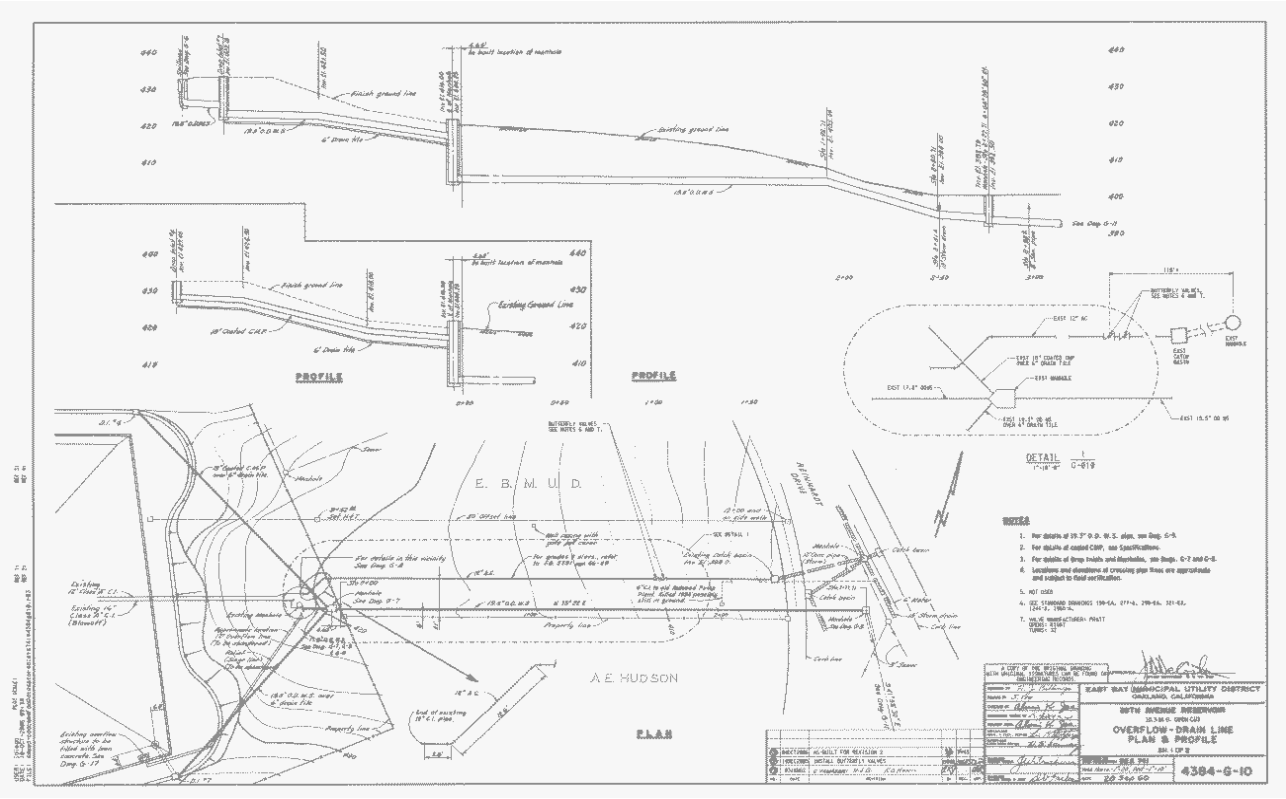


Figure 2.7 - Existing Conditions 3: Overflow/Drainline Plan and Profile

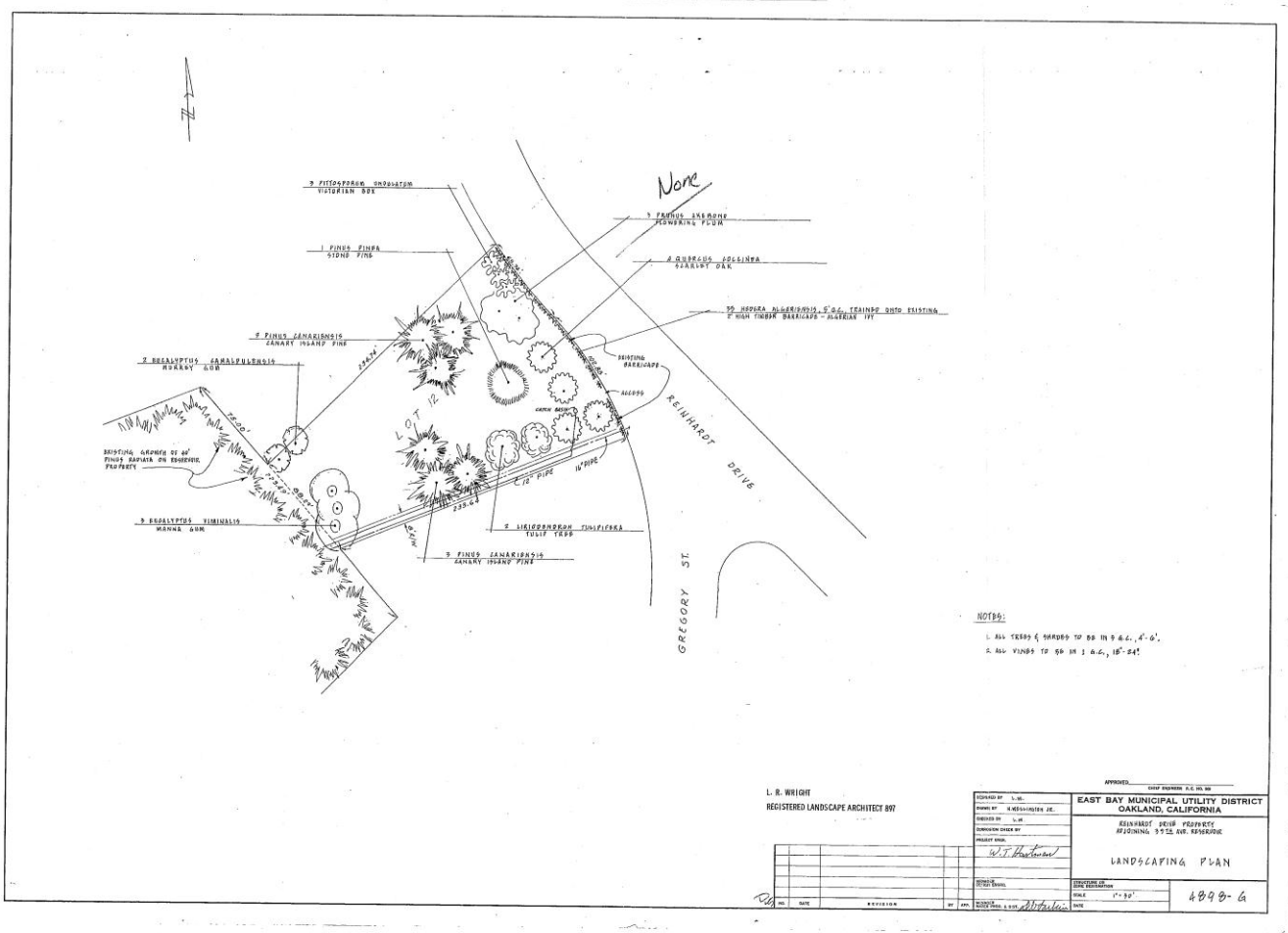


Figure 2.8 - Existing Conditions 5: Landscaping Plan

2.4 SITE OPPORTUNITIES

The Site Opportunities diagram in Figure 2.9 describes the important site features to consider during the design development stages of the project.

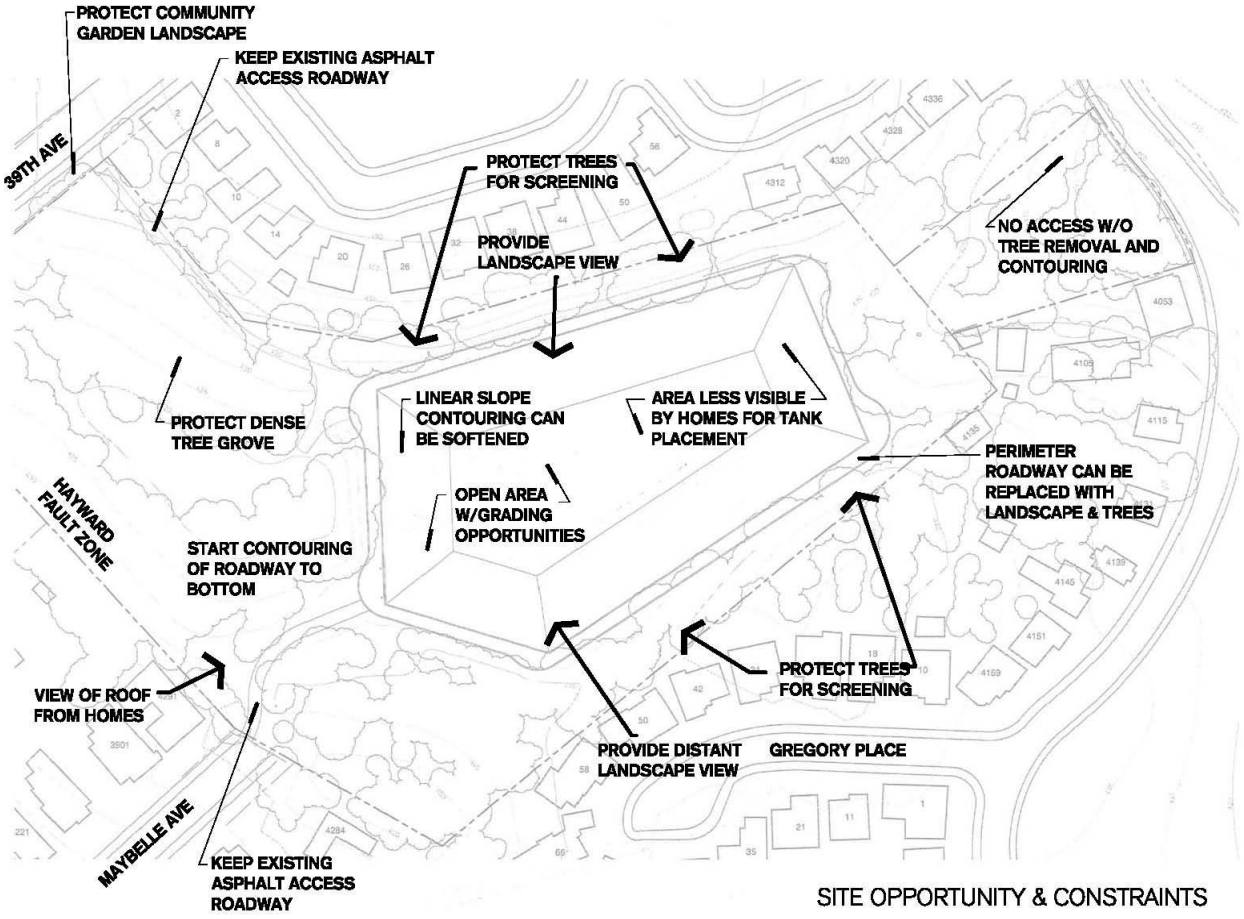


Figure 2.9 - Site Opportunities Diagram

3 CONCEPT DEVELOPMENT

3.1 DESIGN PROCESS

After reviewing the project opportunities and challenges, as well as all available information, Siegfried developed the following (Figures 3.1 through 3.6) loose concept sketches for review with EBMUD and to identify the preferred design direction and frame future discussion regarding public outreach. Variations to the design solution involved the access roadways and path taken to the bottom of the reservoir, tank position, and contouring ideas. At this point in the design process, options where considered that investigated accessibility through the adjacent property to the east.

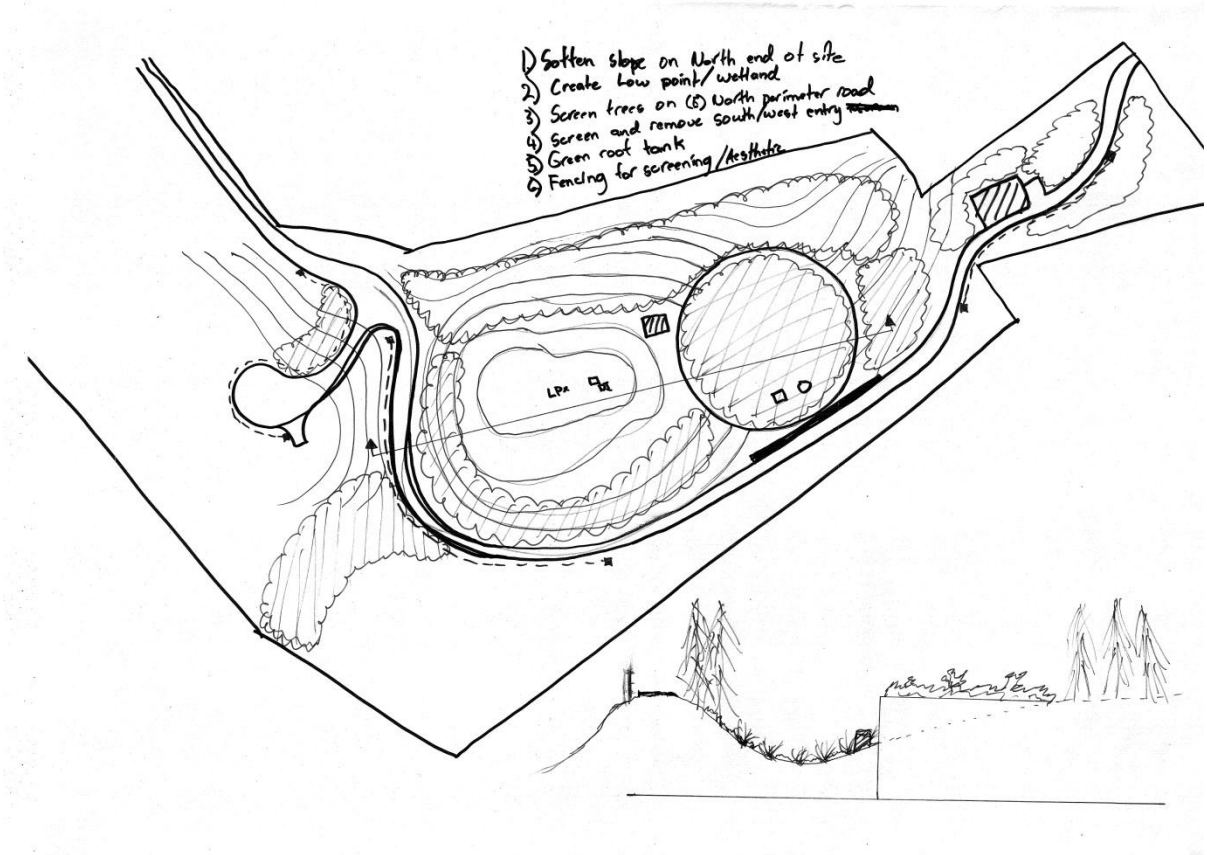


Figure 3.1 - Preliminary Sketch "A"

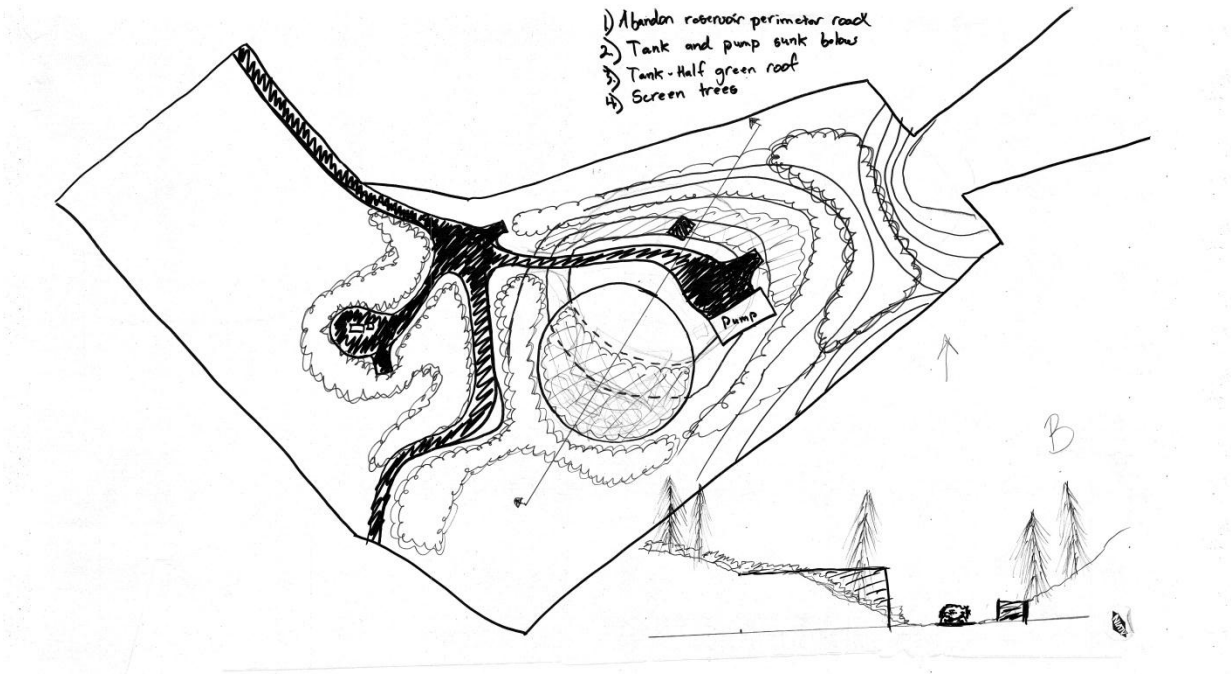


Figure 3.2 - Preliminary Sketch "B"

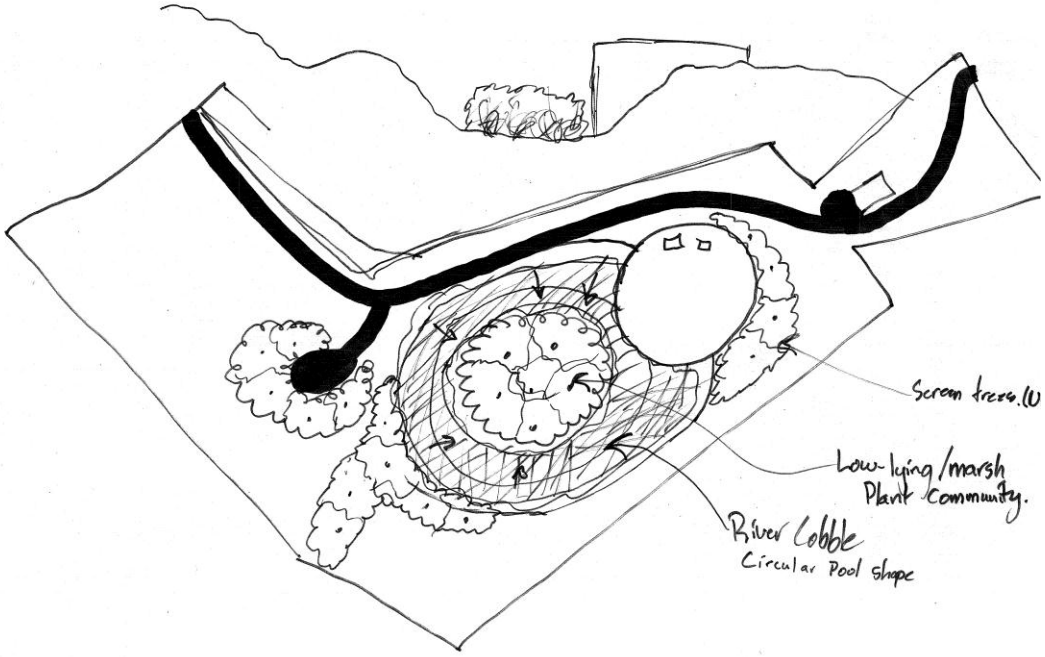


Figure 3.3 - Preliminary Sketch "C"

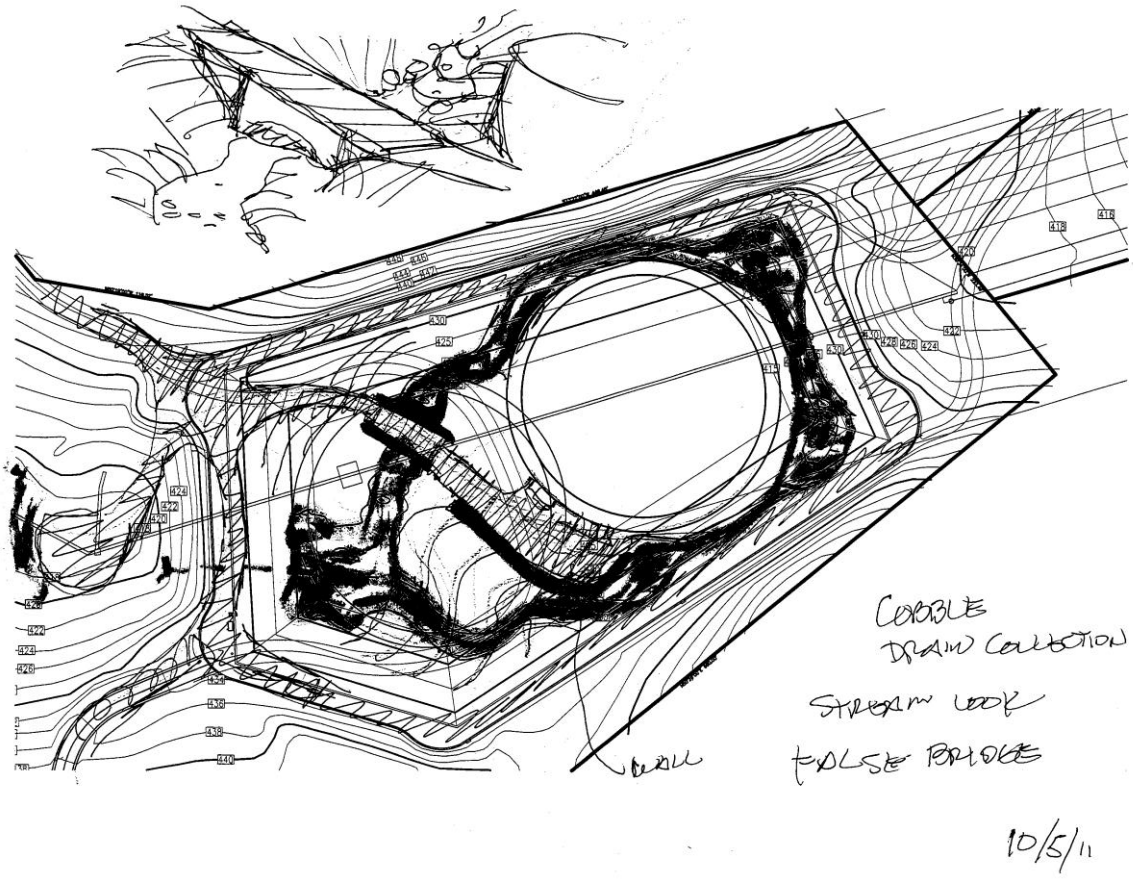


Figure 3.4 - Preliminary Sketch "D"

3.2 INTERNAL DESIGN PRESENTATION

The preliminary designs after being presented to EBMUD staff garnered positive reactions to design layout along with positive input from operations. This valuable input allowed for further refinement of the concepts. Conceptual layout plans were then designed and generated based on an updated topographic plan and presented to EBMUD staff for review on December 14, 2011.

Layouts “A” thru “E” (figures 3.5 through 3.9) were presented and opportunities and constraints were reviewed. The plans were reviewed for maintenance accessibility, aesthetic points of views, and general maintenance requirements. At this point of design refinement preliminary construction budgets were reviewed to ensure that the designs were conforming with EBMUD funding assumptions.

The conclusion of the review was to finalize three concepts for presentation to the public for response and comment. Layouts “A” (figure 3.5) and “D” (figure 3.8) were not further developed. They did not meet as many of the design requirements as well as “B”, “C”, and “E”. For public outreach meeting #1, Layout design “E” became Concept “A”, Layout design “B” became Concept “B” and Layout design “C” became Concept “C”. (See figures 3.5, 3.6, and 3.7)

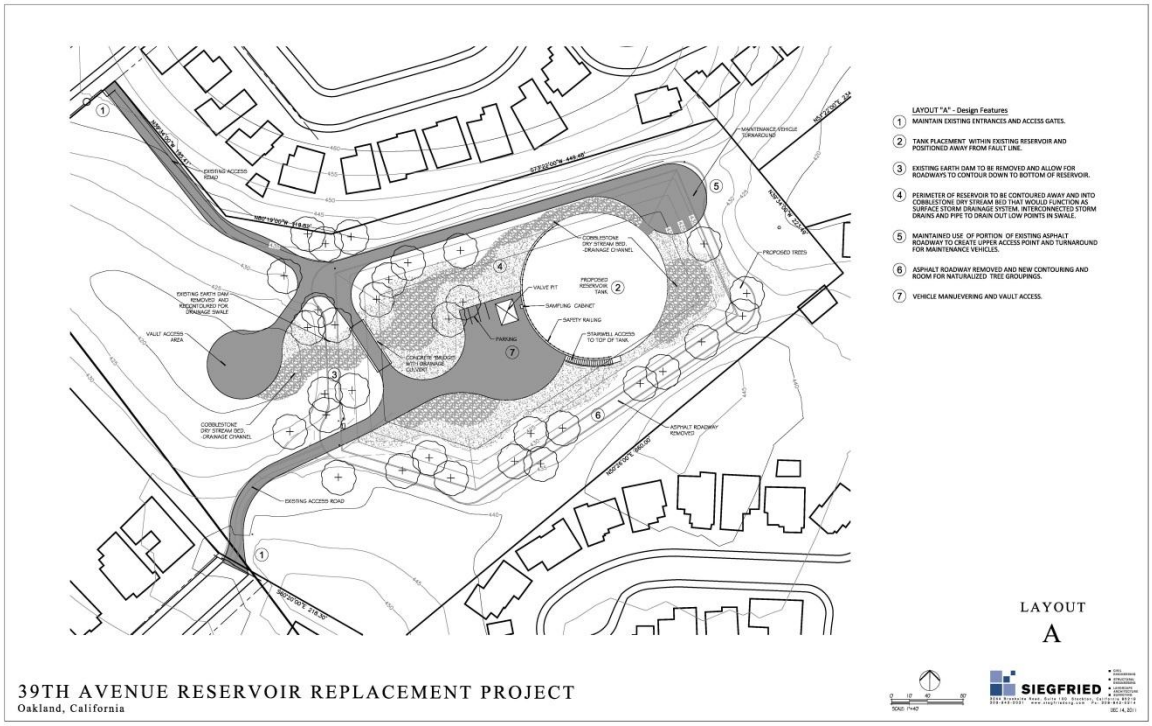


Figure 3.5 - Layout “A”

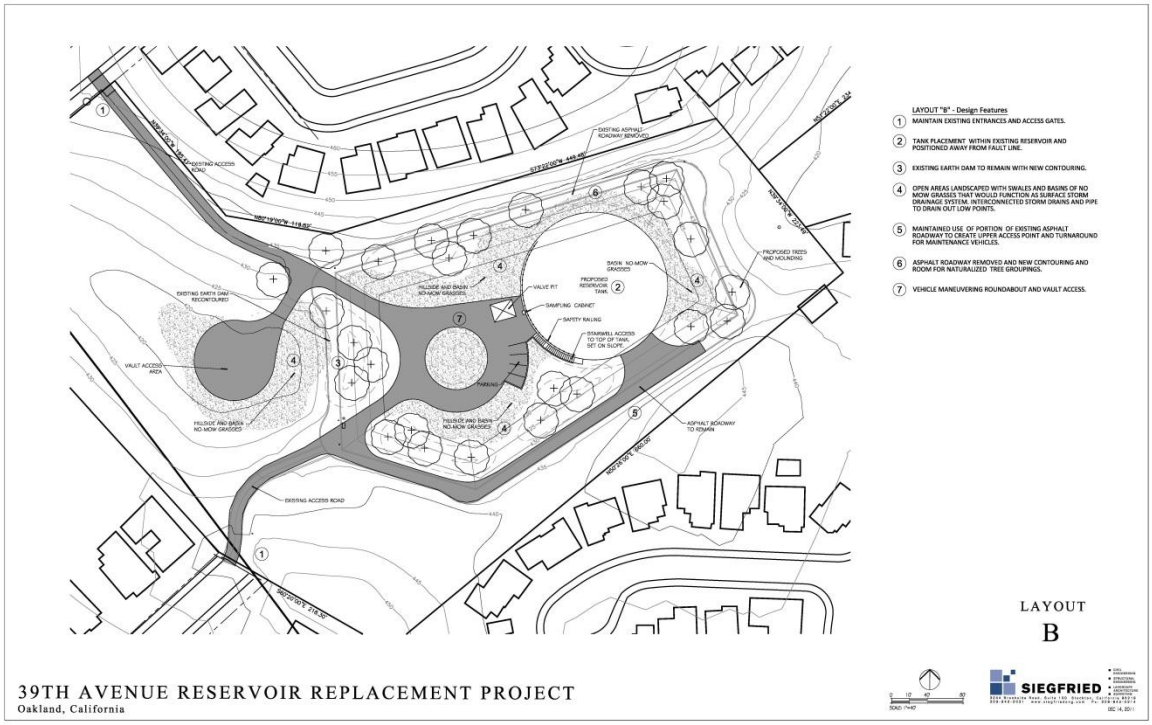


Figure 3.6 - Layout “B”

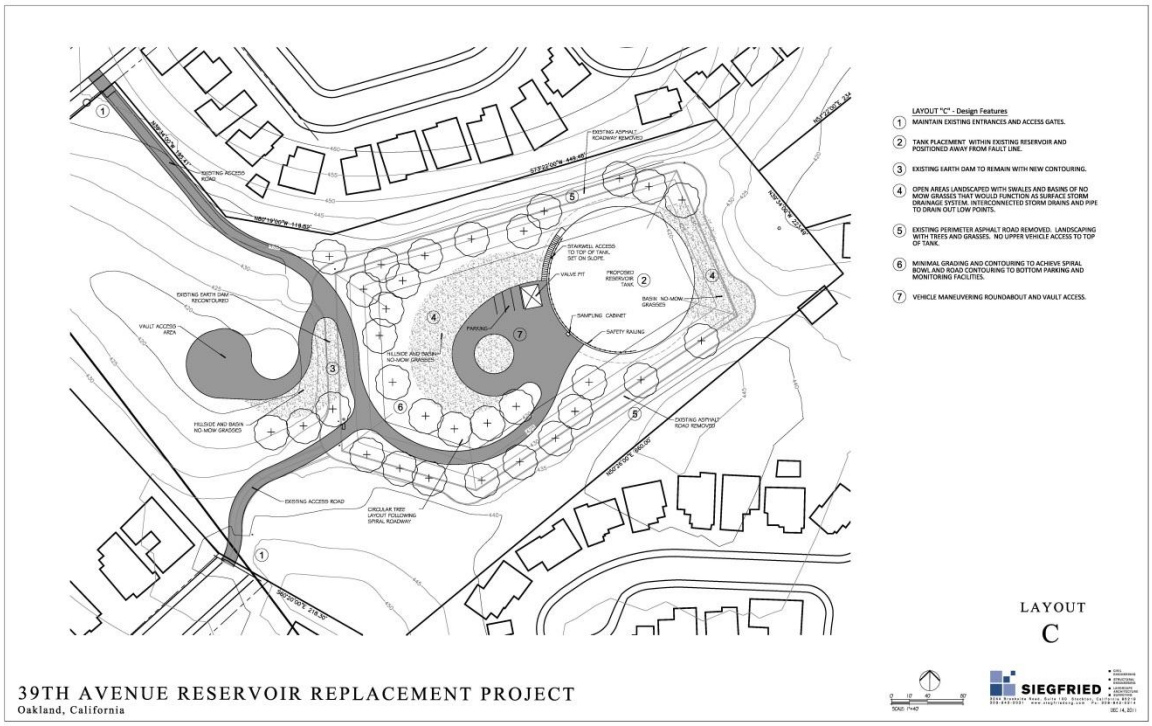


Figure 3.7 - Layout “C”

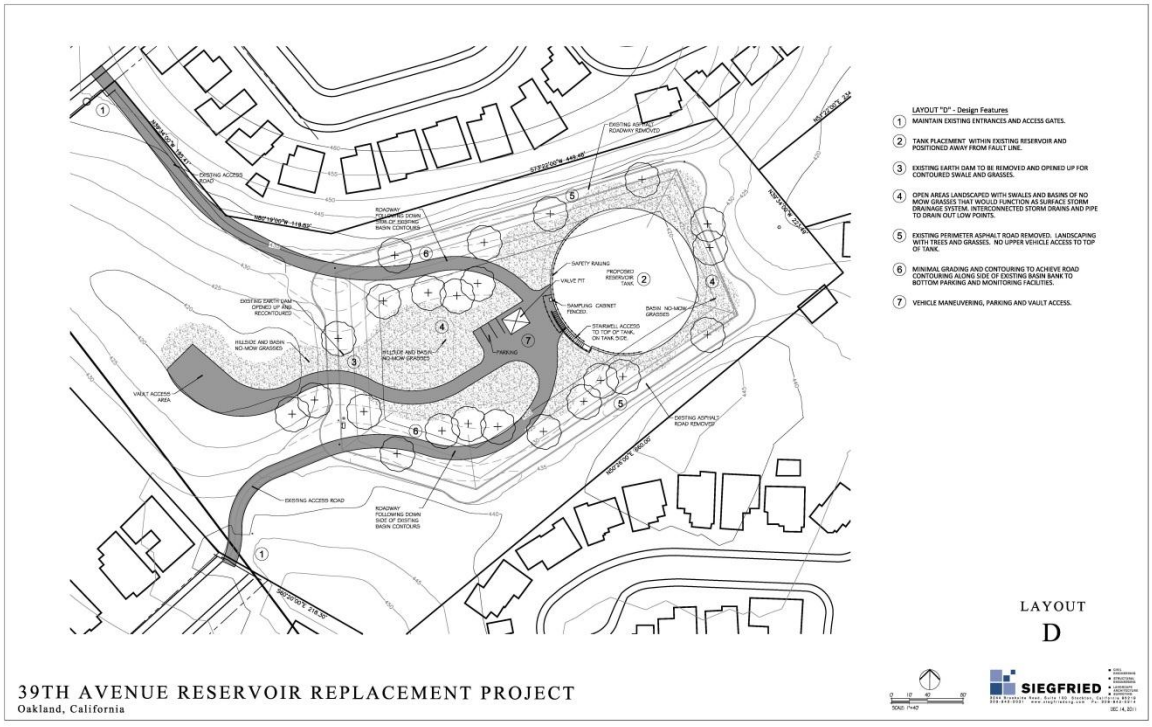


Figure 3.8 - Layout "D"

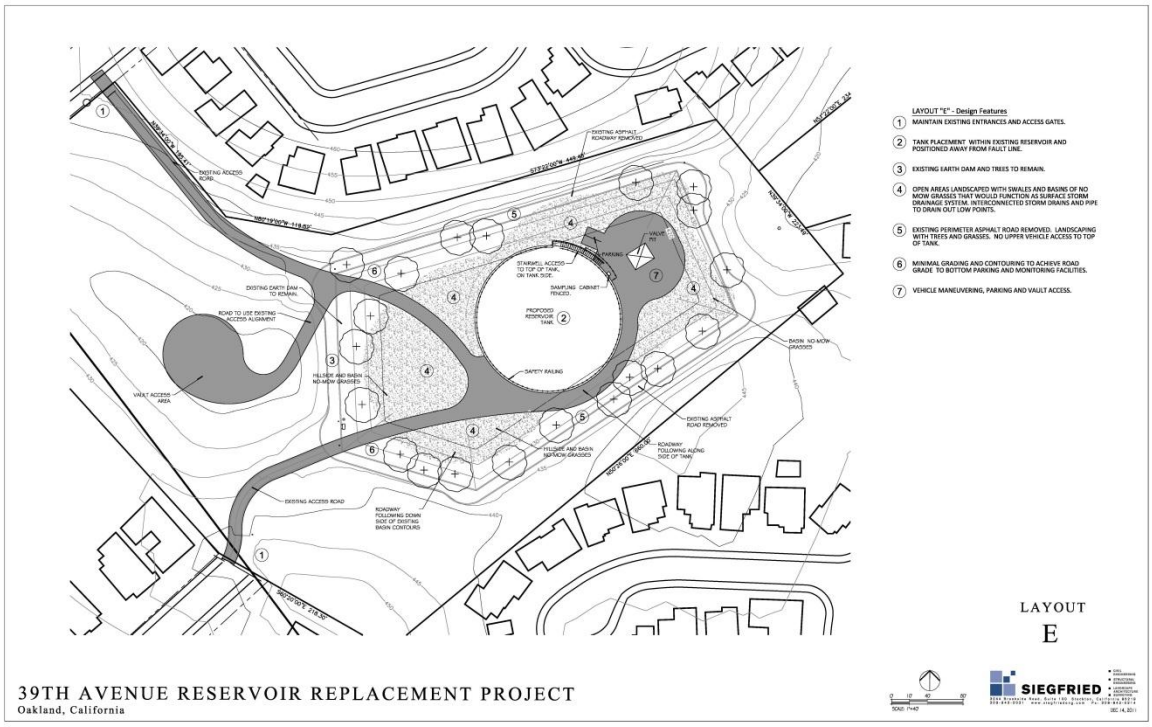


Figure 3.9 - Layout "E"

3.3 PUBLIC MEETING #1

The first public outreach meeting was held in the evening, January 18, 2012, at Redwood Heights School, 4401 39th Avenue, Oakland, California. The public meeting provided an opportunity to introduce the project to the public, and included a presentation by EBMUD of general project overview, project goals, opportunities, and challenges, and then a presentation by Siegfried of design alternatives. The public was informed as to the purpose of the meeting and the desire to have them involved upfront and consider the needs and concerns of the neighborhood in the design solution. Siegfried presented layout concepts "A" thru "C" and explained the design process while being sensitive to elements such as existing trees, earthwork, constructability, sound, visibility, maintenance vehicle accessibility, and proximity to the Hayward fault. The presentation provided explanation of each layout and the pros and cons of shifting the new reservoir, variations to the access road alignment as well as landform features and drainage.

Layout "A" located the tank central to the existing reservoir footprint and provided minimal impact to grading of the existing slopes. Access roads took a direct route to the base of the tank. Negative points with this layout were the fact that the central location was closer to the fault line and more visible by the adjacent neighbors. The access roads would require a steeper grade and would increase noise of the vehicles as they climb the road and exit. The limited earthwork to install the tank would also lead to less available onsite soil to create landforms and integrate the tank into the hillside. The drain rock storm drain design in layout "A" provided for low point collection areas that would be tied together by underground pipes into the existing storm system.

Layout "B" shifted the tank further away from the fault line within the existing reservoir footprint and required grading of the existing slopes. This grading and earthwork would have been used for contouring features and partially burying the tank from view. Access roads took a less direct route to the bottom of the tank and included a roadway loop at the bottom for vehicles to maneuver. The inner island created by the loop could be planted and aid in the screening of the reservoir maintenance operations enclosure. Negative points with this layout were the visibility of the access roads by the adjacent neighbors and the visibility of the tank. The drain rock storm drain design in layout "B" provided for low point collection areas with perimeter swales as a landscape features, and the system would be tied together by underground pipes into the existing storm system.

Layout "C" solved some of the limitations and negative factors with layouts "A" and "B". The tank was shifted to the furthest point away from the fault line, while staying within the existing reservoir footprint. The position required grading of the existing slopes and was limited by the location the perimeter trees which needed to be protected. This excess earthwork would be used for contouring features and partially burying the tank from view. Access roads take a less direct route to the bottom of the tank and spiral down the slope of the existing reservoir contouring to the bottom. This longer roadway provides for a gentler slope and the turning of the roadway allows the view of the roadway and vehicles to disappear around the turn. Screen tree planting, wildflower grass planting and drain rock swales follow in a spiraling pattern. As a way to further blend the tank into the landscape, layout "C" takes the drain rock swale "through" the tank. As the swale meets up with the tank, the drain rock material is installed on the top of the reservoir roof, appearing as a swale connecting the drain rock area on the back of the tank. The tank sides and roof would be painted in a Federal approved color olive to blend into the planting area as well. The drain rock storm drain design in layout "C" provided for low point collection areas, and the system would be tied together by underground pipes into the existing storm system. An inner, lower island inside of the spiraling drain rock swale could be planted and aid in the further screening of the reservoir maintenance operations.

The following exhibits (Figures 3.10 through 3.19) where provided for viewing by the public:

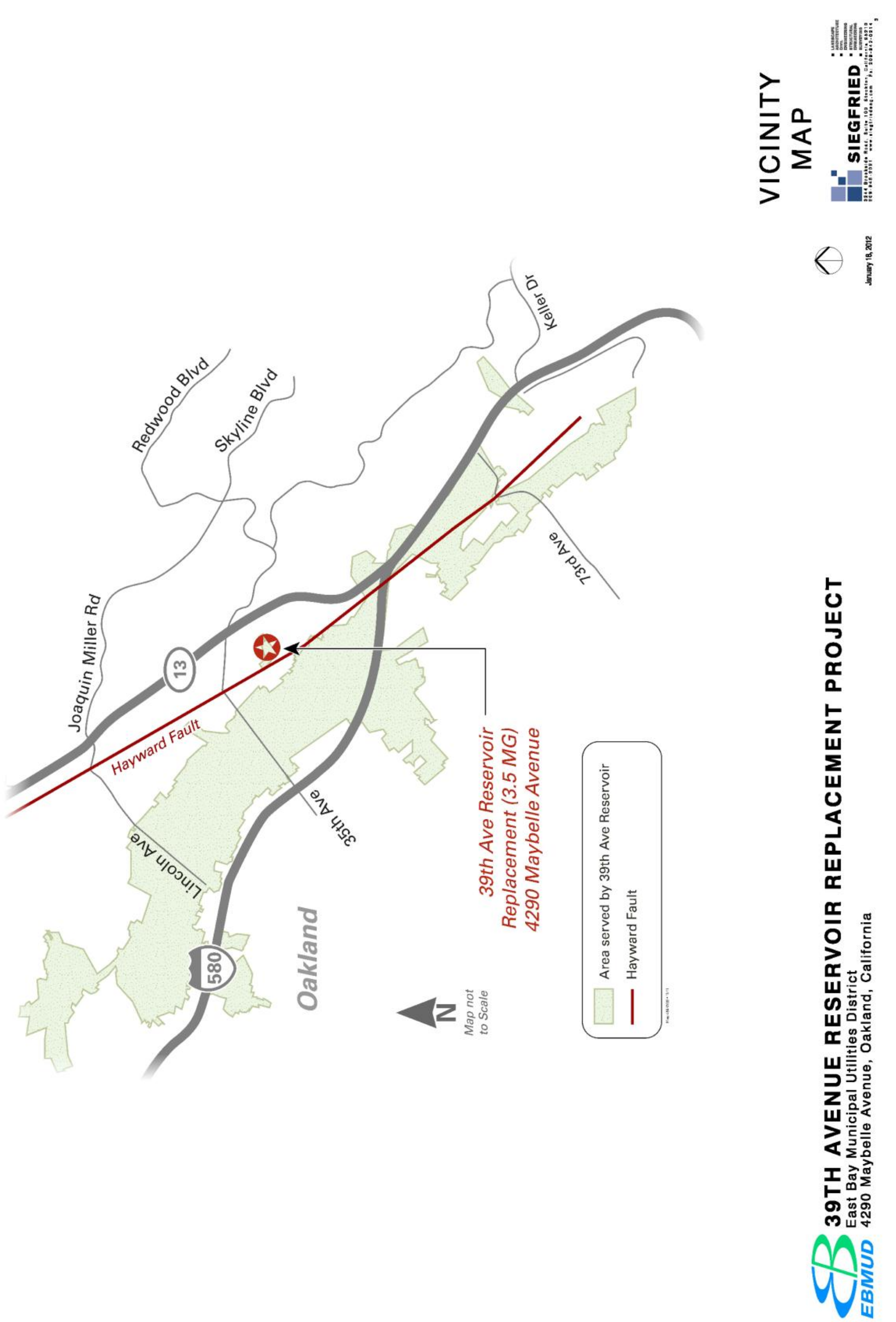


Figure 3.10 - Public Outreach Meeting #1: Vicinity Map

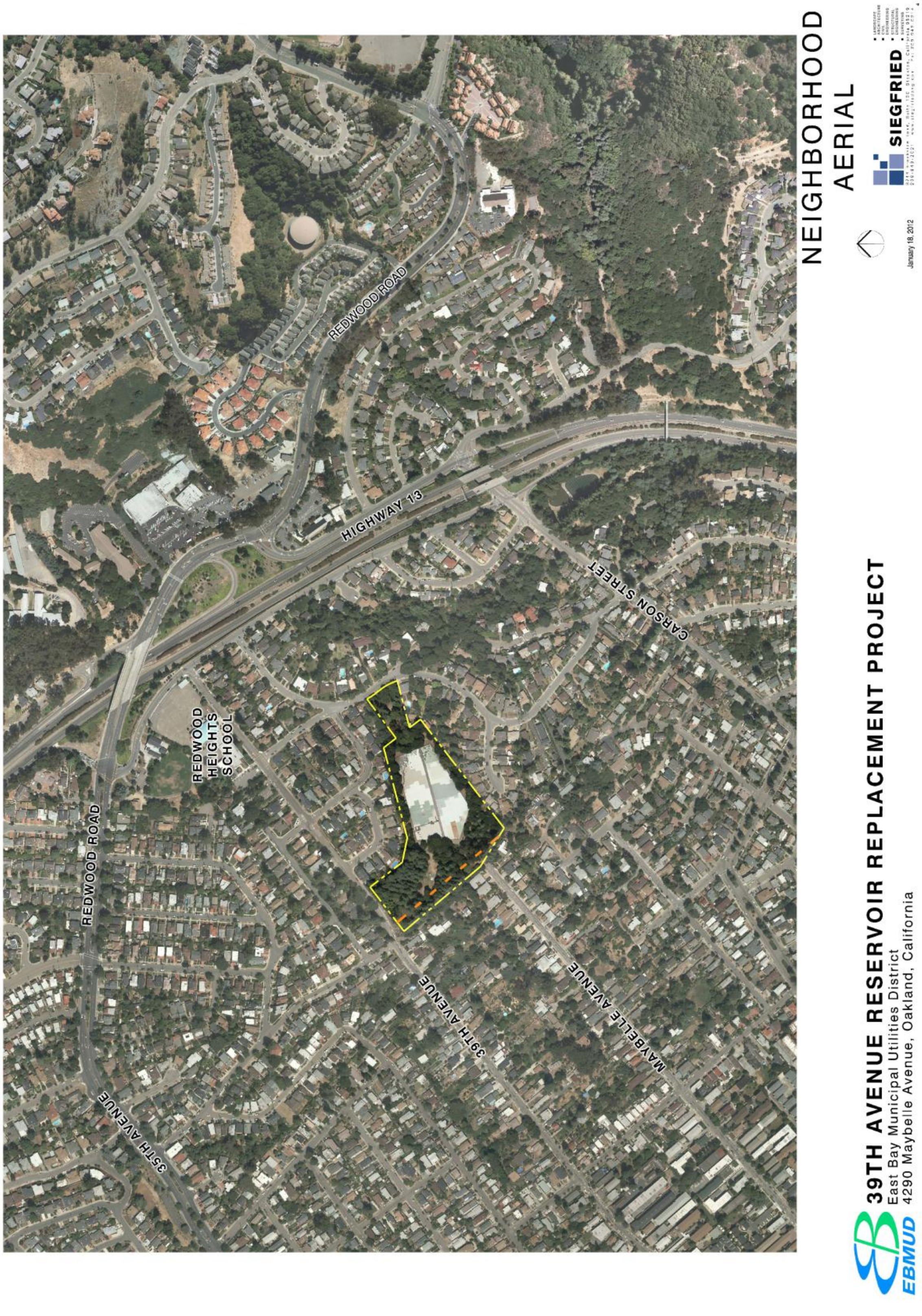


Figure 3.11 - Public Outreach Meeting #1: Neighborhood Aerial

Figure 3.12 - Public Outreach Meeting #1: Project Site Aerial

Figure 3.13 - Public Outreach Meeting #1: Project Components

PROJECT OBJECTIVE

- AVOID REHABILITATION AND FUTURE MAINTENANCE COSTS FOR OVERSIZED FACILITIES
- IMPROVE SEISMIC RELIABILITY
- IMPROVE MORE EFFICIENT WATER QUALITY MAINTENANCE

PROJECT COMPONENTS

1. 3.5 MG RESERVOIR
2. MAINTENANCE VEHICLE ACCESS
3. SAMPLING AND ELECTRICAL CABINETS
4. VALVE PIT
5. VEHICLE PARKING
6. STAIRWELL FOR ROOF ACCESS

SCHEDULE

PROJECT START	2010
DEVELOP SITE CONSTRAINTS	OCT 2011
PUBLIC MEETING No. 1	JAN 2012
PUBLIC MEETING No. 2	MAR 2012
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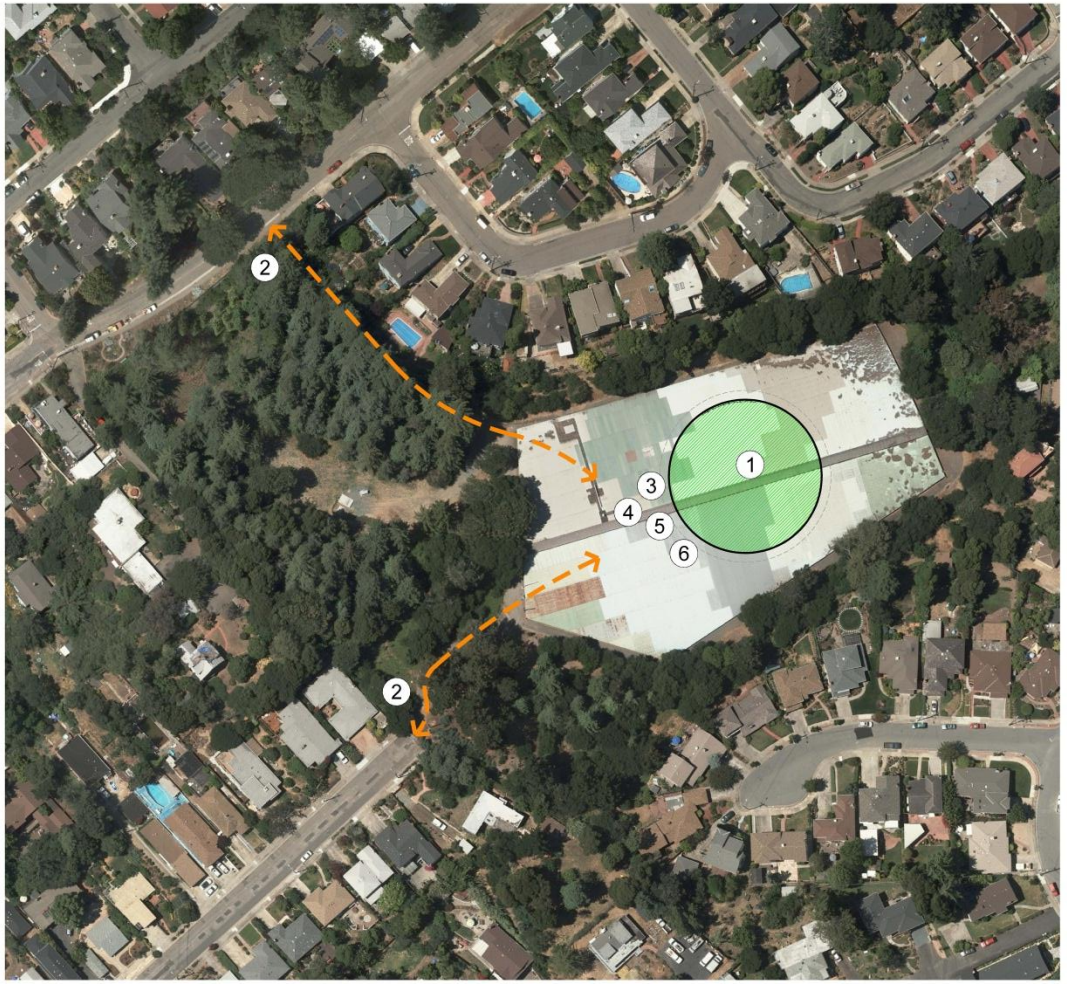


39TH AVENUE RESERVOIR REPLACEMENT PROJECT
East Bay Municipal Utilities District
4290 Maybelle Avenue, Oakland, California

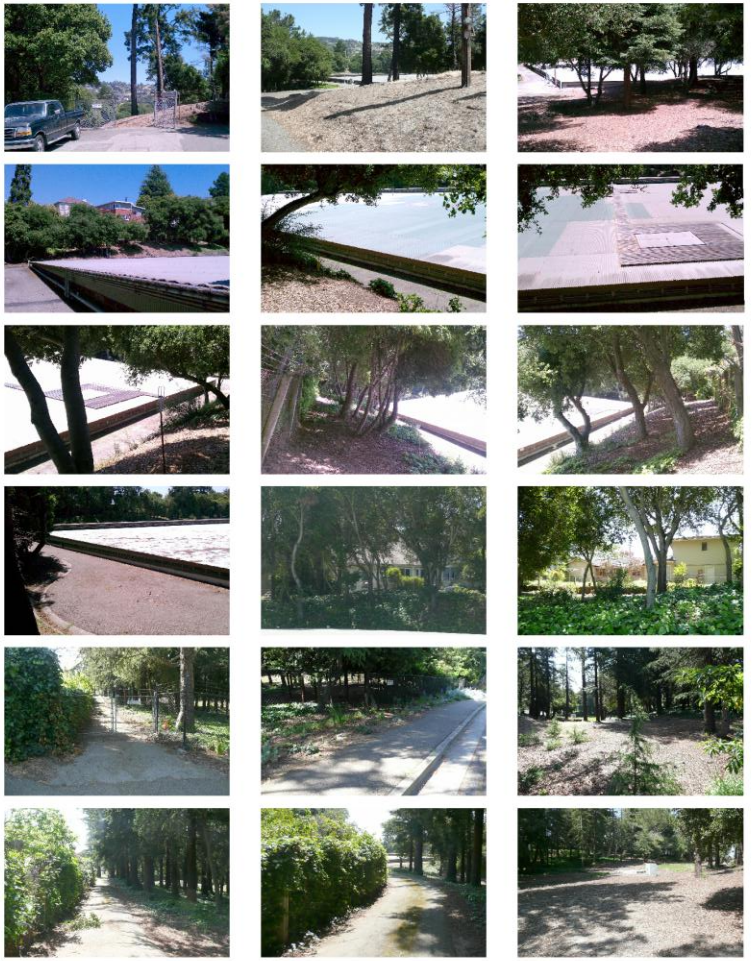
EBMUD

January 18, 2012

SIEGFRIED

EXISTING VIEW FROM THE NORTH

EXISTING VIEW FROM THE SOUTH



ONSITE CONDITIONS

EXISTING CONDITIONS

39TH AVENUE RESERVOIR REPLACEMENT PROJECT
East Bay Municipal Utilities District
4290 Maybelle Avenue, Oakland, California

EBMUD

SIEGFRIED

January 15, 2012

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Figure 3.14 - Public Outreach Meeting #1: Existing Conditions

Figure 3.15 - Public Outreach Meeting #1: Layout "A"

Figure 3.16 - Public Outreach Meeting #1: Layout "B"

Figure 3.17 - Public Outreach Meeting #1: Layout "C"

Figure 3.18 - Public Outreach Meeting #1: Layout "C" with Aerial

Figure 3.19 - Public Outreach Meeting #1: Design Materials

3.4 PUBLIC MEETING #1 – RESULTS AND DESIGN REFINEMENT

In addition to the display boards and presentation, an easel was set up during the meeting and public comments were noted. The following comments/issues were made and noted:

1. Color choice on tank requested
2. Privacy/views
3. Wildlife
4. Fire break
5. Maintain existing trees
6. Schedule/noise/dust
7. Hayward fault
8. Gregory Place residents prefer layout “C”
9. 39th Street community planting are please protect
10. Lighting/crime
11. Skateboarders
12. Security/limited access
13. 39th Street entry – light and gate
14. Arborist to analyze, observe during construction
15. State of the art engineering
16. Solar-large arrays-(EBMUD response- not cost effective for small areas)
17. Layout consensus- Layout A(0), Layout B(1), Layout C(10)
18. Contour and elevation graphic view requested
19. Budgeted 2020-max construction date $ from capital project bonds
20. Site walk requested

During the meeting, the above comments and issues were addressed as much as possible and from the feedback, the general consensus was that the group preferred Layout “C”. The public was informed that the feedback and information taken from the meeting would be applied to the final solution. Due to a general consensus that Layout “C” was preferred the public was informed that the next Public Meeting would present one design layout with further refinements and graphics. The group was informed that they would receive flyers for the next scheduled meeting. See figures 3.19 and 3.20 for meeting setup and attendance.

Figure 3.20 - Public Meeting #1: Photo A

Figure 3.21 - Public Meeting #1: Photo B

3.5 PUBLIC MEETING #2

The second public outreach meeting was held in the early evening, Wednesday, April 25, 2012, at the project site on 39th Avenue, Oakland, California. A previously scheduled site walk meeting in March was cancelled due to rain. The on-site public meeting provided an opportunity for the public to walk the site and visualize the design solution. A tent was set up onsite with the design boards on display for viewing. EBMUD placed orange pylon cones on top of the existing reservoir roof at the approximate location of the proposed tank structure, to aid in understanding the proposed location. A presentation board was generated with a perspective view of the proposed design from the location of the presentation (see figure 3.23). Additional perspectives and section elevations were provided to aid in the interpretation and visualization of the design. (See figures 3.24 through 3.27)

The introduction of the project to the public included a presentation by EBMUD of the project overview and a summary of public meeting #1. Siegfried presented the proposed site design (based on previous Layout "C") and the key factors that lead to the current design. The solution was based on feedback from the first public meeting as well as further internal review by EBMUD. The meeting concluded with a supervised site walk of the project site and the opportunity for further questions.

Siegfried evaluated and considered the key comments from public meeting #1 before revising the plan. The solution needed to meet the needs of EBMUD for constructability, maintenance and cost, as well as address community concerns. Key factors for the final site design solution included proximity to the fault line, visibility of the tank from the adjacent neighbors, accessibility for maintenance vehicles, low maintenance landscaping, and fire break protection.

The proposed site plan located the tank back into the narrowest part of the existing reservoir footprint. The location was determined based on an evaluation of the grades and cuts into the slopes in order to construct the tank itself. A 1:1 grade slope line based off the drip lines of the existing trees down to a 10 foot clear construction area at the base of the tank determined the location. This location moved the tank to the furthest constructible location away from the fault line and also provided the necessary earthwork to contour the design, bury a portion of the tank, and keep site earthwork onsite minimizing truck traffic and soil import costs. The tank location takes advantage of the existing trees to screen it from the homes. The spiraling roadway alignment leading to the bottom of the tank along the existing reservoir contours allows for a gentle slope for vehicles as well as opportunity for the roadway to vanish from view. The north side of the tank will have a vehicle access roadway rebuilt in the existing location of the perimeter roadway. This portion of road will allow for maintenance vehicle access to the top of the reservoir tank stairwell and vault area.

In order to achieve a balance of cost and landscape maintenance, a majority of the slopes will be installed with hydroseeded non-irrigated, wildflower and grass seed mix. This will minimize maintenance efforts and only require seasonal mowing twice a year. Additionally, these areas of non-irrigation will save water. The seed mix will be applied to the side slopes adjacent to the drain rock swales. The design requirement for accessibility and maintenance will be that the design side slopes do not exceed a 3:1 slope.

For fire break protection there will be a minimum thirty foot buffer zone between the adjacent property fenceline and the wildflower/grass seed mix area. This area will contain low, drought tolerant fire resistant plant material. To aid in growth and water efficiency, the groundcover zone will be installed with drip irrigation.

The drain rock storm drainage swale will follow the previously presented concept with drain rock installed on a portion of the tank roof that appears to be flowing over the top of the tank. The drain rock swale layout design and contouring will provide for low point collection areas that will be tied together by underground pipes into the existing storm system.

The Public requested in meeting #1 to see more graphics with perspectives and elevations to help visualize the concept. Exhibit boards were presented with an overall site perspective of the project

and eye level perspectives and element descriptions. Section elevations were added to the site plan exhibit board to aid in visualizing the tank construction and the areas of cut and fill.
New features in the design defined by EBMUD include installation of 8 foot high security fencing along the public right-of-ways, and new access gates at the 39th Avenue and Maybelle Avenue entrances.

Figure 3.22 - Aerial Perspective

Figure 3.23 - Perspective View from North

Figure 3.24 - Perspective View from South

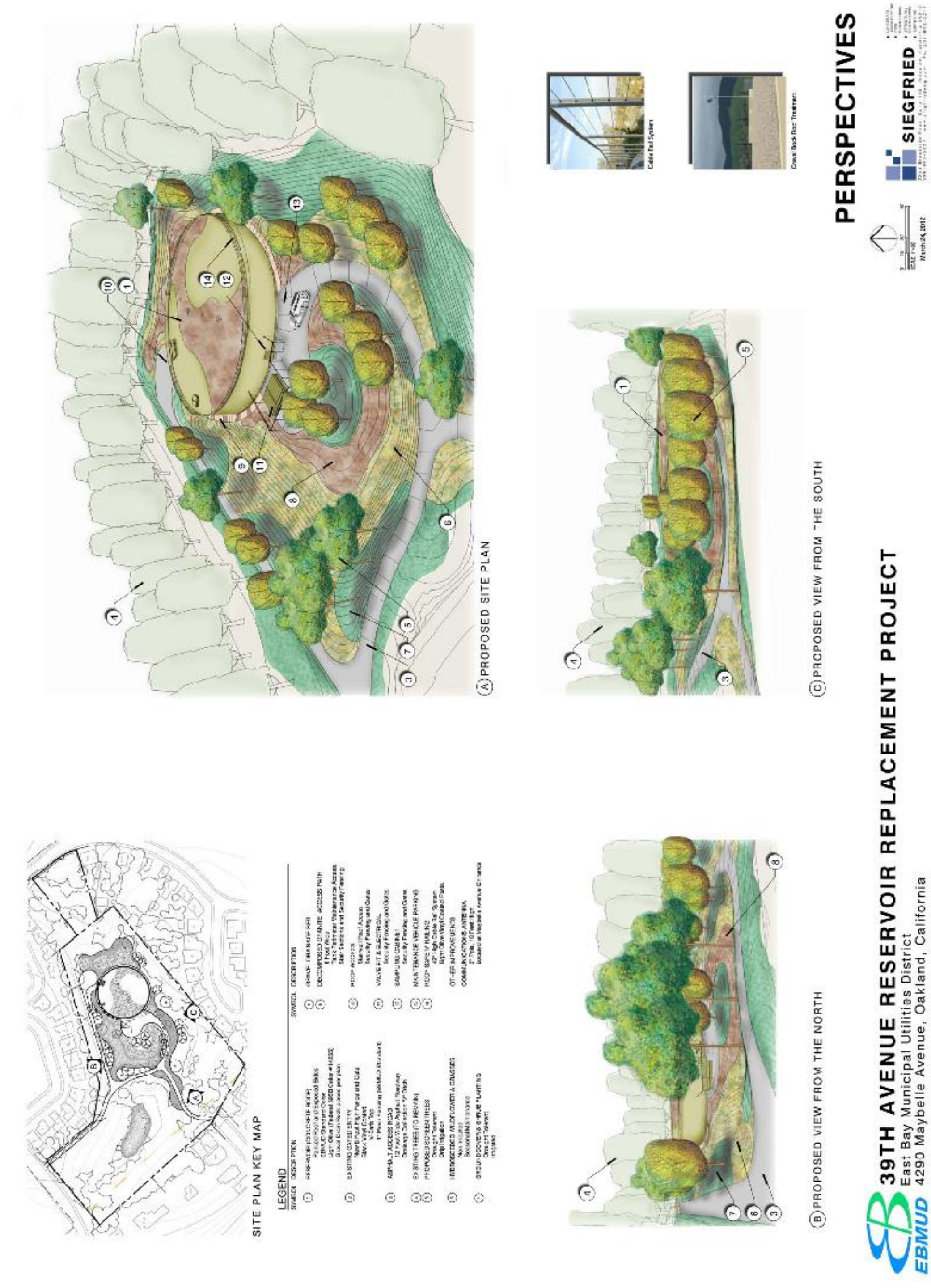
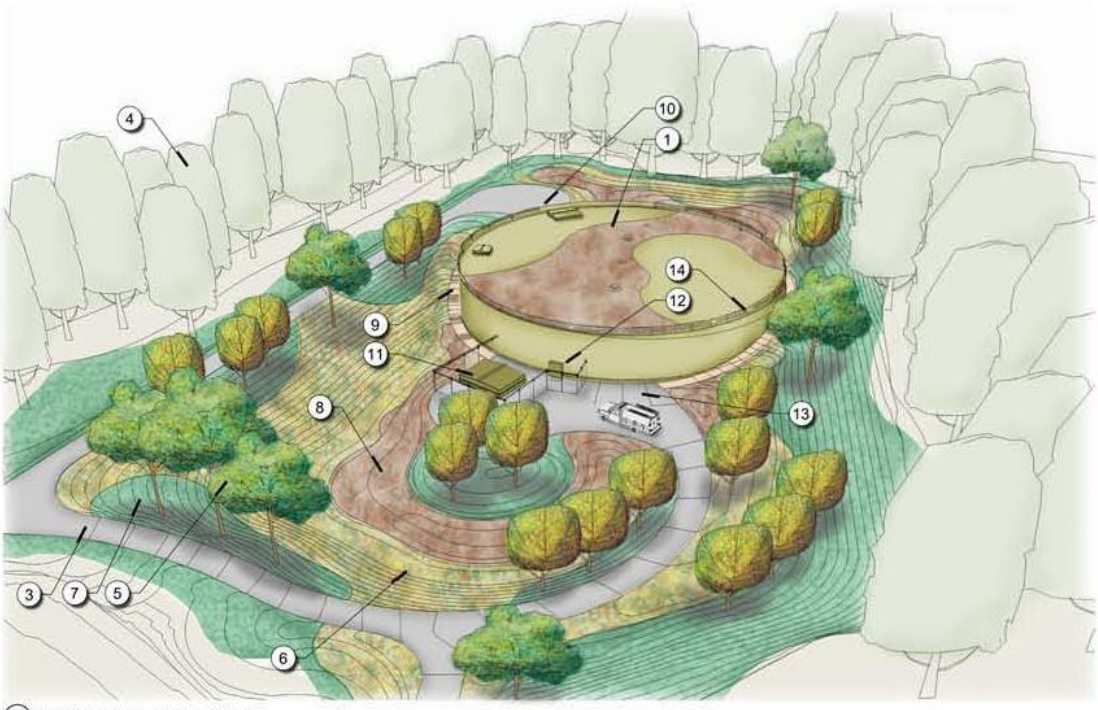


Figure 3.25 - Public Outreach Meeting #2: Perspectives

Figure 3.26 - Public Outreach Meeting #2: Proposed Layout



(A) PROPOSED SITE PLAN

LEGEND

SYMBOL	DESCRIPTION
1	RESERVOIR (CONCRETE ROOF) Painted Roof and Exposed Sides EBMUD Standard Color Light Olive (Federal 595B Color #14255) Gravel Drain Rock placed per plan
2	EXISTING GATED ENTRY New 8 Foot High Fence and Gate Black Vinyl Coated V-Barb Top 1" Mesh Fencing (EBMUD Standard)
3	ASPHALT ACCESS ROAD 12 Foot Wide Asphalt Roadway Drainage Collection "V" Ditch
4	EXISTING TREES (TO REMAIN)
5	PROPOSED SCREEN TREES Drought Tolerant Drip Irrigation
6	HYDROSEEDED WILDFLOWER & GRASSES Non-Irrigated Seasonal Maintenance
7	GROUNDCOVER & SHRUB PLANTING Drought Tolerant Irrigated
8	GRAVEL DRAINAGE BED
9	DECOMPOSED GRANITE ACCESS PATH 6 Foot Wide Tank Perimeter Maintenance Access Stair Sections and Security Fencing
10	ROOF ACCESS Stairwell Roof Access Security Fencing and Gates
11	VALVE PIT & ELECTRICAL Security Fencing and Gates
12	SAMPLING AND RTU CABINETS Security Fencing and Gates
13	MAINTENANCE VEHICLE PARKING
14	ROOF SAFETY RAILING 42" High Cable Rail System Light Olive Vinyl Coated Posts
	OTHER IMPROVEMENTS
	COMMUNICATIONS ANTENNA Existing Antenna to be Relocated on Site

Figure 3.27 - Proposed Site Plan

3.6 PUBLIC MEETING #2 – RESULTS AND DESIGN REFINEMENT

Standard protocol for EBMUD and Community involvement typically follows a three public meeting approach. Due to the overall public consensus and support for the design, EBMUD chose to eliminate the third and final public meeting. Public comments from meeting #2 will be part of this document and will be integrated into the final design during the Improvement Plan phase.

Like meeting No. 1 an easel was set up during the meeting and public comments were noted. The following comments were made:

1. Timeline update (EBMUD)
2. Estimated CEQA late summer(EBMUD)
3. Approval fall 2012(EBMUD)
4. Design 2018(EBMUD)
5. Construction 2019-2020(EBMUD)
6. Examples of roof- rock and paint
7. Entry at Maybelle and 39th steep
8. Plant material
9. Not available for park-community wants a park use
10. Planting at entry to remain intact and protected during construction
11. 39th Avenue, a lot of traffic-minimize traffic and provide signage
12. CEQA process-to evaluate noise and traffic
13. Earthquake safety concerns-overflow water in earthquake to remain on site
14. Fire resistant plant material-irrigated
15. Existing reservoir concrete liner-crush on site- noise/air?
16. Roof material and color
17. Demolition concerns
18. Trail for access? No access
19. Everyone pleased with design

Given the late seasonal rain and the cancellation of a meeting in March, due to rain, a tent was erected to keep those in attendance dry. (See figures 3.26 and 3.27)

Figure 3.28 - Public Meeting #2: Photo A

Figure 3.29 - Public Meeting #3: Photo B

4 NEIGHBORHOOD ISSUES

4.1 NOISE IMPACTS

Noise will be generated during the demolition, construction and operation/maintenance phases of the project. Demolition noise sources may include roof structure de-construction (saws, drills, trucks on and off-site), concrete removal and crushing (grinding, jack-hammering), roadway asphalt removal, grading of embankment and site (graders, trucks on-site). Construction noise sources will also include excavation and grading equipment, trucks, and miscellaneous construction equipment.

4.2 TRAFFIC IMPACTS

As noted above, there will be truck traffic during the demolition and construction phases. Trucks will remove treated wood waste and other debris during demolition. Concrete trucks will be required for the tank construction. Construction personnel will drive and park within the site boundaries and not on public roadways.

4.3 AIR QUALITY

Dust will be generated during the demolition phase by the process of dismantling the roof and wall structure, removal and crushing of the concrete, removal of asphalt roadway, liner and earthwork grading. Onsite mitigation will be required in the project plans and specifications.

4.4 IMPACT COMPARISON BY PROJECT PHASE

The number of noise sources could be greatest during the demolition phase. Most of the noise and traffic impacts will vary depending on the phase of construction. Truck traffic may be more apparent during the fall period with the loss of leaf cover. Construction and traffic will be sensitive to local noise ordinances and work days and times.

5 DESIGN GUIDELINES

5.1 EBMUD DESIGN GUIDELINES & REQUIREMENTS

1. DESIGN ELEVATIONS
   Base elevation of reservoir 414.0
   Access valve pit roof 416.0
   Top of reservoir roof 438.0
   Water overflow elevation 433.0

2. RESERVOIR CONSTRUCTION GRADING

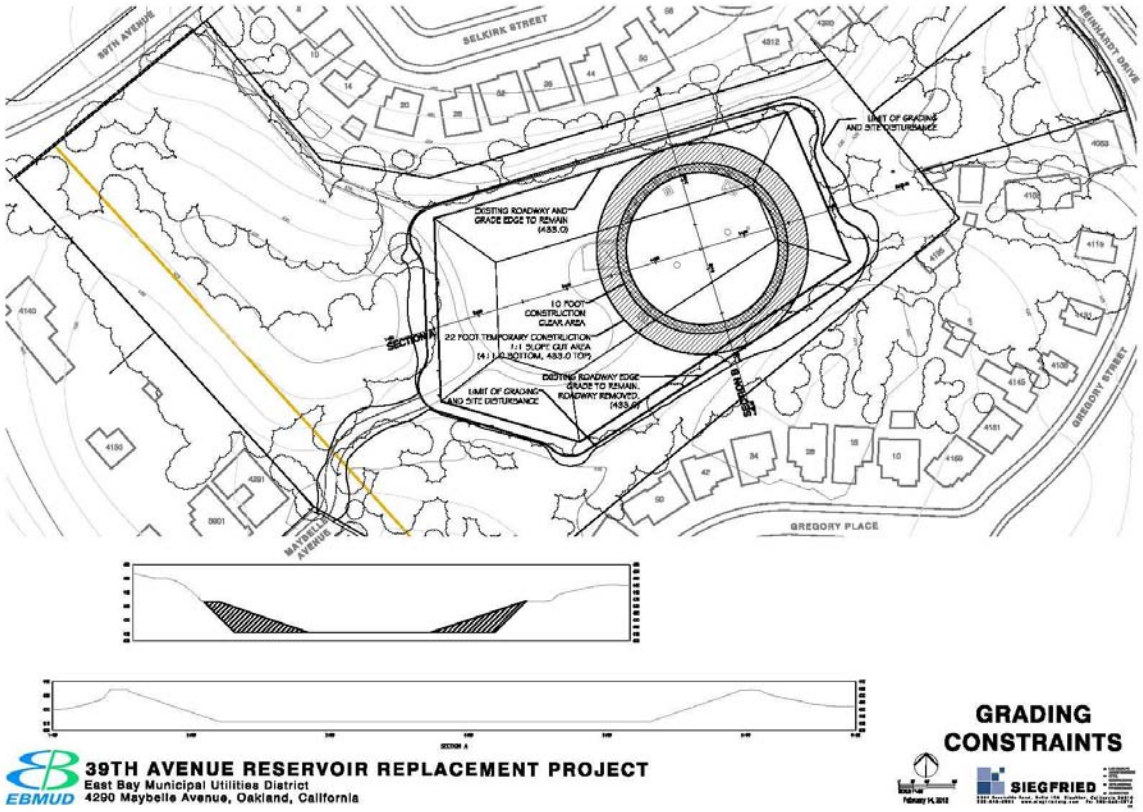


Figure 5.1 - Grading Constraints

3. Grading LIMITATIONS and methods of construction had to be defined in order to properly place the tank. A clearance of 10' is required around the tank for initial construction and can be filled in after the tank is constructed. The maximum grade cutback from the 10' zone is 1:1. In addition the design must honor the existing tree drip lines.
4. The reservoir and valve pit should be located away from fault zone as much as possible.
5. The reservoir should be concrete so that the landscape design can include partially burying the tank.
6. A ten foot construction clearance around the outside footing ring is required. After tank construction, the clearance area can be filled in and contoured accordingly.
7. Allow four roof penetrations; two vents, one access hatch, and one additional hatch.
8. Valve pit located at least ten feet away from the tank footing.
9. Sampling cabinet should be located near the valve pit, on the tank wall.

10. For operational purposes, vehicle access is required to valve pit and sampling cabinets.
11. 2 vehicle parking stalls are required.
12. Fault Trace – Primary trace located 150 feet to the west. B-Zone (the area expected to accommodate secondary and distributed deformation) extends 100 feet into the western most embankment of the existing reservoir.
13. One-tank design preferred.
14. Inlet/Outlet Modification – The Cast Iron Pipeline should be replaced.
15. Contractor Staging Area – Near existing Reservoir Isolation Valve (RIV).
16. RIV Relocation – Plans will be to relocate Reservoir Isolation Valve adjacent to new valve pit. Area to be hydroseeded.

5.2 LANDSCAPE & SITE DESIGN GUIDELINES

5.2.1 GRADING

1. Proposed layout assumes approximately 8,000 cubic yards of soil to be moved on the site with the goal to keep the site earthwork balance and bury the reservoir tank as much as possible.
2. Off-site hauling and import of soil to be minimized.
3. Final contouring and slopes within the planted areas are not to exceed 3:1.
4. EBMUD to determine specifications and depths of structural fill required under reservoir tank, but for preliminary grading 2,000 C.Y. of structural fill was assumed.

5.2.2 STORM DRAINAGE

1. Storm drainage swales will be installed with 4”-8” diameter drain rock with a subsurface drain piping system. The site shall have no standing water and will be tied into the existing storm drain system.
2. Storm water management design summary:
   a. Irrigated plants reduce runoff quantities through evapotranspiration, stabilize hillside, and when planted with certain fire resistant species can provide a significant fire break.
   b. Non-irrigated Hydro-seeded wildflowers and grasses increase water quality by reducing the pollutants in site runoff by slowing the water flow and allowing heavy metals and sediment to fall out of the runoff flow.
   c. The gravel beds act as a mechanical device to increase water quality creating cavities for sediment and other pollutants to settle out of the run off flow as the energy and speed of the flow is reduced. In addition the overall runoff has been found to be reduced somewhat by allowing trapped water to evaporate as opposed to running off the site.

5.2.3 ROAD/ACCESS

1. Existing access points to remain – 39th Avenue and Maybelle Avenue.
2. Twelve foot wide asphalt roadway with adjacent three foot wide concrete v-ditch.
3. 15% max. roadway slope design.
4. Preferred roadway layout: 8-10% slope.

5.2.4 PLANTING

1. Drought tolerant, do not have to be California natives.
2. Low maintenance plant material.
3. Design for growth habit to natural size and shape to minimize trimming requirements.
4. Local plant palette.
5. Trees- screen trees, shade canopy trees, medium and small accent trees. A mix of evergreen and deciduous.
6. Shrubs- generally along the perimeter and at the bottom along the roadway and drain rock swale area. Low and spreading. Seasonal color should be considered for aesthetic as well as wildlife benefits.

7. Wildflowers/Grasses mix- seed mix to stabilize the exposed slopes, low growing heights, and seasonal color.
8. Trees, shrubs and grasses are to be cut to meet fire specification standards.
9. Wildflower/grass seed mix to be installed at least 30 feet away from fencelines for fire safety.

The following is a list of recommended plant material which is appropriate for the site location, plant characteristics, fire resistance and maintenance requirements:

5.2.5 TREES

Arbutus menziesii-Pacific Madrone
Arbutus unedo-Strawberry Tree
Chilopsis linearis-Desert Willow
Ceanothus 'Ray Hartman'-Ray Hartman Ceanothus
Lagerstroemia X `Tuscarora`-Crape Myrtle Coral Pink
Quercus agrifolia-Coast Live Oak
Quercus kellogii-California Black Oak
Quercus lobata-Valley Oak

5.2.6 SHRUBS

Arctostaphylos 'Pacific Mist'-Pacific Mist Manzanita
Cercis occidentalis -Wesern Redbud
Cistus X skabergii -Pink Rockrose
Epilobium canum-California Fushsia
Garrya elliptica-Silktassel
Heteromeles arbutifolia-Toyon
Rhamnus californica 'Eve Case'-Eve Case Coffeeberry
Rhus integrifolia-Lemonade Berry
Ribes sanguineum-Red Flowered Currant
Sisyrinchium -Blue-Eyed Grass

5.2.7 GROUNDCOVER

Arctostaphylos 'Emerald Carpet'-Emerald Carpet Bearberry
Ceanothus griseus horizontalis 'Yankee Point'-Carmel Creeper
Cotoneaster dammeri "Lowfast'-Lowfast Bearerry Contoneaster
Iris douglasiana -Douglas Iris
Lupinus albifrons-Silver Bush Lupine
Lantana montevidensis -Trailing Lantana
Salvia sonomensis-Creeping Sage

5.2.8 HYDRO-MULCH

Erosion control grass: "Heritage Mix 'Bay Area' "
(40 Total Lbs/ Acre, By Pacific Coast Seed)
Hordeum californicum (12 Lbs)-California Barley
Nassella pulchra (9 Lbs)-Purple Needlegrass
Nassella cernua (9 Lbs)-Nodding Needlegrass
Melica californica (6 Lbs)-California Oniongrass
Poa secunda (4 Lbs)-Native Pine Bluegrass

Wildflower mix: "California Bay Area Wildflower Mix"
(Additional 10 Lbs/Acre Added "Heritage Mix" Above, By Pacific Coast Seed)
Achillea millefolium-Native Yarrow
Castilleja exerta-Purple Owls Clover
Clarkia purpurea-Wine Cup-Clarkia
Eriogonum nuduin-Naked Buckwheat
Eriophylhun confertifloiurn-Golden Yarrow
Eschscholzia californica-California Poppy

Lupinus nanus-Sky Lupine
Lupinus bicolor-Pygmy-Leaf Lupine
Ranunculus californica-Californi Buttercups
Sisyrinchium bellum-Blue Eyed Grass
Triphysaria-Eggs & Butter
Wyethia angustifolia-Mule Ears

Seed mix, "Heritage Mix 'Bay Area'" and "California Bay Area Wildflower Mix" are available through Pacific Coast Seed, 533 Hawthorne Place, Livermore, CA 94550, (925) 373-4417

5.2.8 IRRIGATION

1. Drip irrigation application in shrub and groundcover zones.
2. Isolated valves for drip application to trees.
3. Hydroseeded grasses and wildflower mix. Non-irrigated.

5.3 SITE ARCHITECTURAL DESIGN GUIDELINES

5.3.1 WALLS

1. Concrete construction walls, shall be standard gray concrete color.
2. Tank side walls to be painted per federal 595B color 14159 Avocado.

5.3.2 ROOF

1. Concrete construction roof, shall be standard gray concrete color.
2. Exposed, non-rock areas to be painted or stained per federal 595B color 14159 Avocado.
3. Per plan layout, 4”-8” diameter drain rock to be mortared in place on top of concrete roof structure.
4. 1% roof slope.

5.3.3 ROOF RAILING

1. 42” high safety hand railing the entire perimeter of roof.
2. Pipe and cable combo system (recommended FENNEY product line or equal).

5.3.4 LIGHTING

1. No additional site or security lighting to be installed.

5.3.5 FENCING

1. Perimeter Fencing:
   a. 8’ high black vinyl coated fencing.
   b. 1” mesh fencing.
   c. V-barb top, all fence.
2. Interior Fencing:
   a. 8’ high black vinyl coated fencing.
   b. 3/8” mesh fence.
   c. V-barb top, all fence.
   d. Fencing at tank roof area to occur per plan guidelines at all locations along perimeter of tank where there is less than an 8’ difference between finish grade and top of roof. Alternatively, fencing length can be reduced if a portion of the 42” high safety railing system is converted to an anticlimb system.

5.3.6 MISCELLANEOUS SITE STRUCTURES

1. Communication Antenna mounted at roof.
2. 2” pole, 10’ high with box.
3. EBMUD to confirm location.

6 MAGNITUDE OF COSTS

6.1 MAGNITUDE OF COSTS

EBMUD PROJECTED COSTS

3.5 MG Tank	Bid Price	Reference
General Conditions/Insur./bonds	$500,000	Spec 1991
Demolish Existing Roof	$600,000	Spec 1995
Foundation	$300,000	
3.5 MG Prestressed Tank	$3,200,000	Spec 1991
Temporary Cut	$100,000	
Valve Pit&Piping	$400,000	Spec 1991
Access Road	$100,000	Spec 1991
Backfill Around Tank	$100,000	
Landscape	$300,000	
Visual Improvements	$125,000	
Pedestrian tank perimeter access	$140,000	
Electrical	$300,000	
Sub Total	$6,165,000	
Design & Construction	$1,541,250	
Contingency @ 20%	$1,233,000.0	
Total Tank Cost ($M)	**$8.9**	

Estimate Exclusions:

1. Site demolition is not included.
2. Design, permitting, and construction management not included.
3. Maintenance and establishment not included.

7 APPENDIX

7.1 LIST OF TABLES / ILLUSTRATIONS

APPENDIX