



THE CITY OF SAN DIEGO

Report to the Historical Resources Board

DATE ISSUED: August 18, 2016 REPORT NO. HRB-16-050

ATTENTION: Historical Resources Board
Agenda of August 25, 2016

SUBJECT: **ITEM #7 – Morena Reservoir Dam and Outlet Tower**

APPLICANT: City of San Diego

LOCATION: 2550-A Lake Morena Drive, Campo, 91906

DESCRIPTION: Consider the designation of the Morena Reservoir Dam and Outlet Tower located at 2550-A Lake Morena Drive as a historical resource.

STAFF RECOMMENDATION

Designate the Morena Reservoir Dam and Outlet Tower located at 2550-A Lake Morena Drive as a historical resource with a period of significance of 1896-1946 under HRB Criteria A, C and D. This recommendation is based on the following findings:

1. The resource is a special element of the San Diego's historical and engineering development and retains integrity to its period of significance. Specifically, the Morena Reservoir Dam and Outlet Tower are directly associated with events that have made a significant contribution to the history of water development in the San Diego region. When construction began in the 1890s, the Morena Dam was heralded as the solution to the City's persistent water problems, as it would have the largest capacity of any local dam, and its completion in 1912 was a critical milestone in advancing the City's infrastructure. In addition, the Morena Reservoir Dam and Outlet Tower – the largest rockfill dam in the world at the time of its construction in 1912 - also represents a significant engineering achievement in San Diego.
2. The resource embodies the distinctive characteristics through the retention of character defining features of a rockfill dam and retains a good level of architectural integrity from its period of significance. Specifically, the Morena Reservoir Dam is the oldest dam in the City, and represents an engineering achievement that embodies the distinctive characteristics of a rockfill dam (an increasingly rare dam type in California from this time period), including improvements that correlate to important building periods in state and local water infrastructure development.
3. The resource is representative of a notable work of proposed Master Engineer M.M. O'Shaughnessy. Specifically, O'Shaughnessy was hired for the Morena project in 1909 during the second phase of construction of the dam and its associated outlet tower. While

O'Shaughnessy developed a long list of impressive engineering structures throughout his career, the Morena Dam represents a particularly noteworthy example of his work for the fact that the dam represents a unique construction technique. Further, at the time of its construction, Morena Dam was said to be the largest rockfill dam in the world, making it one of the most important structures ever designed by O'Shaughnessy.

BACKGROUND

This item is being brought before the Historical Resources Board in conjunction with a proposed modification or demolition of a structure of 45 years or more, consistent with San Diego Municipal Code Section 143.0212. The Morena Dam and Outlet Tower is located on APN 603-080-06-00, as shown on the map provided in Attachment 2, and is on a small area of City-owned land near Campo in the unincorporated area of San Diego County. The property has not been identified in any historic surveys, as the subject area has not been previously surveyed. A photo survey prepared by staff is included in Attachment 3.

The historic name of the resource, the Morena Reservoir Dam and Outlet Tower, has been identified consistent with the Board's adopted naming policy and reflects the name placed on the resource at the time of construction.

The Morena Dam is located in a canyon 80 feet wide, with side slopes in the solid granite rising at a 45-degree angle. The dam is a loose rockfill structure with a concrete masonry water face. The crest measures 550 feet wide with a 20-foot-thickness at the coping. The dam sits 171 feet above the streambed (to the top of the parapet wall). The existing parapet wall is approximately 4 feet high (above the crest) and contains a series of evenly spaced wide concrete block columns that span the top of the wall. The parapet wall (constructed in 1930) is reinforced with metal spacer bars and wall anchors. The upstream face of the dam is composed of 6- to 10-ton blocks of rubble granite set in concrete mortar, and is constructed on a slope of 9 horizontal to 10 vertical. Reinforced concrete slabs (approximately 1.5 feet thick) are attached to the solid masonry with iron rods and make up the upper water face of the dam. The rockfill portion of the dam (the lower 120 feet) consists of hand-placed derrick and crevices chinked with small stones. A concrete cut-off wall extends 112.5 feet below the streambed, making the total height of the dam (including the portion below the streambed) 283.5 feet.

Documented alterations to the dam face include raising the crest 5 feet in 1917, raising the crest an additional 10 feet in 1923 by placing a 15-foot-thick layer of loose rock on the downstream face from the berm to the crest, and raising the dam another 4 feet in 1930 by adding a 6-foot thickness to the downstream face from the berm to the crest and raising the parapet wall vertically.

The dam's concrete spillway is an ungated ogee crest type located on the north side of the dam. The spillway has a capacity of 25,000 cubic feet per second at the dam crest. The crest of the concrete spillway is 155 feet above the streambed, extends 312 feet upstream from the north section of the dam, and discharges through a channel. The length of the spillway channel is 317 feet. Documented alterations to the spillway include removing the original gate structures and trash racks in 1917; raising the spillway crest and increasing its length in 1923; installing 22 automatic gates and lengthening the channel to 312 feet in 1930; and enlarging the spillway, raising the crest an additional 2 feet, and removing the gate structures in 1946.

The cylindrical Morena Outlet Tower measures 15.5 feet in external diameter with walls varying in thickness from 20 to 36 inches and a maximum height of 172 feet. The top of the concrete tower features a reinforced concrete operating deck that regulates the outer gates, and a steel-reinforced cupola with an exterior staircase with pipe railing at the very top. The gates were manufactured by the Coffin Valve Company and were of sluice type with vertical stems controlled by guides. Each gate contains a screen cover to keep trash and other debris from entering into the 24-inch-diameter circular cast-iron pipes. The pipes run through the walls of the tower and connect with a 30-inch-diameter vertical down-pipe that discharges into the tunnel. The tunnel, measuring 387 feet long, 8 feet wide, and 7.5 feet high, was built through the solid bedrock on the south side of the dam at a 30-foot contour. It is lined with concrete and connects to the base of the outlet tower. The tunnel draws water from the reservoir by means of the reinforced concrete outlet tower structure. Documented alterations to the exterior of the outlet tower include removal of the original steel pedestrian footbridge that accessed the outlet tower from the south side of the reservoir (exact date unknown, but post- 1948), and addition of the cupola, including an exterior staircase with pipe railings (1930). It is also known that various internal alterations have occurred, likely associated with routine maintenance of the tower and its equipment (specifics unknown).

ANALYSIS

A Historical Resource Technical Report (HRTTR) was prepared by Dudek, which concludes that the resource is significant under HRB Criteria A, B, C and D. Staff concurs that the site is a significant historical resource under HRB Criteria A, C and D, but not Criterion B, and recommends that the significance that the HRTTR has identified under HRB Criterion B is better reflected under HRB Criterion A. This determination is consistent with the *Guidelines for the Application of Historical Resources Board Designation Criteria*, as follows.

CRITERION A - Exemplifies or reflects special elements of the City's, a community's or a neighborhood's historical, archaeological, cultural, social, economic, political, aesthetic, engineering, landscaping or architectural development.

Morena Dam, the outlet tower, and reservoir are directly associated with events that have made a significant contribution to the history of water development in the San Diego region. As the second oldest dam in San Diego County (after Sweetwater, 1888) and oldest dam with the City system, the Morena Dam is significant for its association with San Diego's water infrastructure, which was essential to the stability of the region. Water or the lack thereof played a critical role in the planning, growth and development of San Diego County, and the City. When construction began in the 1890s, the Morena Dam was heralded as the solution to the City's persistent water problems, as it would have the largest capacity of any local dam. Although its construction did not succeed in alleviating the City's entire water shortfall, its completion in 1912 was a critical milestone in advancing the City's infrastructure. The Morena Dam was part of the Otay-Cottonwood watershed, which would ultimately become the primary supplier of water to San Diego.

The construction of the Morena Reservoir Dam and Outlet Tower also marks an important engineering achievement in San Diego. At the time of its construction, the Morena Dam was said to be the largest rockfill dam in the world, and is important as a rare example of early rockfill-type construction. Its initial construction from 1886 until 1912 was also an important milestone in the

development of municipal dams in California and is recognized for its considerable size, construction techniques and workmanship which were all significant for this period. It also stands apart from other dams in the San Diego region (i.e., Sweetwater, Savage, Barrett), which are of concrete gravity-arch type.

Significance Statement: The Morena Reservoir Dam and Outlet Tower are directly associated with events that have made a significant contribution to the history of water development in the San Diego region. When construction began in the 1890s, the Morena Dam was heralded as the solution to the City's persistent water problems, as it would have the largest capacity of any local dam, and its completion in 1912 was a critical milestone in advancing the City's infrastructure. In addition, the Morena Reservoir Dam and Outlet Tower – the largest rockfill dam in the world at the time of its construction in 1912, also represents a significant engineering achievement in San Diego. Therefore, staff recommends designation of the Morena Reservoir Dam and Outlet Tower under HRB Criterion A as a special element of San Diego's historical and engineering development.

CRITERION B - Is identified with persons or events significant in local, state or national history.

The HRTR states that the subject property is associated with events significant in local, state, and national history. The HRTR argues that construction of the Morena water project was a major undertaking in a remote part of San Diego that required significant planning and coordination, and was an important event at the time construction began. The Morena Dam was part of the Otay-Cottonwood watershed, which would ultimately become the primary supplier of water to San Diego. The subject property is directly associated with important events related to water development in the San Diego region, namely with the City gaining source water independence and being a critical component to the water infrastructure that supported the City's growth and development until the end of World War II; and the HRTR therefore concludes that the property is significant under HRB Criterion B.

In regard to HRB Criterion B, the Board's adopted *Guidelines for the Application of Historical Resources Board Designation Criteria* states that "Resources associated with historical events are those associated with a single event such as the place where an important battle occurred, a building in which an important invention was developed, or a factory district where a significant strike occurred." The effort to bring a reliable water source to San Diego was a decades-long battle, and the construction of the dam occurred over two long phases from 1896-1912 and 1912-1946. The construction of the dam and its role in the effort to supply San Diego with water can therefore not be characterized as a singular event, as required by HRB Criterion B. Staff concurs that the dam is highly significant to San Diego's water history, but believes that significance is better reflected in HRB Criterion A, as detailed above. Therefore, staff does not recommend designation under HRB Criterion B.

CRITERION C - Embodies distinctive characteristics of a style, type, period or method of construction or is a valuable example of the use of natural materials or craftsmanship.

The Morena Dam and Outlet Tower is the second oldest dam in San Diego County (after Sweetwater, 1888) and is the oldest dam owned and operated by the City of San Diego. At the time of its construction, the Morena Dam was said to be the largest rockfill dam in the world. A rockfill dam is a type of construction that originated in California in the 1850s during the Gold Rush when miners would use drill and blast techniques to create an abundant supply of rock material for construction.

Early rockfill dams (the first major milestone in rockfill dam construction) were small and composed of loosely dumped rockfill with an upstream timber face to slow water seepage. In the early 1900s, rockfill dams reached a new milestone, with heights exceeding 100 feet. The Morena Dam falls into this second milestone of rockfill dam construction techniques, which is evident in California between the 1910s and 1940s. The Morena Dam also stands apart from other dams in the San Diego region (i.e., Sweetwater, Savage, Barrett), which are of concrete gravity-arch type. Examples of rockfill dams from the second milestone of rockfill dam construction techniques (1910s to the 1940s) are becoming increasingly rare in Southern California, and early examples like Morena Dam are non-existent.

All of the rockfill along the upper half of the dam face was positioned by derrick and hand placement techniques. The crevices of the rockfill were detailed by hand, hammering with a small stone to ensure that sharp edges were removed and to prevent serious settlement. The work required a small army of men to provide intricate handwork and stability to the dam face. Subsequent improvements to the dam, including increases to the dam crest and spillways, have not altered the character-defining elements of this rockfill construction, which demonstrate the careful workmanship that went into its initial construction. Rather, these improvements correlate with important milestones in the advancement of water infrastructure that were occurring throughout the San Diego region, California, and the United States, and thus, contribute to the dam's significance by reflecting important safety-related building practices occurring in the San Diego region. The rockfill dam, its associated concrete crest/parapet improvements, associated outlet tower, spillways and sluice gates are all contributing elements, which reflect the importance of the function and significance of the dam. Therefore, the period of significance for the dam and outlet tower's construction history is 1896-1946.

Significance Statement: The Morena Dam is the oldest dam in the City, and represents an engineering achievement that embodies the distinctive characteristics of a rockfill dam (an increasingly rare dam type in California from this time period), including improvements that correlate to important building periods in state and local water infrastructure development. Therefore, staff recommends designation under HRB Criterion C.

CRITERION D - Is representative of a notable work of a master builder, designer, architect, engineer, landscape architect, interior designer, artist or craftsman.

Over ten years into the embattled construction of the dam, Michael Maurice O'Shaughnessy was hired to serve as chief engineer and oversee completion of the Morena Dam and Dulzura Conduit. O'Shaughnessy had an impressive resume of large-scale engineering structures and municipal projects during the early 20th century, including the Merced River Dam, Throttle Dam, the Twin Peaks Reservoir and Tunnel, the Stockton Street Tunnel, the Municipal Railway System, San Francisco's streetcar system, the Hetch Hetchy Reservoir and Power Project, the Lake Eleanor Dam, and the O'Shaughnessy Dam. O'Shaughnessy was hired for the Morena project in 1909 during the second phase of construction of the dam and its associated outlet tower.

After what had turned out to be a disastrous first phase of construction, which included construction of a faulty toe wall and numerous deviations from the original plan specifications, O'Shaughnessy breathed new life into the project. He brought with him a high level of engineering expertise (which had been severely lacking from the project), redesigned the dam to new specifications (which included scrapping much of the original faulty construction), and provided a more professional and safe

working environment with appropriate oversight. In 1913, as a regular contributor to the publications of the Society of Civil Engineers, O'Shaughnessy won the James Laurie Prize for his 1911 article, "Construction of the Morena Rockfill Dam". This was also the first James Laurie Prize ever awarded.

In regard to integrity, the post-1912 alterations have not resulted in any major changes to either the original rockfill dam or outlet tower. The Morena Dam's previous alterations are easily distinguished from the original construction, appearing in the form of new layers of reinforced concrete atop the original 1912 section of the dam. In this manner, the historic alterations have not impacted the integrity of O'Shaughnessy's original design, as the original 1912 dam face is still easily distinguished from the more recent layers.

Significance Statement: The Morena Reservoir Dam and Outlet Tower represent a notable work of proposed master engineer M.M. O'Shaughnessy. O'Shaughnessy was hired for the Morena project in 1909 during the second phase of construction of the dam and its associated outlet tower. While O'Shaughnessy developed a long list of impressive engineering structures throughout his career, the Morena Dam represents a particularly noteworthy example of his work for the fact that the dam represents a unique construction technique. Further, at the time of its construction, Morena Dam was said to be the largest rockfill dam in the world, making it one of the most important structures ever designed by O'Shaughnessy. Therefore, staff recommends designation under HRB Criterion D.

CRITERION E - Is listed or has been determined eligible by the National Park Service for listing on the National Register of Historic Places or is listed or has been determined eligible by the State Historical Preservation Office for listing on the State Register of Historical Resources.

The Morena Reservoir Dam and Outlet Tower has not been listed on or determined eligible for listing on the State or National Registers. Therefore, the property is not eligible for designation under HRB Criterion E.

CRITERION F - Is a finite group of resources related to one another in a clearly distinguishable way or is a geographically definable area or neighborhood containing improvements which have a special character, historical interest or aesthetic value or which represent one or more architectural periods or styles in the history and development of the City.

The Morena Reservoir Dam and Outlet Tower is not located within a designated historic district. Therefore, the property is not eligible for designation under HRB Criterion F.

OTHER CONSIDERATIONS

If the property is designated by the HRB, conditions related to restoration or rehabilitation of the resource may be identified by staff during the Mills Act application process, and included in any future Mills Act contract.

CONCLUSION

Based on the information submitted and staff's field check, it is recommended that the Morena Reservoir Dam and Outlet Tower located at 2550-A Lake Morena Drive be designated with a period of significance of 1896-1946 under HRB Criterion A as a special element of San Diego's historical and

engineering development, Criterion C as a resource that embodies the distinctive characteristics of a rockfill dam, and HRB Criterion D as a resource that reflects the notable work of proposed Master Engineer M.M. O'Shaughnessy. Designation brings with it the responsibility of maintaining the building in accordance with the Secretary of the Interior's Standards. The benefits of designation include the availability of the Mills Act Program for reduced property tax; the use of the more flexible Historical Building Code; flexibility in the application of other regulatory requirements; the use of the Historical Conditional Use Permit which allows flexibility of use; and other programs which vary depending on the specific site conditions and owner objectives.



Keller Stanco
Senior Planner/HRB Liaison

KS

Attachments:

1. Draft Resolution
2. Assessor's Parcel Map
3. Staff's Photo Survey
4. Applicant's Historical Report under separate cover

RESOLUTION NUMBER N/A
ADOPTED ON 8/25/2016

WHEREAS, the Historical Resources Board of the City of San Diego held a noticed public hearing on 8/25/2016, to consider the historical designation of the **Morena Reservoir Dam and Outlet Tower** (owned by City of San Diego, 1200 Third Avenue, Suite 1700, San Diego, CA 92101) located at **2550-A Lake Morena Drive, Campo, CA 91906**, APN: **603-080-06-00**, further described as SEC 23-17-4E TCT 55 14.46 AC M/L IN in the County of San Diego, State of California; and

WHEREAS, in arriving at their decision, the Historical Resources Board considered the historical resources report prepared by the applicant, the staff report and recommendation, all other materials submitted prior to and at the public hearing, inspected the subject property and heard public testimony presented at the hearing; and

WHEREAS, the property would be added to the Register of Designated Historical Resources as **Site No. 0**, and

WHEREAS, designated historical resources located within the City of San Diego are regulated by the Municipal Code (Chapter 14, Article 3, Division 2) as such any exterior modifications (or interior if any interior is designated) shall be approved by the City, this includes but is not limited to modifications to any windows or doors, removal or replacement of any exterior surfaces (i.e. paint, stucco, wood siding, brick), any alterations to the roof or roofing material, alterations to any exterior ornamentation and any additions or significant changes to the landscape/ site.

NOW, THEREFORE,

BE IT RESOLVED, the Historical Resources Board based its designation of the Morena Reservoir Dam and Outlet Tower on the following findings:

(1) The property is historically significant under CRITERION A as a special element of San Diego's historical and engineering development that retains integrity to its 1896-1946 period of significance. Specifically the Morena Reservoir Dam and Outlet Tower are directly associated with events that have made a significant contribution to the history of water development in the San Diego region. When construction began in the 1890s, the Morena Dam was heralded as the solution to the City's persistent water problems, as it would have the largest capacity of any local dam, and its completion in 1912 was a critical milestone in advancing the City's infrastructure. In addition, the Morena Reservoir Dam and Outlet Tower – the largest rockfill dam in the world at the time of its construction in 1912 - also represents a significant engineering achievement in San Diego. This finding is further supported by the staff report, the historical research report, and written and oral evidence presented at the designation hearing.

(2) The property is historically significant under CRITERION C as a resource that embodies the distinctive characteristics of a rockfill dam and retains integrity to its 1896-1946 period of significance. Specifically, the Morena Reservoir Dam is the oldest dam in the City, and represents an engineering achievement that embodies the distinctive characteristics of a rockfill dam (an increasingly rare dam type in California from this time period), including improvements that correlate to important building periods in state and local water infrastructure development. This finding is further supported by the staff report, the historical research report, and written and oral evidence presented at the designation hearing.

(3) The property is historically significant under CRITERION D as a notable work of proposed Master Engineer M.M. O'Shaughnessy and retains integrity to its 1896-1946 period of significance. Specifically, O'Shaughnessy was hired for the Morena project in 1909 during the second phase of construction of the dam and its associated outlet tower. While O'Shaughnessy developed a long list of impressive engineering structures throughout his career, the Morena Dam represents a particularly noteworthy example of his work for the fact that the dam represents a unique construction technique. Further, at the time of its construction, Morena Dam was said to be the largest rockfill dam in the world, making it one of the most important structures ever designed by O'Shaughnessy. This finding is further supported by the staff report, the historical research report, and written and oral evidence presented at the designation hearing.

BE IT FURTHER RESOLVED, in light of the foregoing, the Historical Resources Board of the City of San Diego hereby approves the historical designation of the above named property. The designation includes the parcel and exterior of the building as Designated Historical Resource **Site No. 0**.

BE IT FURTHER RESOLVED, the Secretary to the Historical Resources Board shall cause this resolution to be recorded in the office of the San Diego County Recorder at no fee, for the benefit of the City of San Diego, and with no documentary tax due.

Vote: N/A

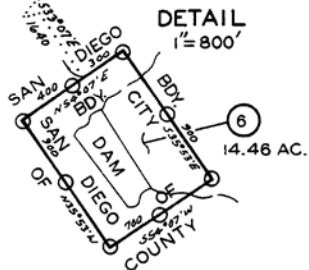
BY: _____
COURTNEY ANN COYLE, Chair
Historical Resources Board

APPROVED: JAN I. GOLDSMITH,
CITY ATTORNEY

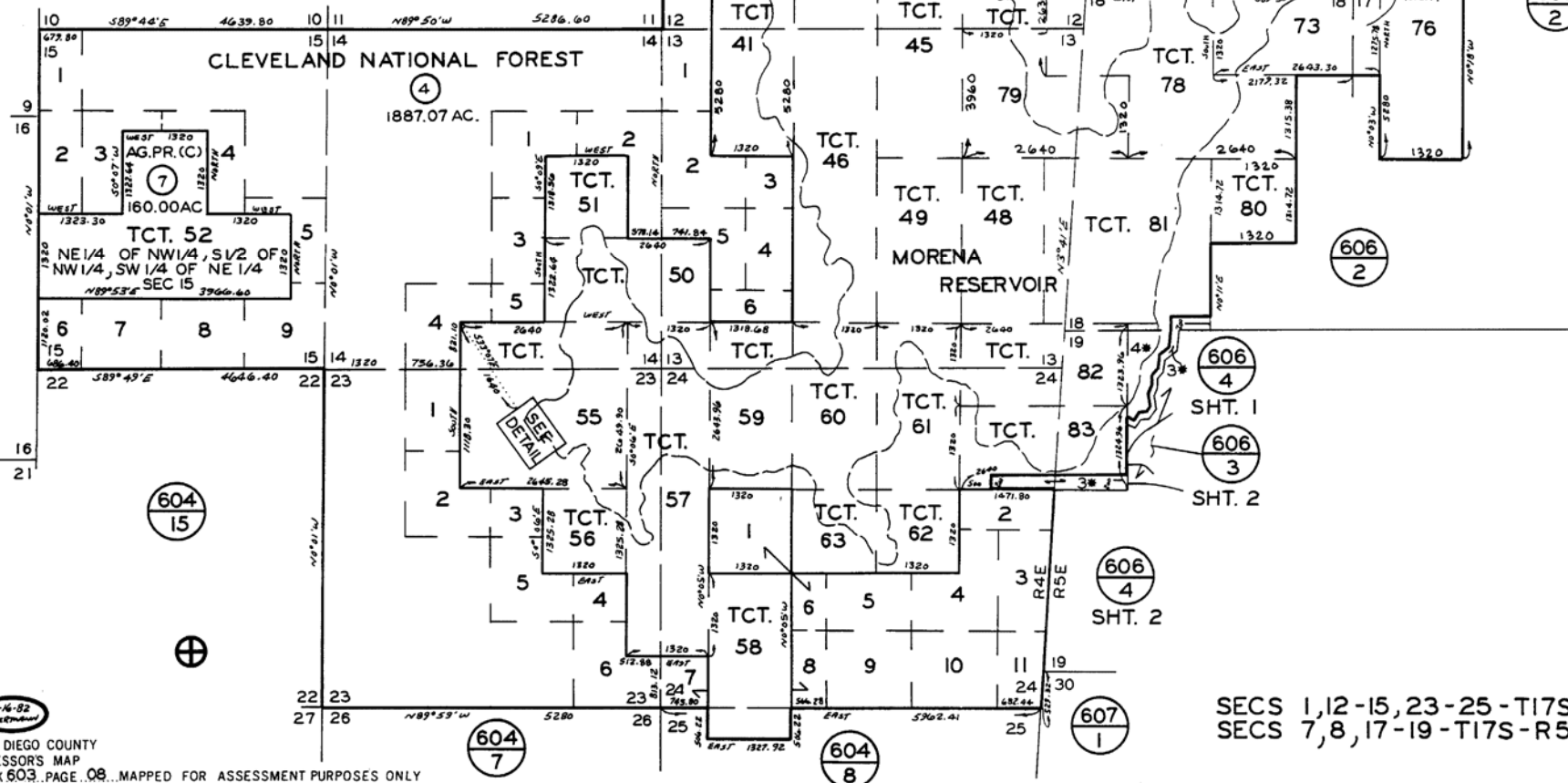
BY: _____
CORRINE NEUFFER,
Deputy City Attorney

DRAFT

COR. NO. 2
TCT. 55



AG. PR. (C) = AGRICULTURAL PRESERVE (CONTRACT)

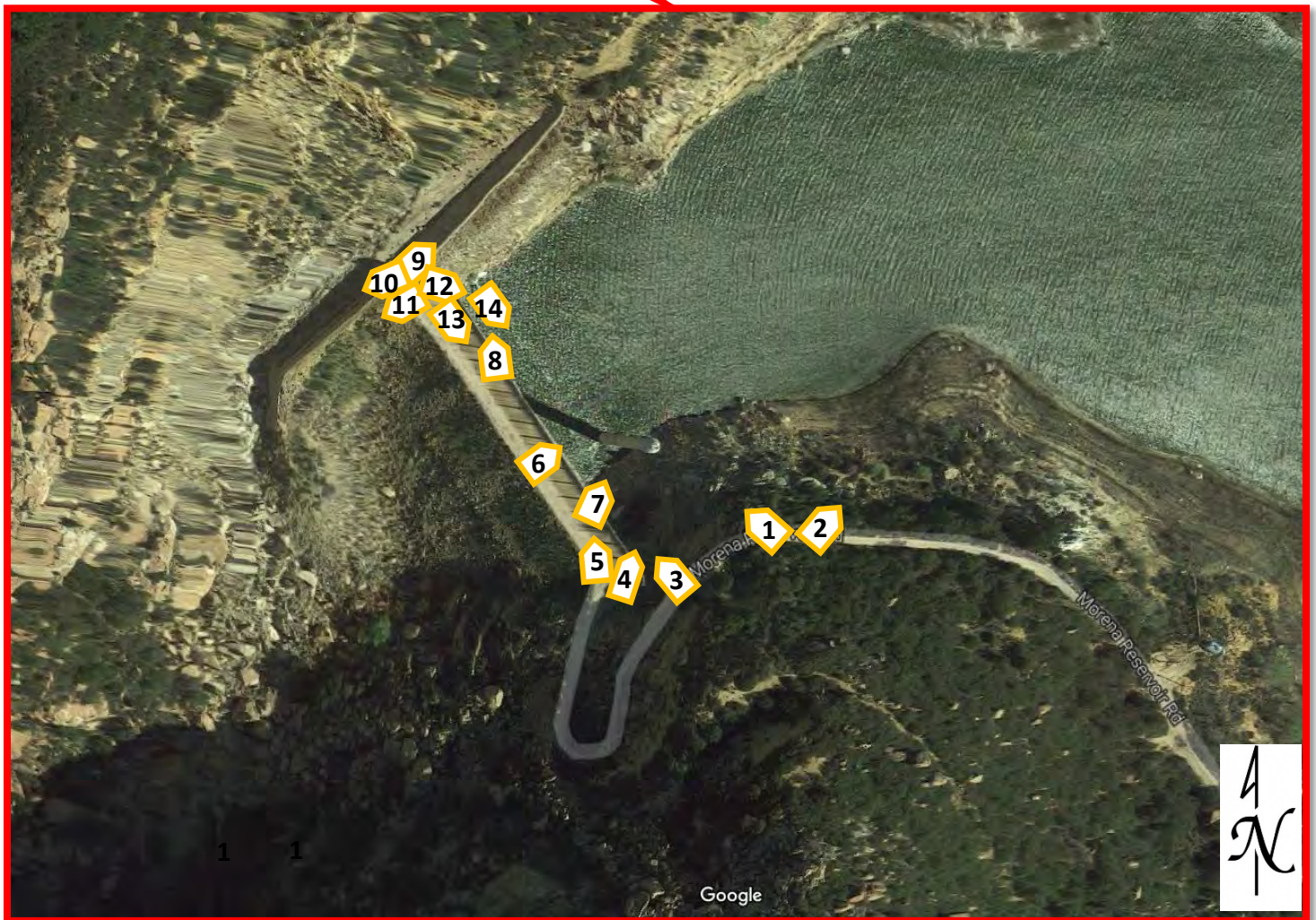


4-27-89

| CHANGES | | | |
|---------|-----|------|------|
| BLK | OLD | NEW | CUT |
| 4 | 83 | 2821 | |
| 5 | 83 | 2822 | |
| 6 | 7 | 83 | 1053 |

- 1* APPROX. C BUCKMAN SPRING ROAD 60FT WIDE RS 653
- 2* APPROX. C MORENA STOKES ROAD 60FT WIDE RS 571
- 3* APPROX. LOC. PACIFIC CREST
- 4* POR. TCT. 50
- 5* ⑤ 760-122-02
-03
-04
-05

MORENA RESERVOIR DAM AND OUTLET TOWER
STAFF PHOTO SURVEY
Taken August 5, 2016



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3.



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14.



