



THE SURFRIDER FOUNDATION, SAN FRANCISCO CHAPTER

The Untold Story Behind the Erosion Mess South of Sloat

The roots of the erosion conflict at south Ocean Beach, San Francisco

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The Aftermath of the 2010 El Niño photo B. McLaughlin

As a major El Niño winter begins to set in, meteorologists have been telling us for months to prepare for heavy erosion and storm damage along our beaches. Here in San Francisco, we have a poster child for this phenomenon: the Great Highway Extension south of Sloat Boulevard. Ever since the mid 1990's, this area has been ground zero for beach erosion and storm damage. It was here back in 2010, during our last El Niño, that a piece of the road fell into the surf. That winter, a chain of storms brought massive waves crashing against the base of the road. Concrete debris that held up the road was clawed away, spilling out onto the beach below. As in prior El Niño events, the San Francisco Department of Public Works had to declare an emergency to protect the road as well as a sewer line underneath. The agency quickly built a giant wall of boulders to protect the infrastructure. Today, the Great Highway Extension is fully repaired with the vulnerable portion slightly realigned inland. However, the beach below, or what is left of it, remains a rocky mess. The public parking lots are crumbling away while a wastewater line under the road still lies perilously close to the sea.

Thankfully, a City-backed plan to address the Sloat erosion mess is on the table. In 2012, San Francisco Planning and Urban Research (SPUR) released the Ocean Beach Master Plan (OBMP). The OBMP calls for a strategy to safeguard the infrastructure while also restoring the beach. The SPUR design, which was forged with community input, relies on a hybrid approach to the erosion quandary: the road and parking lots are to be secured by using "managed retreat" – a plan to relocate them inland in phases. The wastewater line in danger – otherwise known as the Lake Merced Tunnel - is slated to be protected by a buried seawall. Once the Lake Merced Tunnel is protected, the beach may finally be cleaned up and restored.

Since its release in 2012, the Ocean Beach Master Plan has received much praise and publicity for this innovative approach to coastal erosion. Last year president Obama's environmental policy advisor Michael Boots visited the area to survey the erosion hotspot. He showered praise on the OBMP, saying that it serves as a national model for sea level rise and climate change adaptation. However, there is one very important piece of the Sloat erosion story that has gone unreported thus far: back in the 1970's, when the City was planning to build the wastewater infrastructure now at risk from erosion, officials

were warned not to site the project close to the surf at Ocean Beach.¹ Erosion and wave attack were predicted to threaten the infrastructure. In fact, the City was almost denied a permit to build the wastewater project because of the erosion threat. In the end, the City prevailed, but only after fighting an epic battle that included warnings from coastal engineers, outrage from concerned citizens, opposition from neighborhood groups, exasperation from the GGNRA, and strict conditions from the California Coastal Commission.

This is the Untold Story behind the Erosion Mess South of Sloat

The roots of the conflict began with the environmental laws passed in the late 1960's to early 1970's. The National Clean Water Act (1972) was landmark federal regulation that put in place new water quality standards for our oceans and bays. Around the same time, California had just created its own network of agencies to advance clean water policies: the state Water Resources Quality Control Board and nine Regional Water Quality Control Boards (RWQCBs). One of the early actions of the RWQCBs was to force coastal cities with poor water quality - like San Francisco - to install major upgrades to their sewage treatment systems.

San Francisco had poor water quality surrounding its shoreline because of a sewage overflow problem. The problem lies in the fact that our sewer system is "combined" which means sewage waste shares the same pipeline that catches street runoff during storms. During rainfall events the sewers used to (and occasionally still do) fill up to the point in which they get overloaded with street run-off. Because the city's sewage treatment plants can only process and clean so much effluent at a time, excess wastewater is discharged directly into our bay, ocean and city beaches. Before the upgrades mandated by the Regional Water Quality Control Board, the sewer system would overflow anywhere from eighty to a hundred plus times per year.

By the mid 1970's, San Francisco came under intense pressure from the new Regional Water Quality Control Board² to address this situation. The City answered by building the Clean Water Program - a network of large concrete boxes to capture, store and transport the storm water and sewage mix. Known as transport boxes, these conduits would live under city streets that lined the perimeter of town. When completed, most of the excess combined effluent could be temporarily held in transport boxes until after the storm event; and then slowly fed back into our city's wastewater plants. Storm water discharge events would eventually be reduced to an average of 8 per year. The Clean Water Program would eventually provide a major boost to our ocean and bay's water quality.

During the early months of 1977, the City began looking for a location to build the transport box for the west side neighborhoods of the Sunset and Richmond Districts. The initial plan was to place the structure underneath 42nd Ave. In that location, gravity could be used to bring the neighborhood's wastewater to the new Oceanside Treatment Plant, which was slated to be built adjacent to the SF Zoo.

¹ See 1978 Memorandum North Central Regional Commission *Findings of Denial for Permit Application #137-77 & #128-78, City and County of San Francisco*, p.2.

² Because of delays on implementing a sewer upgrade, the board had placed a building moratorium on the City. See Statement by Roger B. James, Assistant Executive Officer California Regional Water Quality Control Board, San Francisco Bay Region to California Coastal Commission June 5, 1979.

However, local residents mounted vigorous protests at city planning meetings. People objected to traffic tie-ups, construction noise and the impact to their home's real estate values. The protests were unusually effective. Within a few short months, the 42nd Ave location was abandoned.

Project planners switched their sights to the Great Highway, which was about to undergo a major renovation. The coastal road was slated to become a four-lane road which would mean the old road would be demolished. Clean Water Program officials saw an opportunity to place the new sewage storage and transport project under the newly refurbished road. What may have been particularly attractive was that federal and state grant money would be available to fund over 87% of the work³. At a city planning commission hearing, it was noted that the Ocean Beach location would also impact fewer residents.

During the study and design period for the Great Highway location, objections once again came from local residents. This time, the community did not just complain about issues of noise and property values. Instead, concerns were raised about the wisdom of putting vital sewer infrastructure on the beach. Wave damage to the transport box could cause a sewage spill, fouling the shoreline. Residents were also worried about the beach eroding away. Many suggested that the City instead look at putting the transport box underneath Sunset Boulevard.

Concerns for the Great Highway location had merit. The waves of Ocean Beach were already well known to be a steady and constant menace to the road. In fact, ever since the Great Highway was carved out of the sand dunes it has been damaged repeatedly from attacks by the sea. How would a major sewer line fare when winter storm waves came smashing into it?

Among those alarmed by the Great Highway proposal was the National Park Service (NPS) which operates the Golden Gate National Recreation Area (GGNRA). In response to the looming Clean Water project, the federal agency convened an Ocean Beach Erosion Conference. Held at Fort Mason in July 1978, a panel of 30 coastal engineers and experts gathered to examine erosion along the San Francisco coast. The group also weighed in on the City's proposal to place a sewer transport box under the Great Highway.

Several key facts emerged from the conference, perhaps the most significant one being that the beach was undergoing a process of long term, continual erosion. This was because the shoreline was pushed 200 feet seaward in order to build the Great Highway for automobiles.⁴ South Ocean Beach, near the Sloat Boulevard area, had been extended even more. There was a general agreement among experts that steady erosion could be expected to continue until the shoreline regained equilibrium with its original position before the road was built.⁵

³ This was significant as the total cost of the combined road and sewer renovation turned out to be \$1.5 Billion. See "Sewer project rejection stuns city officials" (September 8, 1978) SF Examiner, p. 4.

⁴ The Great Highway was built during the 1920's and finished in 1928.

⁵ The first official shoreline survey of Ocean Beach was performed in 1852 by the US Geodetic Survey (now the National Geodetic Survey). Much of the shoreline at south Ocean Beach originally reached the lower Great

When the conference leaders evaluated the proposal for constructing the sewage transport box under the Great Highway, red flags were raised. Most predicted that the infrastructure would eventually come under assault by the pounding surf during its 100-year lifespan. One prominent engineer consulting with the City, Dr. Richard Ecker, predicted the transport box would be under threat in less than 20 years, possibly sooner⁶. South Ocean Beach drew particular concern. The message was clear: unless designs were put in place to protect the box, damage to the infrastructure was highly likely. Furthermore, it was predicted that the beach would be in danger of eroding away as soon as wave contact with the structure was made. Exposure of the transport from wave run-up would likely cause scour and enhanced erosion, dropping the elevation of the shoreline until it became submerged.

Despite the ominous warnings from the scientific community as well as protests from the neighborhood and community groups, the City pressed on with the Great Highway location. Whatever threats the surf might bring to the new infrastructure, city engineers were determined to provide a solution. One measure would be the “expansion” of the beach. Excavated sand would be moved toward the shore break to protect the road and infrastructure. As far as erosion was concerned, an agreement with the National Park Service and other agencies would have to be struck to provide for beach replenishment.⁷

All seemed to be on track for building the project until it was time for the city to get a permit from the California Coastal Commission.

Then, the project hit a wall.

In 1978, the Coastal Commission was a new state agency charged with the protection of California’s shorelines and beaches. A critical power given to the Commission was to issue permits for any new coastal development – private or public. This brought San Francisco’s Clean Water Program at Ocean Beach under their review. The North Central Coast branch of the Coastal Commission would review the permit for the road and transport box project.

The regional office of the Coastal Commission was aware of the GGNRA’s Ocean Beach Erosion Conference and its findings. Local staff had agreed that beach erosion and infrastructure safety were serious and valid concerns. They set out to work with the City to find a way to realign the project site as

Highway. See Olmsted, R.O. (1979) *Ocean Beach Study: A survey of Historical Maps and Photographs*. San Francisco: San Francisco Wastewater Management Program

⁶ See Ecker, R.M. *Ocean Beach Sand Replenishment Program* (1980) p71

⁷ The original permit application made by the City did not specify which agency would ultimately be responsible. The local staff did try to insist that such an agency be identified and an agreement be worked out before construction. See California Coastal Commission *Initial Summary Report and Staff Recommendations* Application Numbers 137-77 and 128-78 (1978) pp. 11-12. Additionally, in the City’s Beach Nourishment Program approved by the California Coastal Commission in 1986, CWP Executive Director Todd Cockburn asserted that during the planning phase of the transport project, the City had been assured that the GGNRA would “...undertake a sand replenishment program to deal with beach erosion caused by natural forces.” While the GGNRA was willing to aid in any such effort, their view was that the City should be chiefly responsible for securing the funds. See GGNRA General Superintendent Brian O’Neill’s Statement for the California Coastal Commission Hearing Wednesday September 10, 1986.

far away from the ocean as possible. By the time the permit went up for a vote, the road and sewer transport box was relocated much further landward than the City had originally proposed.

In September 1978, the North Central Coast Region of the Coastal Commission officially took up the San Francisco Clean Water Program permit. After looking at the extensive public comment as well as the findings from the NPS erosion conference, the commissioners unanimously rejected the City's permit application. Even though the original project site had shifted inland, the threat of beach loss due to erosion was still too great. The project violated coastal act law in many different ways. One key point was that approving the project would lead to the inevitable need for hard shoreline protection – seawalls or rock revetments. In explaining their no vote, the Regional Commission points out the shoreline in front of Fleishhaker pool as being prone to beach recession.⁸ This is the area that would become the site of the first erosion emergency south of Sloat.

The permit rejection shocked San Francisco's public officials. A lot of state and federal financing was on the line for the high profile project. Additionally, the Regional Water Quality Control Board was ready to place hefty fines on the City if there were any more construction delays.

This all triggered a major call to action by city officials. Then Supervisors Diane Feinstein, John Molinari, and Louise Renne were dispatched to the state capitol to try to overturn the decision.

They were successful. After meeting behind closed doors with officials at the capitol, the state level office of the Coastal Commission took over jurisdiction of the Clean Water permit. After a series of negotiations, the regional district office was forced to rescind its vote as well as to work out a compromise solution.

In June 1979 a compromise agreement was reached. The sewer transport project was approved. However, to protect the beach and the new infrastructure from coastal erosion, there were some strict conditions attached to the permit.

The most significant condition was a requirement for the City to fund and execute beach replenishment on an "as needed" basis. Specifically, sand replenishment was to occur whenever the mean high tide line approached within fifty feet of the road and transport box. Pole markers were to be placed at different locations along the shoreline, some fifty feet west from the base of the road. When the markers became exposed due to erosion, replenishment was to occur. The principle behind the sand replenishment condition was that the beach needed to be preserved for both for the sake of public recreation and to safeguard the new infrastructure.

⁸ See Letter from Robert Brown, Executive Director North Central Regional Commission to North Central Coast Regional Commissioners, October 13, 1978 Subject: *Findings of Denial for Permit Application #137-77 & #128-78, City and County of San Francisco page 5.*

In order to ensure compliance with this condition, the Commission mandated that the city put aside \$10 million in a special account exclusively to fund beach nourishment (special condition #9)⁹. The amount was required because, according to coastal engineers, beach replenishment was going to be needed repeatedly throughout the 100 year life of the wastewater project. With \$10 million, the Commission decided the City would be able to provide 100,000 cubic yards of sand on a yearly basis.¹⁰

Michael L. Fischer, Executive Director of the California Coastal Commission summed up the agency's thoughts on the beach replenishment conditions quite clearly. In a letter dated May 25, 1979 he states:

“A sandy recreational beach is the quintessential coastal resource. Its protection is among the highest priorities of the coastal act. Locating the Transport on the dynamic shoreline at Ocean Beach requires the most conservative and prudent measures to preserve a usable shoreline. The probability of the structure's exacerbating the documented erosion of the beach has been verified by the preponderance of scientific evidence. However, the extent, the degree, and the chronology of this process remain the subject of legitimate debate among experts. Such uncertainty can be expected as long as the result of this Commission's action is not a shoreline bereft of sand.”

In the aftermath of the project's approval, the city government spent the entire 1980's both building the huge project, while simultaneously fighting to undo the beach replenishment condition in the permit. San Francisco officials essentially felt open ended replenishment was unfair and unworkable due to cost. The City particularly chafed at the idea of being held responsible for funding the work. The argument was that if there was to be any large scale beach replenishment efforts, other federal and state agencies should share in the responsibility. In the words of Clean Water Program Executive Director Todd Cockburn: “Neither the Westside Transport, the Great Highway, nor the concrete seawall will cause erosion at Ocean Beach. Erosion at Ocean Beach is complex natural oceanographic phenomenon. San Francisco cannot reasonably be held solely responsible for artificial nourishment.”¹¹

By 1988, the City secured a series of amendments to the Coastal Commission permit. The requirement for beach replenishment was eventually watered down. By the time the project was finished, the City was only required to “lead a cooperative agreement” with the Army Corps of Engineers, the Park Service, and other state agencies to do beach replenishment. The 1979 sand replenishment fund of \$10 million was reduced to \$625,000. All this occurred despite a storm of protests from the GGNRA and the community.¹²

⁹ See Letter from Michael L. Fischer Executive Director, California Coastal Commission (Letter to State and Regional Commissioners, Interested Public) June 13, 1979, P.21.

¹⁰ See Champion, D. “S.F. to Save on Beach”, SF Chronicle, June 8, 1981, p. 22.

¹¹ See Testimony by Robert Todd Cockburn, Executive Director Clean Water Program to the California Coastal Commission, September 10, 1986.

¹² See City and County of San Francisco *Beach Nourishment Program* (1986), page 7. Also, see statement from Brian O'Neil, superintendent of the GGNRA, to the Coastal Commission Hearing September 10, 1986.

To their credit, San Francisco and the Army Corps agreed to work together on a study for large scale replenishment. The focus of that study was to find a source of sand for the job. However, no one agency would be responsible or held accountable for executing the beach replenishment work.

In 1991, the plans to rebuild the south of Sloat Great Highway Extension and transport system were approved by the local Coastal Commission office. For some reason, neither in SF Planning Department documents nor in the Coastal Commission permit does the erosion threat appear on the radar.¹³ This was most unfortunate since the location of the road and the Lake Merced Transport were rebuilt in a curved shape, with a large bend leading out toward the surf near the Sloat Boulevard intersection. There was no landward realignment of infrastructure as was the case with Lincoln to Sloat section of the project.

Two years later, the entire Clean Water project was complete. A new Oceanside Treatment Plant was placed near the surf zone adjacent to SF Zoo. A network of sewage storage and transport devices ran underneath the entire length of the Great Highway. Along the road, landscaped sand dunes were built to shield the infrastructure as well as to control blowing sand. Beneath the dunes lay a mass of concrete debris and rubble, ready to serve as a shield against the surf.

The Clean Water Project has greatly improved our nearshore water quality. Combined sewer overflows per year were drastically reduced to the single digits, as was promised. However, just two years after the project's completion, the south of Sloat section of the road and transport system came under attack from the sea. First to erode away were the landscaped dunes in front of the north Sloat parking lot. They were gone by the end of 1996. During the El Niño winter of 1997/1998, waves began crashing up against the base of the road and transport box at the curve in the road. This was when the City declared its first erosion emergency resulting in a giant rock revetment to be installed on the beach. In the ensuing years, erosion spread along this area. The parking lots gradually eroded away spilling concrete fill and debris onto the beach. Today, what is left of the beach is a mess. After the winter of 2010, the south of Sloat shoreline looked more like a bombed-out city. Nowadays, waves routinely bounce against the base of the road and parking lots, scouring away sand and endangering the road and the Lake Merced Tunnel.



On the left is the north Sloat parking lot, circa 1993 post construction. On the right is the same parking lot 4 years later, during the 1997 El Niño. (photo courtesy of Bob Battalio, P.E., Phillip Williams and Associates)

¹³ Perhaps this was because it was understood that the south of Sloat area would be covered by the same sand replenishment and emergency armoring conditions already covering the rest of the project.

In the aftermath of the 1990's erosion emergencies, the City, with cooperation from the GGNRA and the Coastal Commission, did undertake a pair of modest dune replenishment projects south of Sloat. However, the efforts were executed on a small scale, and in a piecemeal fashion. These makeshift dunes, which were placed adjacent to the emergency revetment, both washed away within a few years.

The Army Corps of Engineers also tried to rebuild the beach. For many years, the Corps has run a "pilot" project that consists of dumping sand dredged from the shipping channel into the surf zone at Sloat. The hope was that the sand would wash ashore and rebuild the beach. Unfortunately, these efforts have also failed.

This is the untold story of south Sloat erosion. All the warnings were valid. The main predictions of the Ocean Beach Erosion Conference all came true. The road and transport box system came under threat from the surf right away – in less than 5 years after construction. Indeed, the problem area did turn out to be south Ocean Beach. Unfortunately, large scale sand replenishment was never undertaken. The road and transport box were never protected by maintaining 50 feet of beach in front these structures. Very little shoreline, in fact remains. Rock and rubble was left on the beach as temporary protection, never removed as was conditioned in the original permit. Today, the area continues to erode without a long term plan officially embraced.

Conclusion

In our view, vital infrastructure should never have been placed so close to the water. The 1978 regional office of the Coastal Commission was correct in denying the City's permit. The statewide office - which appears to have been forced into producing a compromise - did its best to require the City to preserve the beach. However, San Francisco Clean Water Program officials were determined to reject this mandate. Instead, the City lobbied for a minimal financial commitment and a "shared responsibility" model. This model, in which no one agency seems to be truly responsible, has resulted in the disaster we find today south of Sloat.

Looking at the big picture that the historical record provides, the conflict between the waves of Ocean Beach and shoreline infrastructure has its roots in the history of the Great Highway itself.¹⁴ The shoreline at Ocean Beach is extremely dynamic, and needs a certain amount of space to erode. Essentially, the Great Highway was located too close to the water. In that regard, the Clean Water Program was a golden opportunity to address the situation. The 1978 regional staff of the Coastal Commission tried to do so when they worked with the City to relocate the project further inland. However, it should be noted, the opportunity for a more landward setback was missed when the south of Sloat portion of the project came before the Coastal Commission.

The projected life of the Clean Water project transport system is 100 years. We are almost at the end of the first quarter. Luckily, most of Ocean Beach and the infrastructure appear to be safe, providing

¹⁴ See "A History of Erosion of Ocean Beach" by the author of this report.

citizens and the environment with cleaner water.¹⁵ However, the question remains: what will happen with erosion during the next 78 years?

For those of us who are working to protect the beach south of Sloat, this is the legacy we are left to sift through. The good news is that, with the Ocean Beach Master Plan, we have a new opportunity to fix the south of Sloat mistake. Furthermore, this is a chance to build a more proactive and accountable erosion management plan for the future. According to SPUR, the City and the National Park Service have already committed to a managed retreat strategy for the Great Highway Extension and the public parking lots. Now we hope to see the San Francisco Public Utilities Commission consider the option to relocate the south of Sloat transport line - the Lake Merced Tunnel (LMT). Currently, SFPUC favors the LMT to be protected where it is, with a buried seawall. We believe this could be a major mistake.

Finally, the Surfrider Foundation would like to point out that sea level rise and climate change-driven storms are due to intensify in the years ahead. This means San Francisco will need to prepare for larger and more frequent erosion episodes at Ocean Beach. With a sensible strategy of managed retreat – that includes the Lake Merced Tunnel - we can both protect our infrastructure *and* the shoreline of Ocean Beach.

Special Note:

Between 1993 and today, there have been three citizen / government task forces assigned to finding a solution to Sloat area erosion. There have also been numerous resolutions from the Board of Supervisors, scores of studies done both by the City, the US Geological Survey, as well as the Army Corps of Engineers. There have also been multiple sand backpassing projects and not to mention plenty of taxpayer money spent on this issue. The Ocean Beach Master Plan has made the most substantial progress toward implementing a solution. In that regard, we wish to thank SPUR's Ocean Beach Master Plan project manager, Benjamin Grant. He especially has put in a tremendous amount of work into this project and is garnering results. Moving forward, we hope to see the City and permitting agencies enforce firm deadlines for the implementation of an erosion plan at Sloat. Judging by the historical record, there should also be consequences for unnecessary delay.

The Surfrider Foundation released this report because the history behind the road and wastewater transport has been forgotten. Ever since the south of Sloat area became an erosion hotspot, there has been no mention of the original Clean Water Program history, the great erosion debate, the warnings from coastal engineers and the Coastal Commission's permit requirements.¹⁶ This includes the current

¹⁵ Sometime between 2050-2100, the predictions are fairly grim. Most the beach between Ortega and Rivera is predicted to disappear, with waves lapping against the seawall. See the Ocean Beach Master Plan, pp 59-61. Interestingly, over the last 20 years, north Ocean Beach has actually been accreting or growing in width.

¹⁶ For example, in 2005, SFDPW released its Ocean Beach Great Highway Storm Damage Protection Report. The report covers the extensive damage from the 1990's erosion emergencies as well as what to do in response. There is no direct mention of the Coastal Commission Clean Water Program permit conditions requiring sand replenishment to control erosion. In 2012 and in 2014, two sand back-passing projects were conducted by the City. Once again, there is no evidence in official documents linking the projects to the Coastal Commission permit history.

Ocean Beach Master Plan phase. According to our research, the last public document that clearly acknowledges the Coastal Commission's requirement for beach replenishment dates back to 1992¹⁷. This is unfortunate because a lot of time, personal energy and taxpayer money were spent in the mid 1970s and 1980s to address this issue. The intent was to avoid this very scenario we find ourselves in at Sloat. With this history now in the open, and able to serve as our guide, we hope to see the erosion challenge at Sloat finally resolved so that the beach and the infrastructure are protected.

Special Thanks...

Although this battle was fought 30 years ago, we would like to single out and thank all of the people who stood up for Ocean Beach during the 1970's Clean Water planning meetings. This is a very large group that includes engineers, public officials, citizens and neighborhood organizations. A short list includes: Dr. George Gates, a retired USGS engineer and Great Highway resident who was one of the first voices from the science community to highlight the erosion danger to the proposed Clean Water project; Amy Meyer and Edgar Wayburn of the People for the GGNRA, environmental activists who spent many years fighting for the preservation of our local coastlines; Judy McCabe and Dennis Antenore of the Sunset Coalition, neighborhood activists who mounted a vigorous opposition at many of most of the public hearings; J Michael Wornum and the 1978 North Central District office of the Coastal Commission, who rejected the City's original Clean Water permit; the National Parks for holding the Ocean Beach erosion conference in 1978; and Brian O'Neill, the former superintendent of the Golden Gate National Recreation Area for his vigorous opposition to the City's attempt to reduce its sand nourishment funding obligations.

¹⁷ See letter from Peter Douglas, Executive Director of the Coastal Commission to Coastal Commissioners, Interested Persons re: "Status on Implementation of the Beach Nourishment Plan, Ocean Beach City and County of San Francisco" (for the Commission Meeting of August 14, 1992), August 18, 1992.

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