subheading

quote quote quote quote quote quote quote quote quote quote quote quote quote quote

master plan recommendations

The Ocean Beach Master Plan recommendations address the full gamut of issues identified above, proposing a vision that is comprehensive and ambitious, while reflecting extensive testing and vetting with affected agencies, and an unprecedented level of community consensus rooted in honest exploration of the imperatives, priorities, and tradeoffs at Ocean Beach.

This package of recommendations is presented as a package of improvements, investments and management practices that can achieve best-case outcomes for many objectives through the year 2050, based on consideration and analysis to the year 2100.

VI

overall framework

six big moves

For the sake of clarity they are grouped into six “Key Moves” each of which contains numerous recommendations, which will needs to be phased incrementally as physical conditions evolve, and regulatory and fiscal hurdles are cleared. The sequencing and phasing of these interventions will be discussed in the implementation and phasing section of this document [forthcoming].

Finally, these recommendations reflect the state of knowledge, the available consensus, and the capacity of various agencies to act as of the present planning process. An adaptive approach to implementation, based on the evolution of all these factors will be essential, and is reflected in the recommendation of a formal re-evaluation of all recommendations and underlying assumptions in 2030.

assumptions

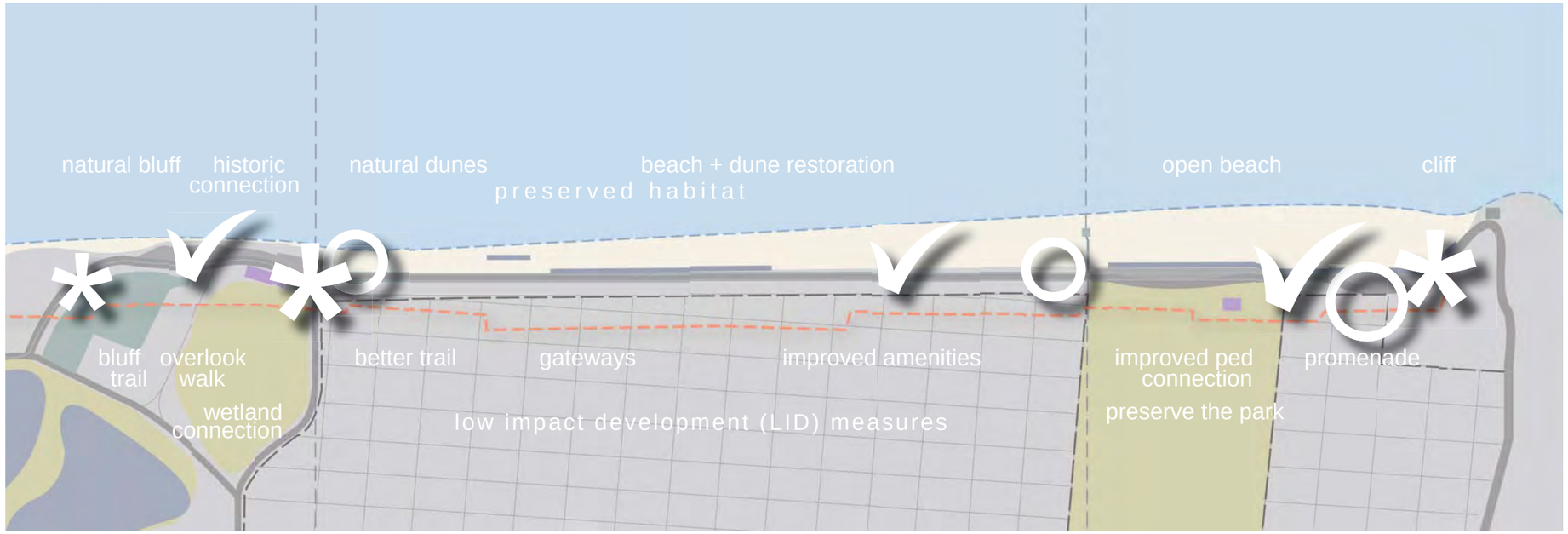
- Analysis to 2100 horizon
- Recommendations to 2050
- Ongoing monitoring + adaptive management
- Re-evaluation in 2030

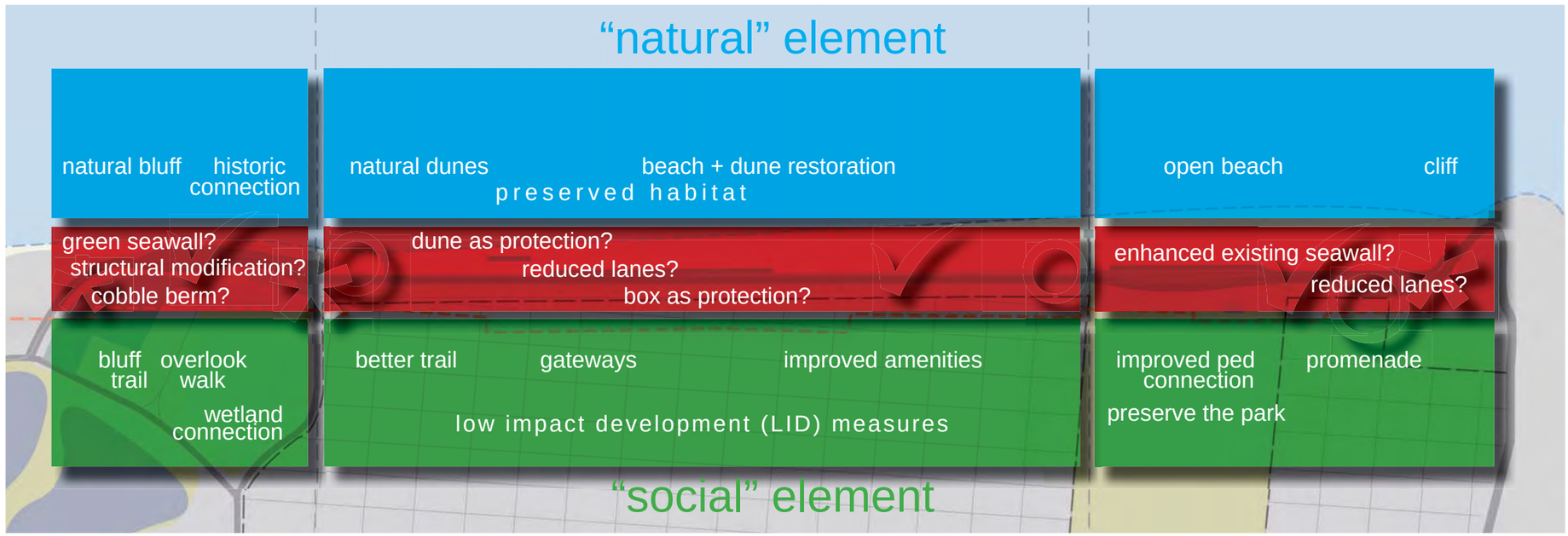
/ *key points key points key points key points key points key points key points key points key points key points key points key points key points key points*

/ *key points key points key points key points key points key points key points key points key points key points key points key points key points key points*

Cor am quodit, si volla dis rem volum et estorepe eleni ni omnienis consed expelendant volutate pellabo. Ut repero conectem vendeliaspel in enimus, voluptio. Em inctis ipiciendit deliquodis as doloribus, quasperferes simin res evelloria voluptios sit maio berite ipis ma quodit, si con et modis verum experem sum quia velia nosandisquam dolore nemperi oresti deratur sequi comnime pro volestor sandit ea sus ium int aute pro debit, tet laut dolesti onseque nam eossinv elibus duciissi officae erupta nis sedi am quasiti berorempedis quis re ne odit es utataecearum ipid ut ut ut ent ant.

Sum fugiam fugitatures delis est ut aspererum et magnimi, sequo comnia di idelenda volupti onsedi





master plan

south reach

middle reach

north reach

cliff house

lands end

golden gate park

master plan

“quote quote quote quote quote quote”

scale 1” = 750’

0 750’ 1,500’

375’ 1,125’

N


key move 1:
reroute great highway behind the zoo via sloat and skyline
golden gate park
treatment plant
zoo
Armory Rd.
Skyline Blvd.
Sloat Boulevard
Wawona St
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
scale 1”=400’
0
200’
400’
600’
800’
N

To date, the city has been defending the Great Highway South of Sloat Boulevard with boulder revetments. Many officials agree that the road is a proxy for a much greater concern: the Lake Merced Tunnel, a 14-foot underground sewer and stormwater pipe that runs underneath the highway. The road is lightly traveled and frequently closed (most notably the southbound lanes were closed for nearly a year in 2010). Rerouting traffic from the Great Highway to Sloat and Skyline (which have capacity to spare) would allow a more flexible approach to coastal protection and create major restoration and recreation opportunities.

tame an unsafe and overwide street

Sloat Blvd is six lanes wide, with diagonal parking in the median. Zoo visitors often park there and jaywalk across the street with small children. Re-routing the Great Highway inland would allow significant improvements to Sloat Boulevard, including moving parking to the south side along the zoo and adding a first-class bike route. The L-Taraval Muni line could be extended one block to terminate adjacent to the zoo.

Counterintuitively, auto access to the region could improve, as traffic controls are upgraded and this important link is no longer subject to closure by erosion or flood.

create a new gateway to the zoo and the coast.

Drivers, cyclists and Muni riders would all arrive at the south side of Sloat, where they could visit the zoo and access the coast without crossing any streets. A new access point near the pump station would provide bike parking, restrooms and information, while a restored Fleishhaker pool house could host a visitor center with food and interpretive elements. Sloat's neighborhood businesses could thrive on a safe, attractive seaside street.

open coastal access

Removing the Great Highway South of Sloat would offer an amazing recreational resource for cyclists, pedestrians and beach users while allowing for a healthier ecosystem. Today's landscape of asphalt, rubble and boulders can be gradually transformed into a coastal trail linking Fort Funston to the rest of Ocean Beach and beyond, reminiscent of recent improvements at Land's End and Crissy Field. Infrastructure would remain, but the structures used to protect it would be designed with access, aesthetics and natural resources (like the bank swallow) in mind.

- **1.1** reconfigure sloat/great highway and sloat/skyline intersections
- **1.2** maintain 1-lane out southbound from oceanside treatment plant (OTP) for trucks
- **1.3** reconfigure sloat blvd, with parking along zoo boundary, permeable pavement, bikeway, and coastal access amenities
- **1.4** pull L-taraval south across sloat, terminus at zoo gate
- **1.5** introduce coastal trail to ft funston
- **1.6** connect N-S to california coastal trail, linking lake merced all the way to marin
- **1.7** replace beach/zoo parking along armory road and using OTP roof
- **1.8** reopen armory road: skyline to zoo lot

key move 1

reroute great highway behind the zoo via sloat and skyline

reroute great highway behind the zoo via sloat and skyline

key move 1

benefits

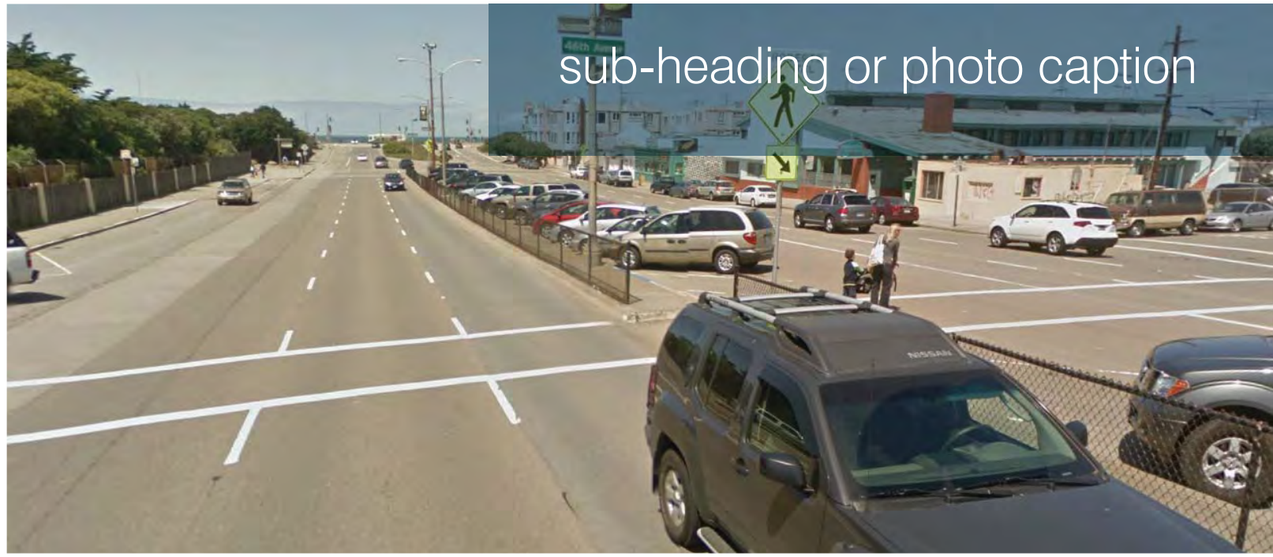
- spectacular new coastal trail, continuous pedestrian connection
- enables significant retreat from coastal erosion
- more flexible infrastructure protection
- major improvements to sloat blvd design, with green infrastructure elements

constraints

- some traffic impacts, likely minor
- requires reconfiguring zoo access
- cost of roadway and intersection improvements

outstanding questions

- nature of traffic impacts
- optimal configuration of sloat blvd and adjacent intersections



key move 2:

introduce a multi-purpose coastal protection / restoration / access system

remove the road, and take advantage of the opportunity

Unlike the Great Highway south of Sloat, the Lake Merced Tunnel is a significant piece of infrastructure and worth protecting in the coming decades. West of the zoo, the road is perched atop an erodable berm of construction fill, well above the pipe. Letting that vertical space go would allow a much more flexible approach to coastal protection. The recommended solution is conceptual and will require considerable study to ensure its feasibility, but the underlying ideas represent a new and more nuanced approach to the problem of erosion at Ocean Beach.

armor the lake merced tunnel with a low-profile structure

The Lake Merced Tunnel sits at a much lower elevation than the roadway. If it can be protected with a low wall, cap or internal reinforcement, it can become a sort of "speed bump" under the beach. This is a significant engineering challenge, as it needs to be protected from wave energy, flotation forces (it is mostly empty most of the time) and seismic forces. However, an examination of the problem with coastal engineers and agency technical staff lend credence to the approach.

layer flexible, dynamic structures over hard structures

The structure protecting the Lake Merced Tunnel would be covered by a berm of cobble, stones that range from the size of marbles to that of softballs. These structures, modeled on natural cobble beaches, can be shaped dynamically by wave action and excel at dissipating wave energy. A second cobble berm, farther inland, would protect existing force mains and high ground near the Fleishhacker Pool building. Large quantities of sand would then be placed over the cobble, providing a first line of protection and a sandy beach most of the time.

restore the surface, allowing coastal access and ecological benefits

If infrastructure protection alone is the goal, then a traditional seawall or revetment would do, but other important objective would be compromised. The recommended approach allows Ocean Beach to protect infrastructure while also improving recreational access, ecological function and character, in keeping with its status as a National Park. Regular placement of sand and revegetation would offer an accessible beach environment, with a spectacular trail connecting Sloat Boulevard to Fort Funston. Cobble is passable and attractive even when sand has been washed away, as it might be in major storms. And the San Francisco Zoo could find a new expression of its conservation values through an improved relationship the watershed and the coastal ecosystem.

- **2.1** incrementally withdraw from bluff edge
- **2.2** reinforce the Lake Merced (LM) tunnel in place, remove revetments and fill
- **2.3** sand nourishment via Army Corps, develop and pursue Best Practices for beach nourishment
- **2.4** cobble berm over LM tunnel covered by sand (via Army Corps sand nourishment) serves as wave dissipation zone; overwash occurs during severe storm events
- **2.5** second cobble berm protects force mains, high ground at pump station, Fleishhacker bldg
- **2.6** terraced, vegetated seawall with cobble toe along oceanside treatment plant (OTP)
- **2.7** create detention swale (through zoo) and constructed wetland
- **2.8** fleishhaker bldg renovated as warming hut and interpretive center
- **2.9** interpretive elements explain stormwater infrastructure system to visitors
- **2.10** conduct near-term pilot studies of dynamic coastal protection: skyline to zoo lot

key move 2

introduce a multi-purpose coastal protection / restoration / access system

benefits

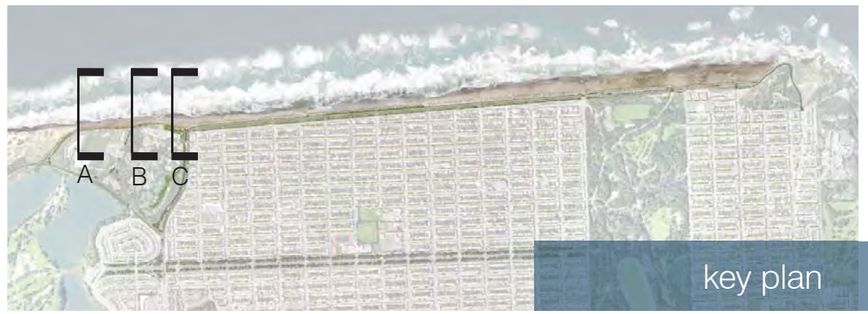
- incorporates significant coastal retreat
- protects costly infrastructure in place for decades
- a softer approach to coastal protection, that can work with coastal processes
- restores ecological and recreational function

constraints

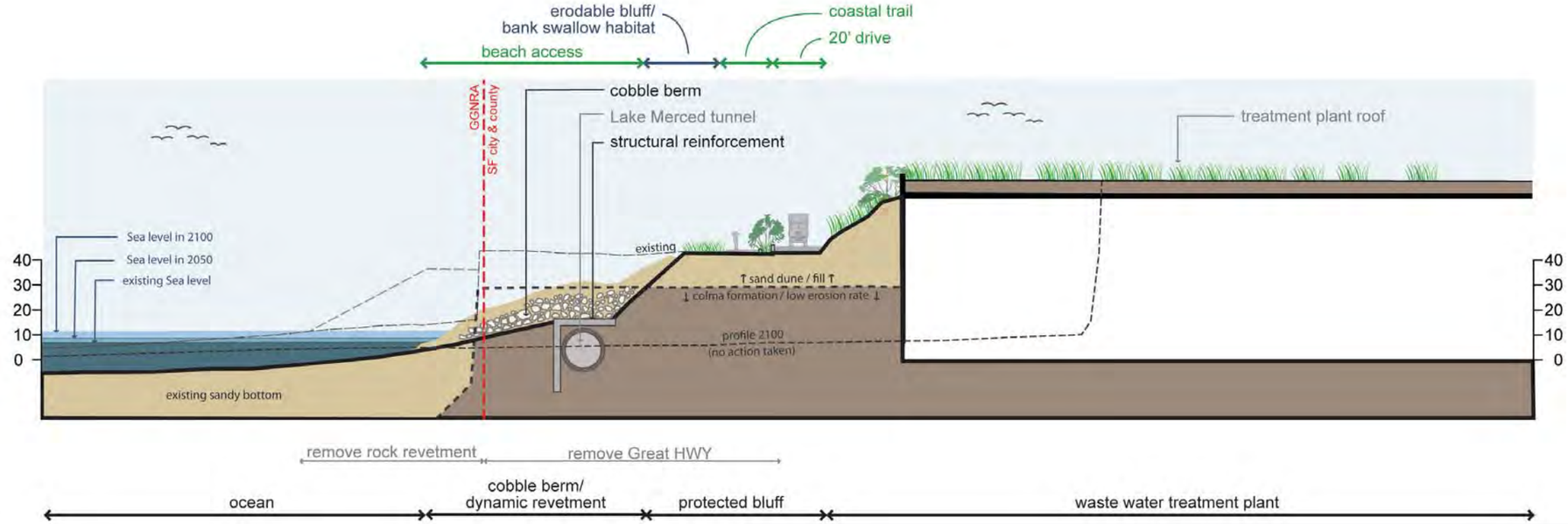
- significant up-front investment from multiple agencies
- challenging to maintain sand cover and surface restoration
- depends on careful integration with army corps beach nourishment
- new approach requiring careful study and monitoring

outstanding questions

- can the tunnel be protected at a low enough profile for a reasonable cost?
- how will wave action interact with cobble and sand to shape the beach and berm?
- how will protection measures be phased to prevent spills, protect habitat, and manage cost?

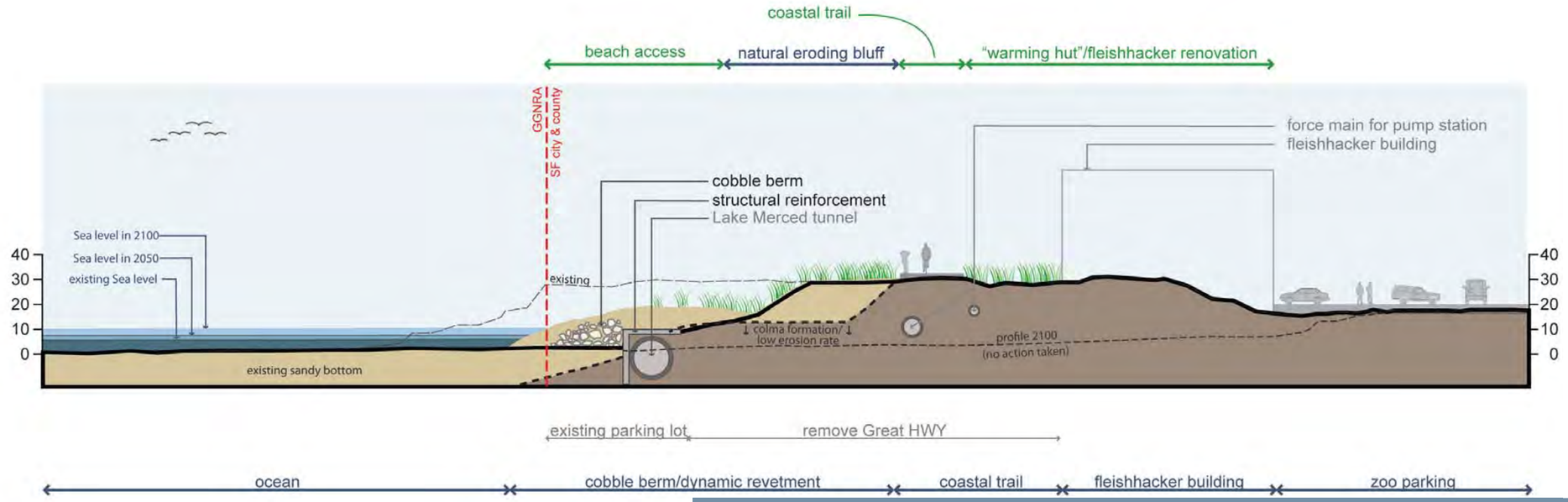


key plan

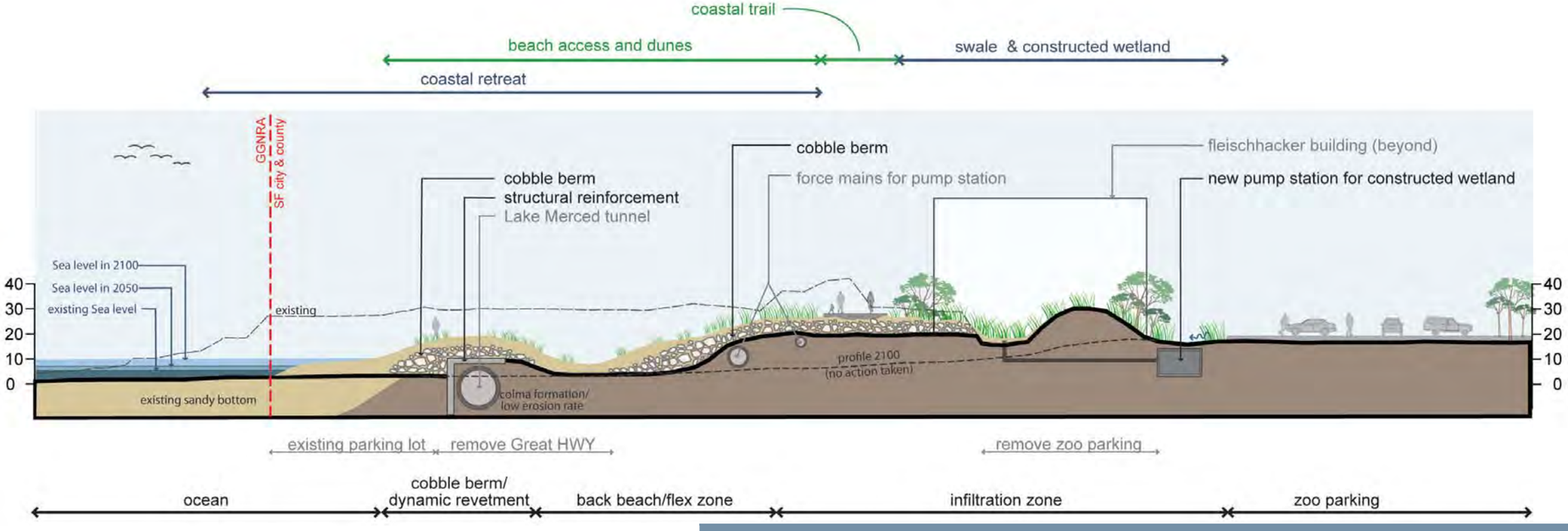


section A (at ocean side treatment plant)

key move 2



section B (at zoo parking lot)



section C (at proposed wetland / fleishhacker)

key move 2

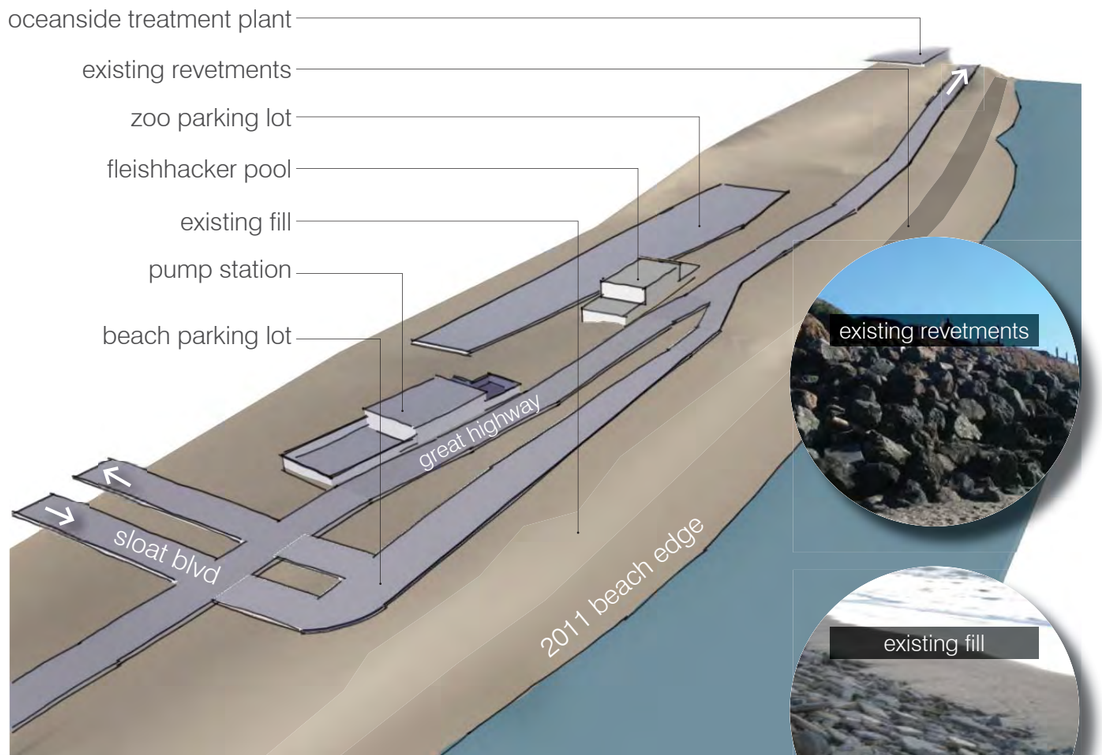
introduce a multi-purpose coastal protection / restoration / access system

phasing

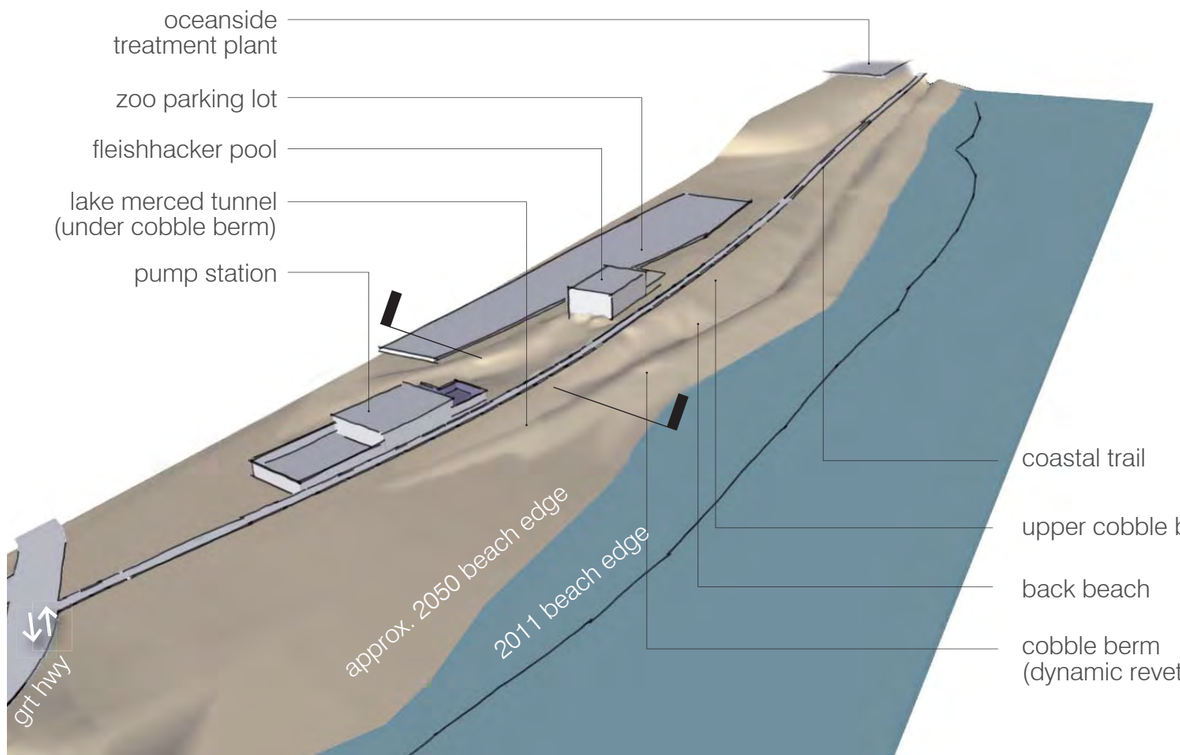
The installation of these coastal protection measures will be an incremental process, balancing the desire for rapid improvements with the gradual evolution of the coast. Roadway and parking lot demolition can only occur as permitting and replacement facilities are implemented. In the interim, on-site pilot studies can be completed to assess the most innovative aspect of the recommendations, such as the use of cobble.

Near Sloat Boulevard, where artificial fill predominates, it will be appropriate to excavate and remove the fill actively, as soon as the parking lot and roadway can be removed. This would be coupled with the installation of the low-profile protection of the Lake Merced Tunnel, the removal of the adjacent revetment, and the placement of cobble and sand.

Further south, where natural sandstone bluffs predominate, coastal recession should be allowed to proceed naturally, allowing the bluff face to continue as potential habitat for the bank swallow, until hazard thresholds are reached and the sequence of protection measures are installed. At the Oceanside Treatment Plant, this threshold has already been reached, and the revetment should be replaced with a low structure as soon as feasible, with the bluff above continuing to recede once the road is removed.



south of sloat - existing condition

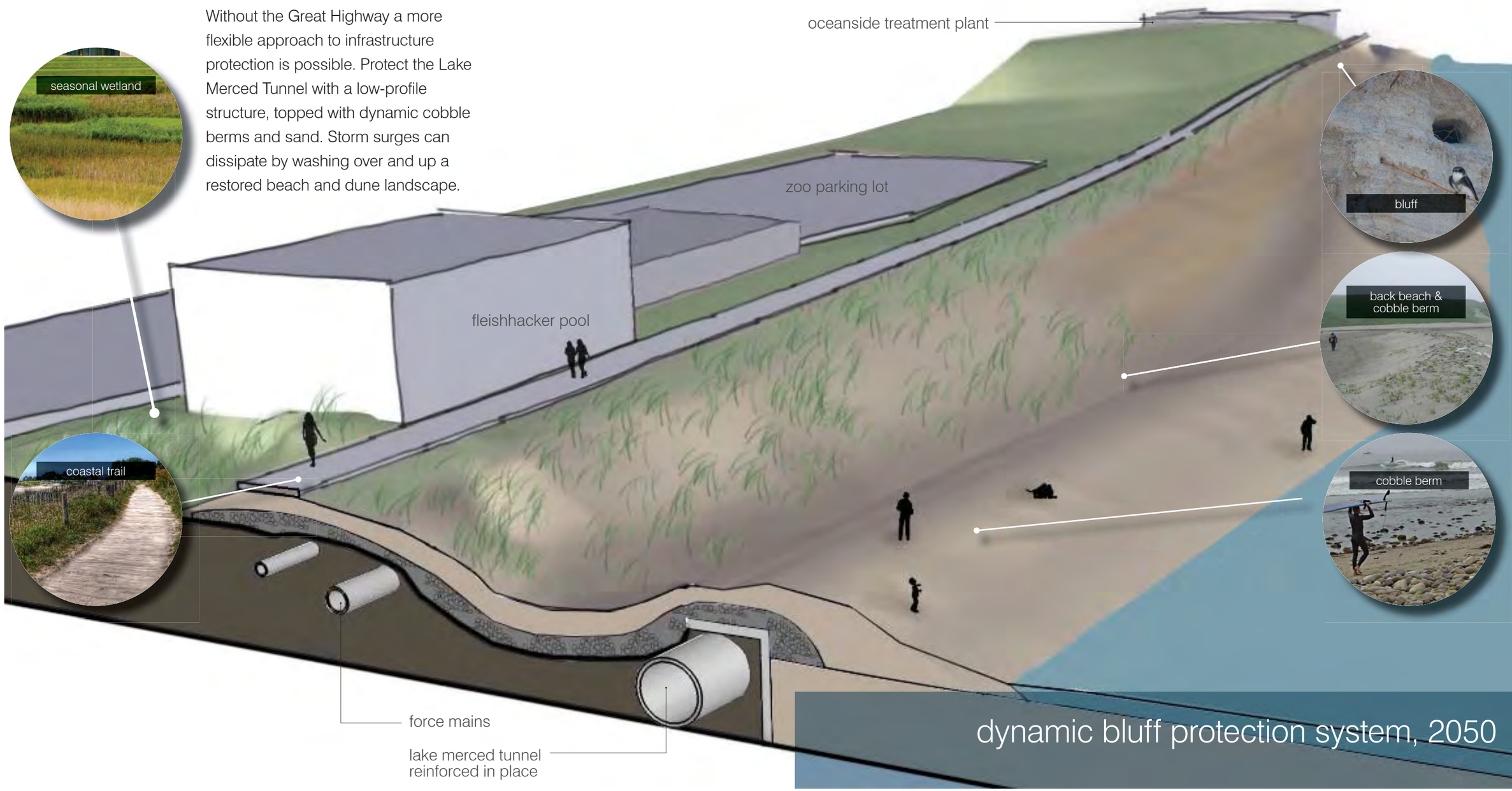


south of sloat - multistage coastal protection, 2050

introduce a multi-purpose coastal protection / restoration / access system

key move 2

Without the Great Highway a more flexible approach to infrastructure protection is possible. Protect the Lake Merced Tunnel with a low-profile structure, topped with dynamic cobble berms and sand. Storm surges can dissipate by washing over and up a restored beach and dune landscape.



dynamic bluff protection system, 2050

key move 2

introduce a multi-purpose coastal protection / restoration / access system

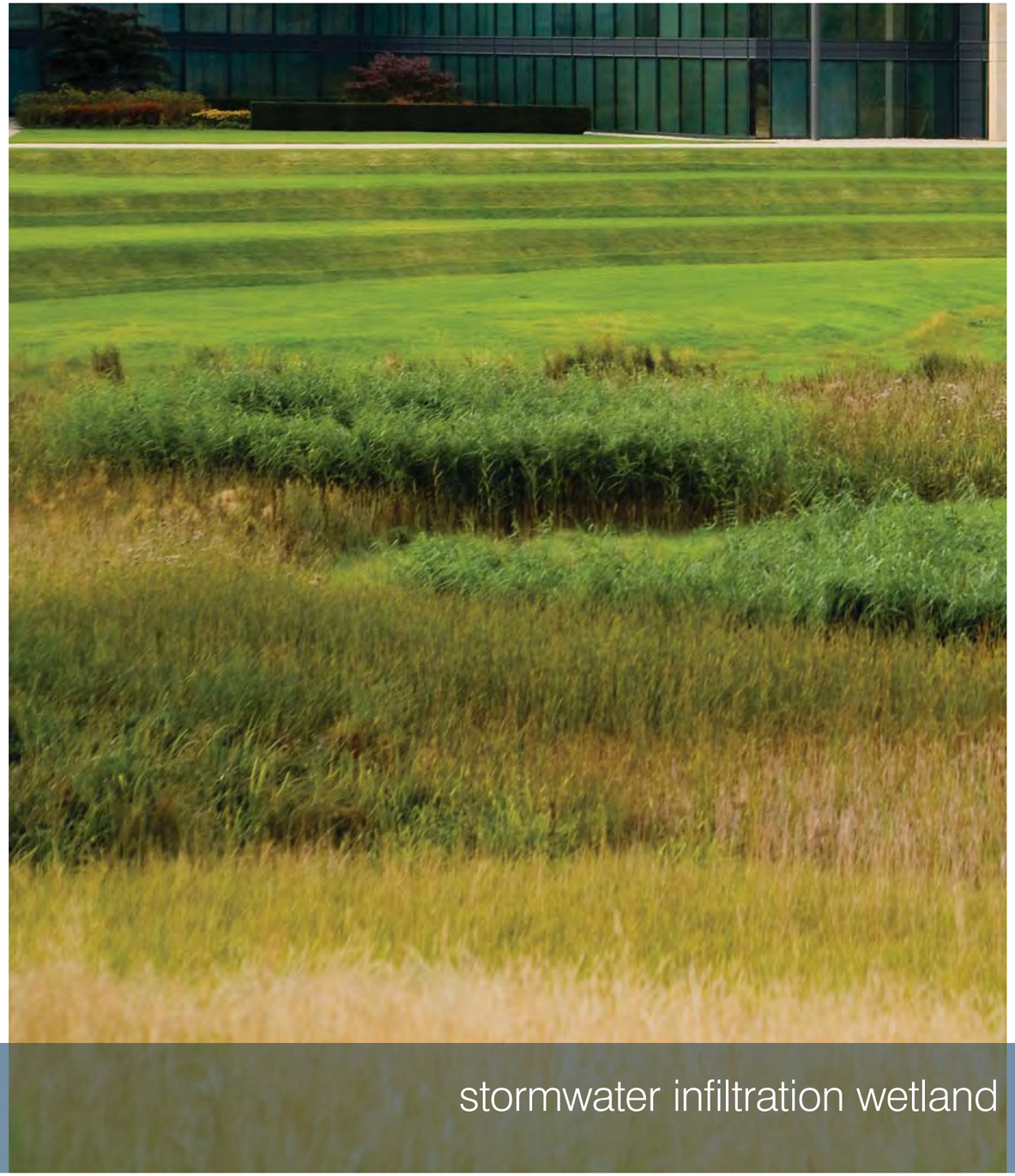
detention swale + constructed wetland system through zoo

introduce a stormwater infiltration wetland

The reconfiguration of Sloat Boulevard and is location in the West Side watershed creates a significant green infrastructure and stormwater management opportunity. A living system combining green streets, swales, and restored waterways moves stormwater flows and directs the water to a constructed wetland for retention and infiltration, recharging San Francisco's freshwater aquifer and combatting saltwater intrusion. The wetland would be located at the entrance to the zoo parking lot, removing a small number of spaces, which could be relocated at a proposed lot at Zoo road.

The wetland and adjacent vegetation provide habitat and recreational benefits while improving water quality. This system could be incrementally expanded to increase catchment area and riparian features, including portions of the Zoo landscape and Lake Merced, ultimately removing up to 33.7 million gallons per year from the combined system.

This simple and powerful gesture supports San Francisco's citywide commitment to reducing stormwater flows to the bay and ocean and to simultaneously improve public spaces and ecological amenities.



stormwater infiltration wetland

key move 3

- **3.1** reduce great highway to 2 lanes + wide shoulder for cycling, emergency access
- **3.2** reconfigure great highway / sloat intersection following transport box to avoid erosion hot spot
- **3.3** distributed parking at key access nodes
- **3.4** restore existing restrooms, build new restrooms
- **3.5** improve access at judah, taraval, rivera and noriega
- **3.6** traffic calming + mitigation measure to lessen neighborhood traffic impacts
- **3.7** LID (low-impact design) to address stormwater management

reduce width of great highway to provide amenities / managed retreat

Our major coast road is today an expressway geared toward the automobile. By converting the southbound lanes to other uses, including access amenities like restrooms, bike parking, signage, and pockets of auto parking, connected by a new promenade on the ocean side of the road, we apportion this critical public resource to a much wider set of uses. The existing Northbound lanes would serve as a two-way street.

In addition, in areas between major access points, the space gained by narrowing the roadway would be devoted to expansion and restoration of the dunes, which could migrate shoreward, overtop of the Westside Transport Box. Coupled with the direct placement of sand through the Army Corps of Engineers' proposed beach nourishment program, this approach could extend the period of time in which a significant sandy beach would be feasible South of Noriega.

This change would likely result in some traffic impact, via spillover effects. Mitigation measures to prevent aggressive cut-throughs in adjacent neighborhoods (already a problem during frequent raod closures) would be essential, as would coordination with ongoing planning for circulation on the West Side. Comprehensive traffic analysis will be essential to determine if the traffic impacts of this intervention would be justified by the considerable improvements in coastal access.

key move 3

reduce width of great highway to provide amenities / managed retreat

key move 3

reduce width of great highway to provide amenities / managed retreat

benefits

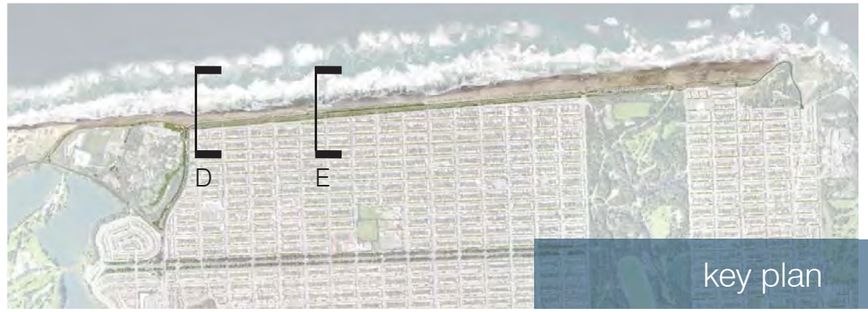
- a restored dune system is given space to migrate landward, allowing a wider beach as sea-level rise sets in.
- allows space for additional amenities, improved beach access
- favors pedestrians, bicycles, beach access, and wildlife over traffic flow

constraints

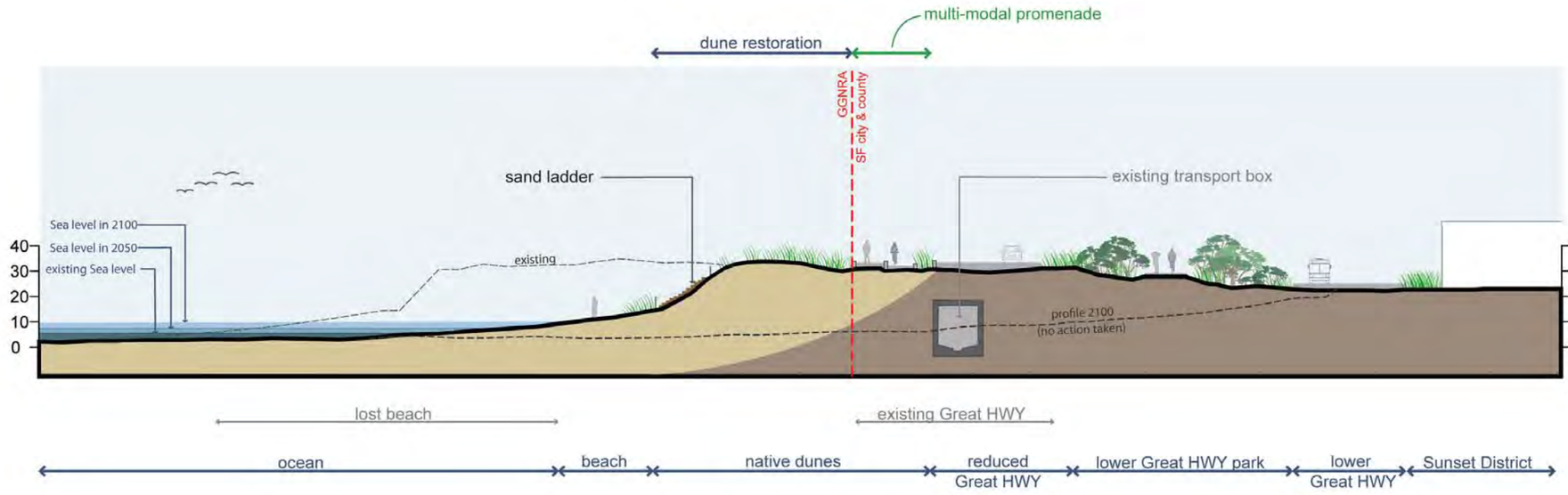
- traffic impacts, which may be significant, in adjacent neighborhoods
- limited space gained at substantial cost
- potential to bring more users to plover habitat areas
- some redundancy between recreational trails

outstanding questions

- what will traffic impacts be and to what degree can they be mitigated?
- how much additional beach width will result in the long run?



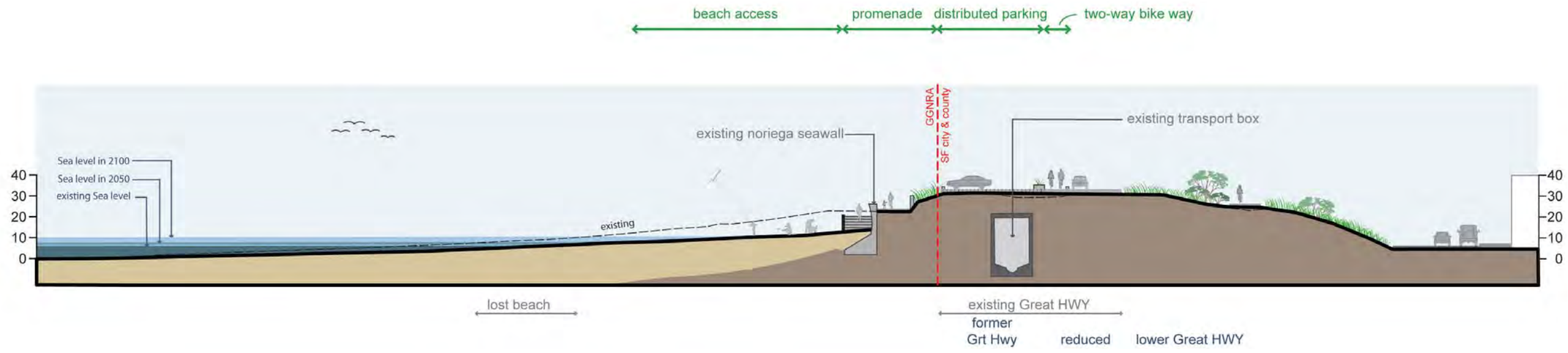
key plan



section D (great highway at wawona)

reduce width of great highway to provide amenities / managed retreat

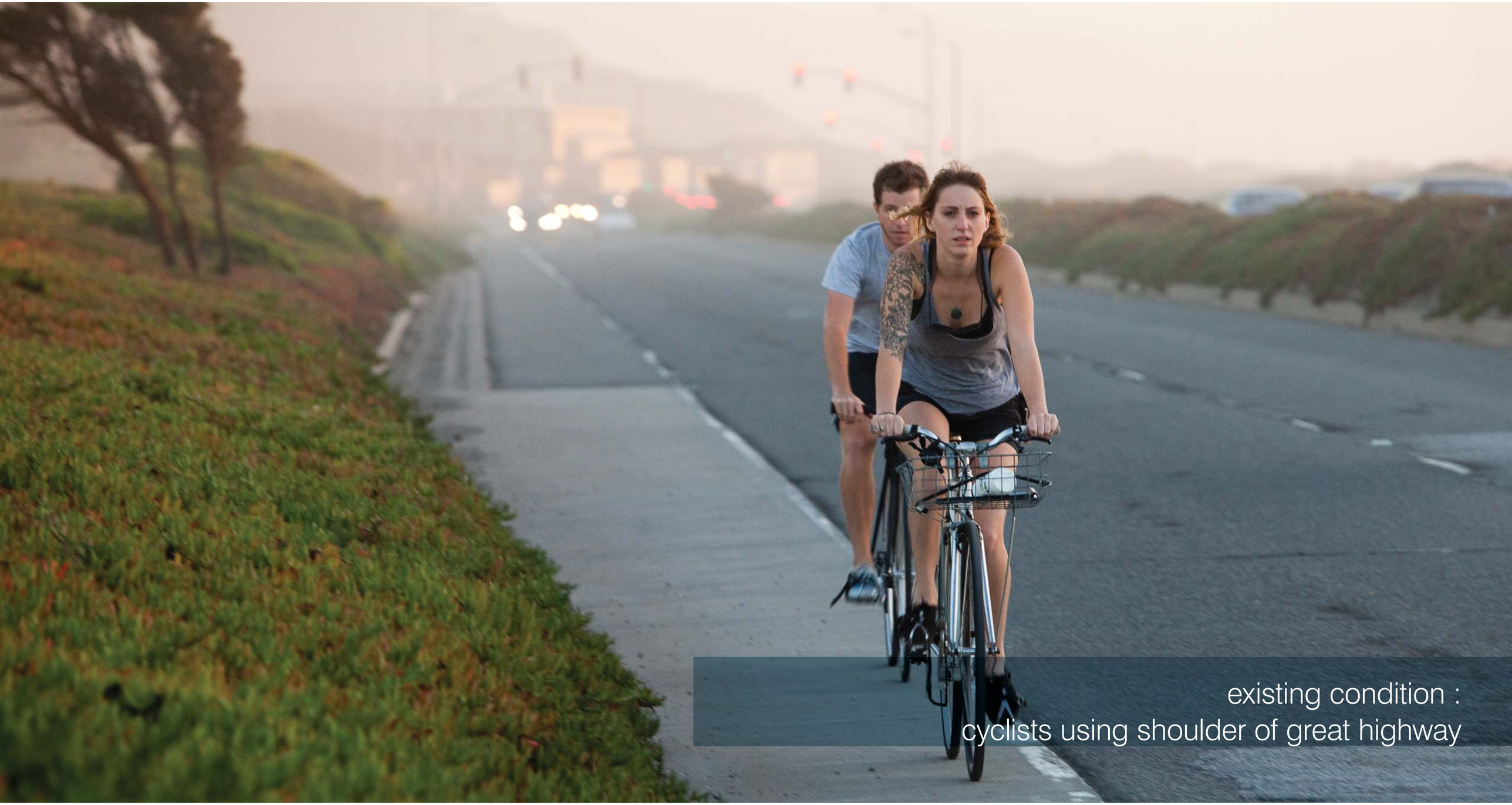
key move 3



section E (noriega seawall at rivera)

key move 3

reduce width of great highway to provide amenities / managed retreat



existing condition :
cyclists using shoulder of great highway

key move 4

4.1 sand nourishment via army corp of engineers along southern end of middle reach

4.2 dune restoration in key locations, especially at lincoln and vicente

4.3 sand ladders and modular boardwalks provide access while limiting impact

middle reach native dune restoration

The existing “dunes” are actually sand embankments, constructed as part of the SFPUC’s clean water program, and vegetated with non-native grasses and iceplant. Re-countouring and re-vegetating these embankment to introduce a native dune morphology and ecosystem would provide ecological benefits by reintroducing a scarce and fragile coastal ecosystem, increase the visibility of the ocean from the Great Highway, and may provide some improvements in sand management by reducing the existing embankment’s tendency to launch windborne sand long distances.

key move 4

middle reach native dune restoration

key move 4

middle reach native dune restoration

benefits

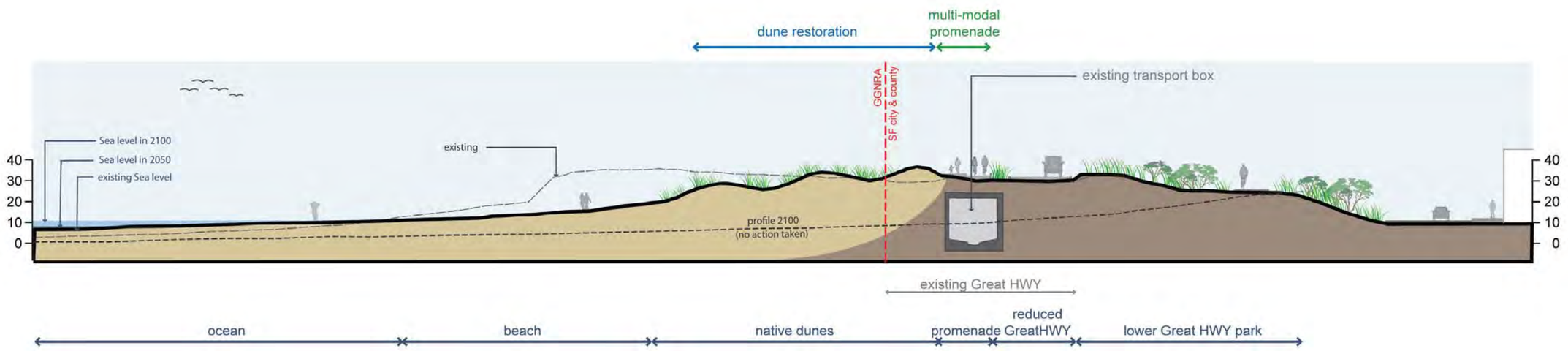
- ecological restoration and improved aesthetics
- removal of non-native species
- lower profile will allow more visual access to the ocean
- potential for improved sand management with lower profile

constraints

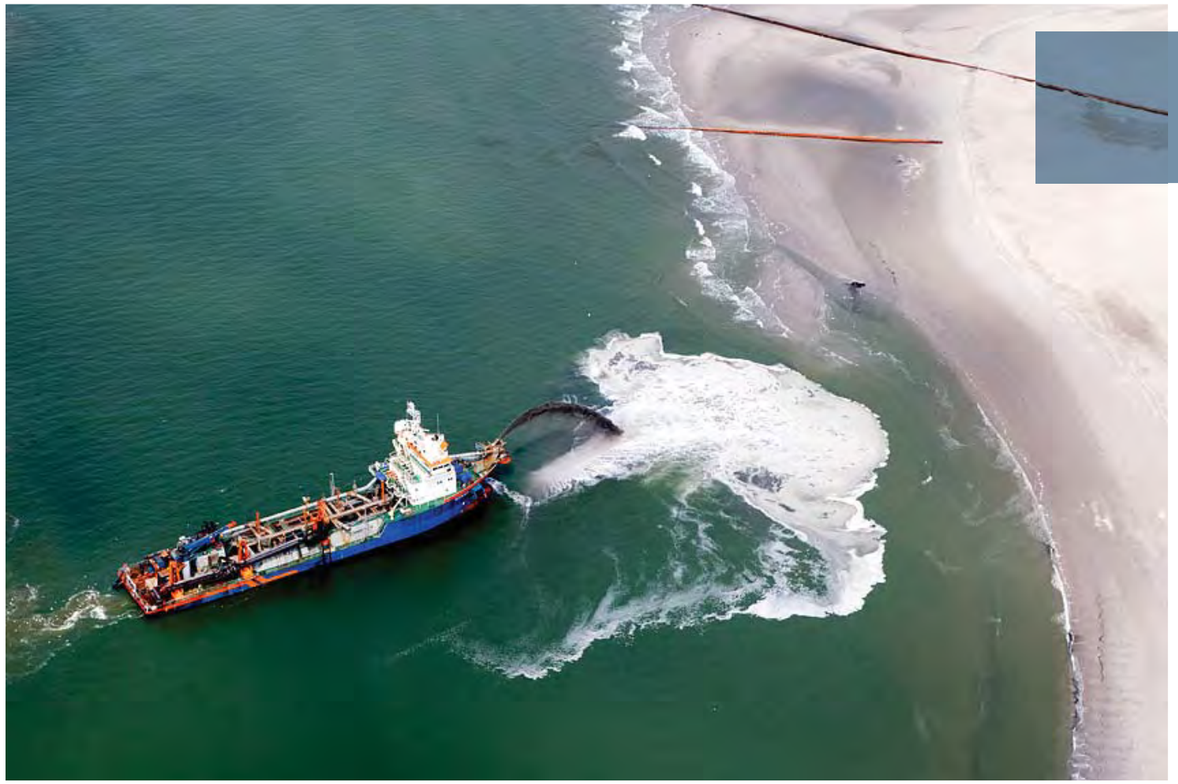
- significant cost
- challenge of fully removing non-native grasses
- access to dunes limited to protect restoration

outstanding questions

- would a native dune form offer comparable coastal protection?
- to what degree would management of windblown sand be improved
- how can sand placed through beach nourishment best feed the dune system?



section F (great highway at moraga)



“sand engine”, north sea, netherlands

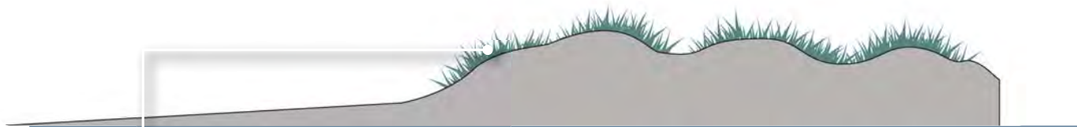
sand nourishment

sand nourishment via army corps of engineers along southern end of middle reach and south reach

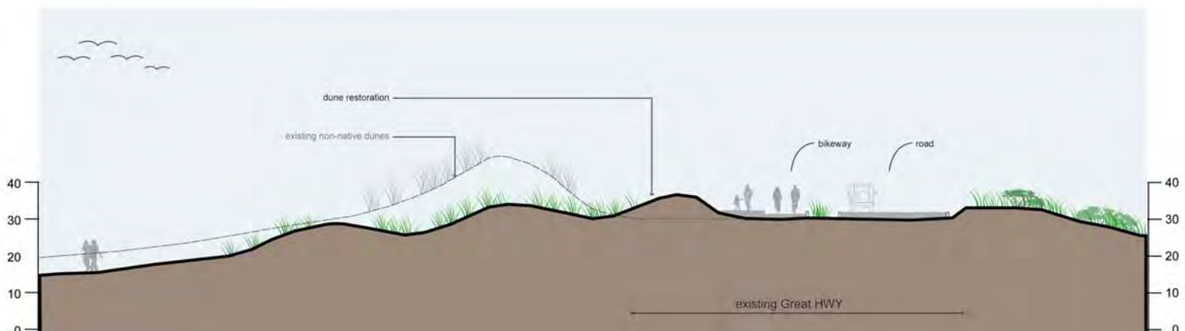
key move 4

middle reach native dune restoration

native dune morphology + native species



non-native dune morphology + non-native species



typical section :
dune restoration southbound lanes of great highway


existing non-native dunes

key move 5

better connection between golden gate park and beach

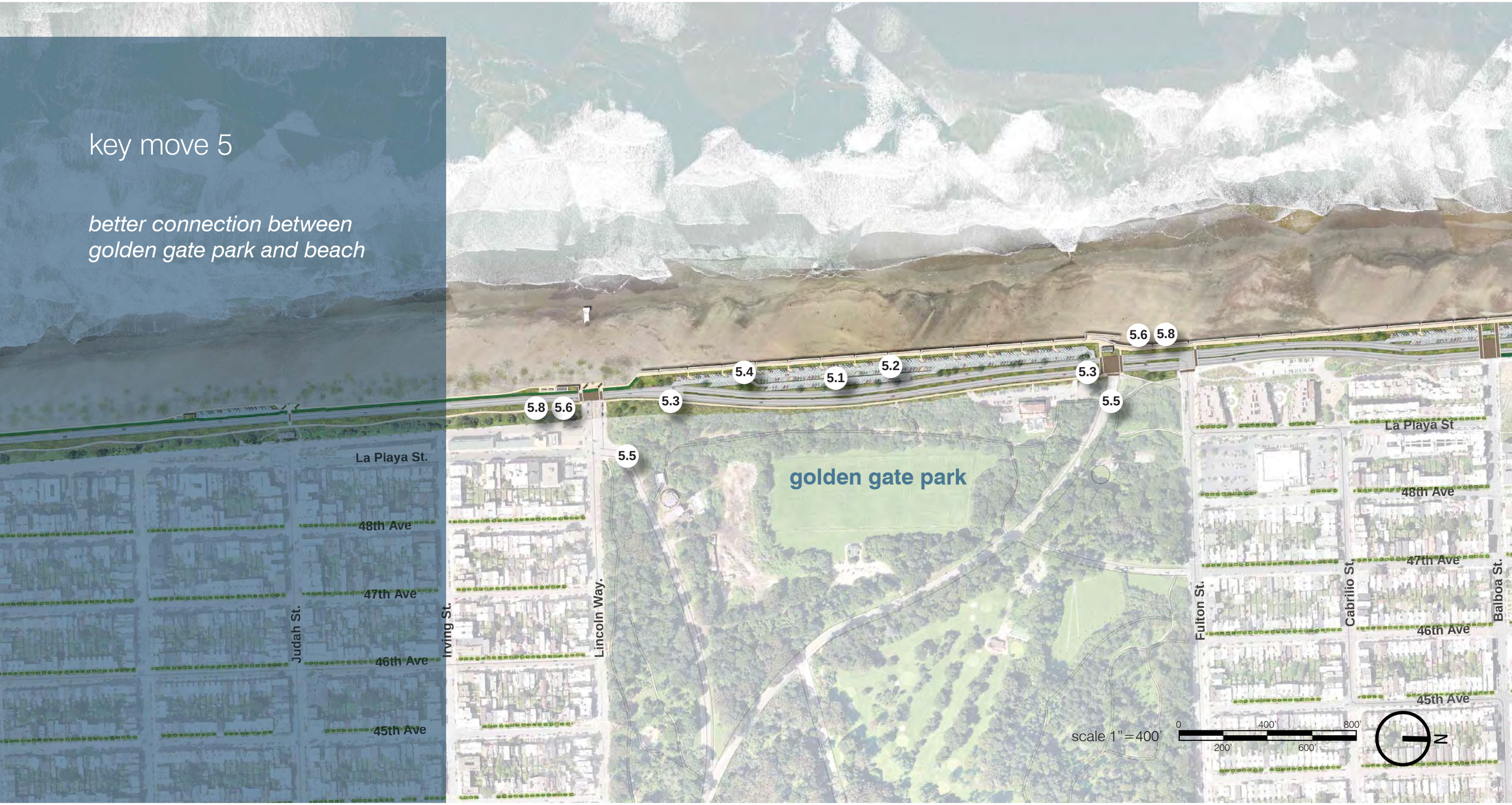
- **5.1** improve parking lot, preserve event/flex-space capacity
- **5.2** maintain row of “watching the water” parking
- **5.3** modify parking entrances, and improve pedestrian crossings at JFK/Beach Chalet
- **5.4** provide vertical arrival element / overlook at ends of Golden Gate Park
- **5.5** add east side bike lanes (in both directions), connect bike trail with GGP
- **5.6** add abundant bike parking
- **5.7** joint City/Federal Parking Management Plan
- **5.8** introduce appropriate landscape site elements

The coastal frontage of Golden Gate Park – the O’Shaughnessy parking lot and seawall promenade – does not currently provide the spectacular sense of arrival that it could. Identified by GGNRA plans as a location for active and vibrant activities, it is currently defined by a large expanse of asphalt, with a great deal of unused parking most of the time. Pedestrians arriving from the park find a confusing path to the sea and few basic amenities.

This Key Move would rework this space to create a multi-use space appropriate to the context and program of this critical connection, while maintaining parking, providing basic amenities and appropriate landscaping, and allowing for continued use for major events.

key move 5

better connection between golden gate park and beach



key move 5

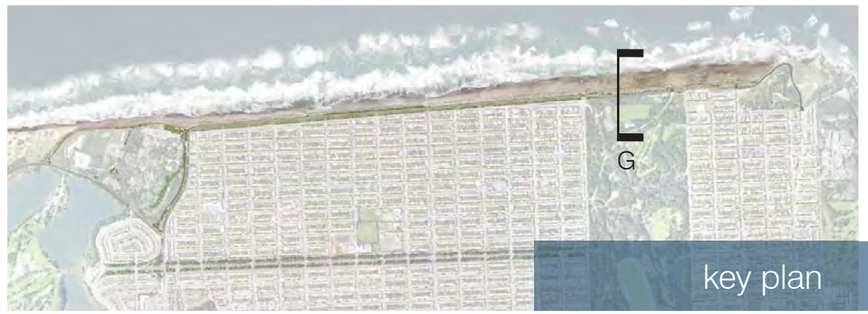
better connection between golden gate park and beach

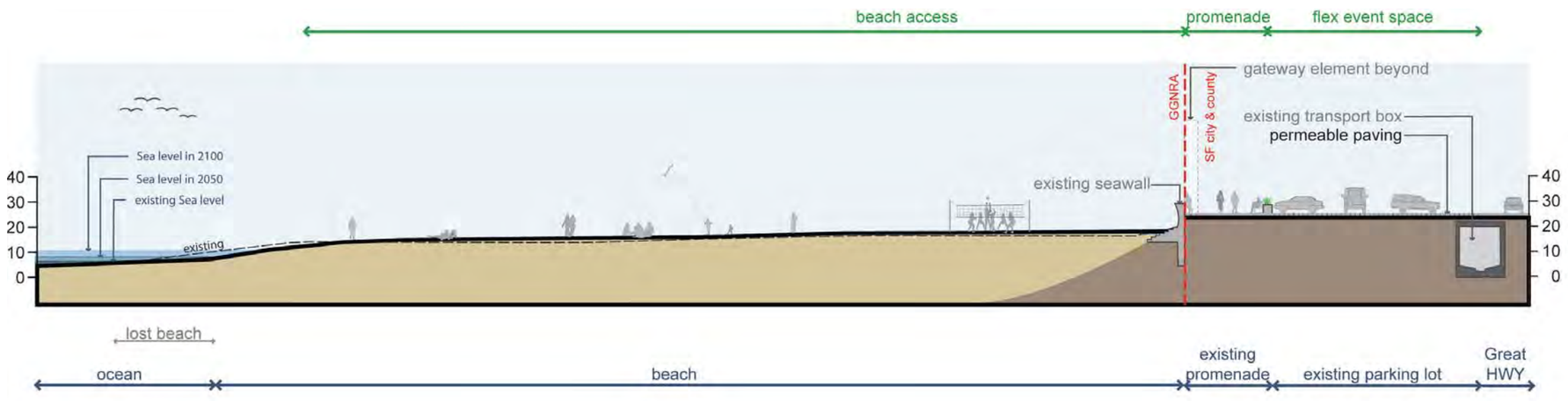
benefits

- a sense of arrival in a context-appropriate landscape
- improved basic amenities at the busiest access point
- maintains parking and event capacity while improving pedestrian and bicycle safety
- improved environmental performance with permeable paving, alternative energy

constraints

- cost
- interagency management challenges



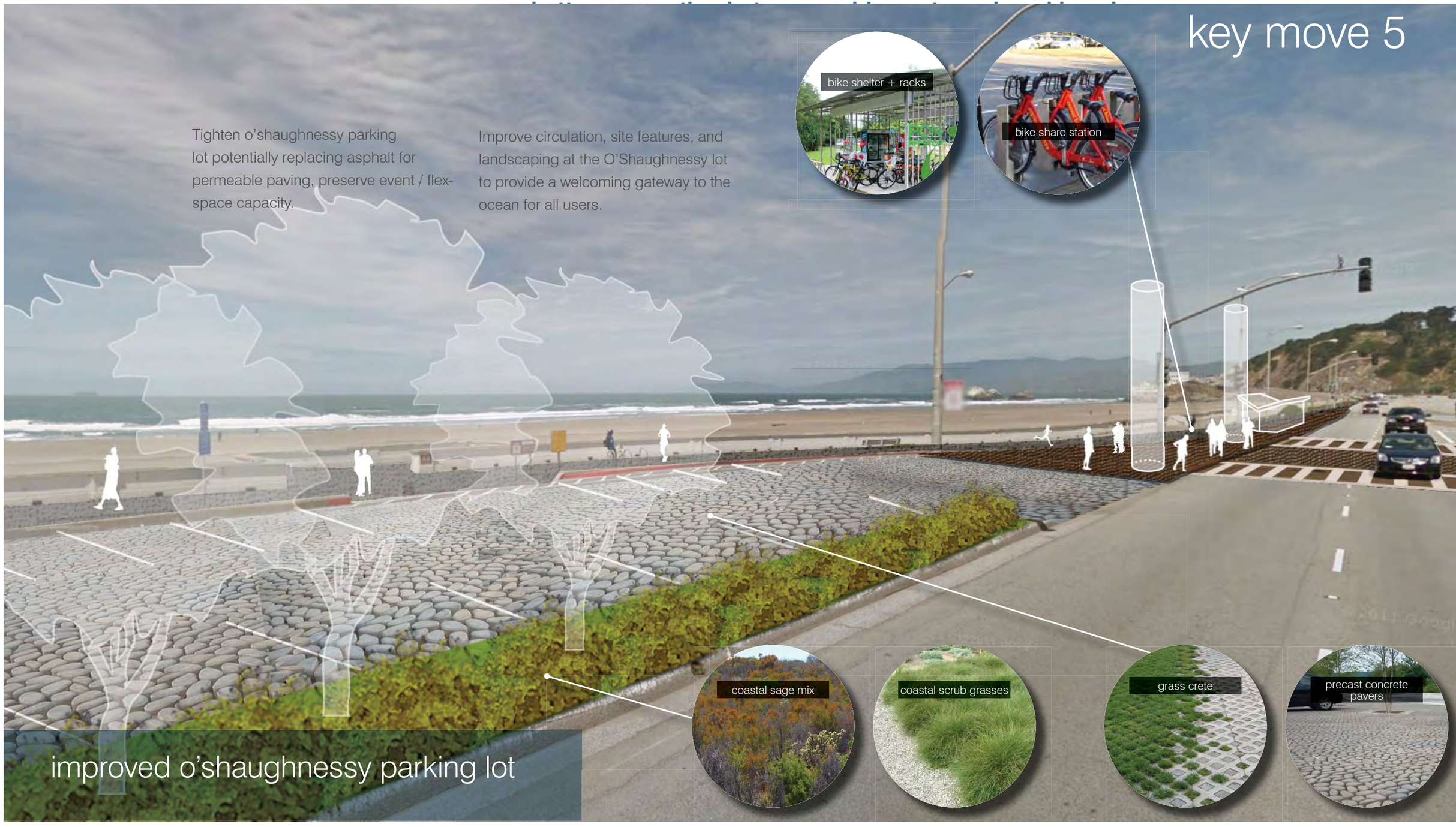


section G (at o'shaughnessy seawall)

key move 5

Tighten o'shaughnessy parking lot potentially replacing asphalt for permeable paving, preserve event / flex-space capacity.

Improve circulation, site features, and landscaping at the O'Shaughnessy lot to provide a welcoming gateway to the ocean for all users.



improved o'shaughnessy parking lot

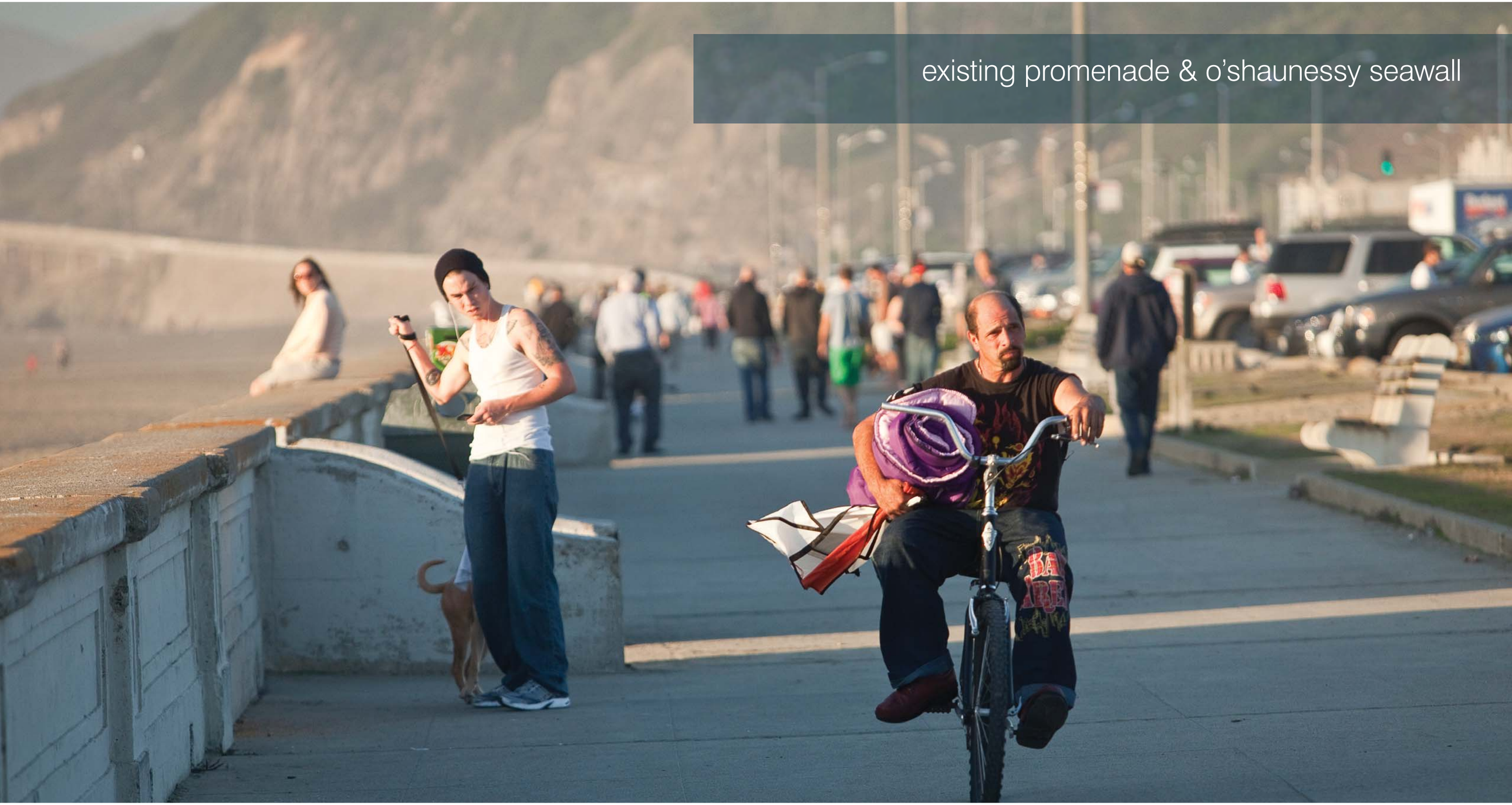
key move 5

Lincoln avenue gateway (potential improvement elements)

Provide vertical arrival element / overlook at ends of Golden Gate Park

arrival element / gateway at lincoln

existing promenade & o'shaunessy seawall



key move 6

bicycle + pedestrian improvements north of balboa

- **6.1** narrow Great Highway North of Balboa (from 4 to 2 lanes)
- **6.2** keep diagonal Cliff House parking
- **6.3** narrow Point Lobos Avenue from 4 lanes to 2, add 2-way separated bikeway on inland side. Separated bikeway along cliff to prevent bicycle/vehicular conflict on steep slope
- **6.4** connect bike lane to bike trail to Lands End and add “bicycle box” at Pt Lobos and 49th

North of Fulton Street, the great highway carries much less traffic than its design would suggest, and it presents a confusing and unwelcoming condition to pedestrians and cyclists. North of Balboa, there is a dangerous combination of bicycle traffic, diagonal parking, and a steep grade. These recommendations would narrow the roadway from four lanes to two, allow for a physically separated two-way bikeway along the bluff adjacent to the Cliff House while leaving the diagonal visitor parking intact. This shortens pedestrian crossings and addresses the non-standard intersection at Balboa. It also presents an opportunity to make a key connection for cyclists and pedestrians to the trails at Land’s End, the Presidio, and beyond, in keeping with the role of Ocean Beach as a key connector of the broader open space network.

key move 6

bicycle + pedestrian improvements north of balboa

key move 6

bicycle + pedestrian improvements north of balboa

potential pt lobos & 49th (existing condition)

benefits

- improved pedestrian, bicycle safety, shortened crossings
- improved aesthetics and street design
- maintains cliff house parking while reducing car-bike conflicts
- enhances key recreational connection to land's end, coastal trail

constraints

- modest traffic impacts

outstanding questions

- what is the optimal arrangement of bicycle lanes along point lobos avenue?
- what will the traffic impacts be?

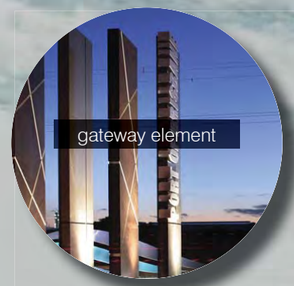
key move 6

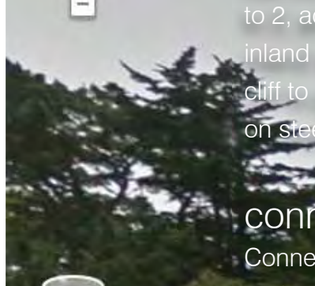
poin t lobos road diet :

Narrow pt lobos avenue from 4 lanes to 2, add 2-way separated bikeway on inland side. Separated bikeway along cliff to prevent bicycle/vehicular conflict on steep slope

connect to lands end :

Connect bike lane to bike trail to land's end and add "bicycle box" at pt lobos and 49th

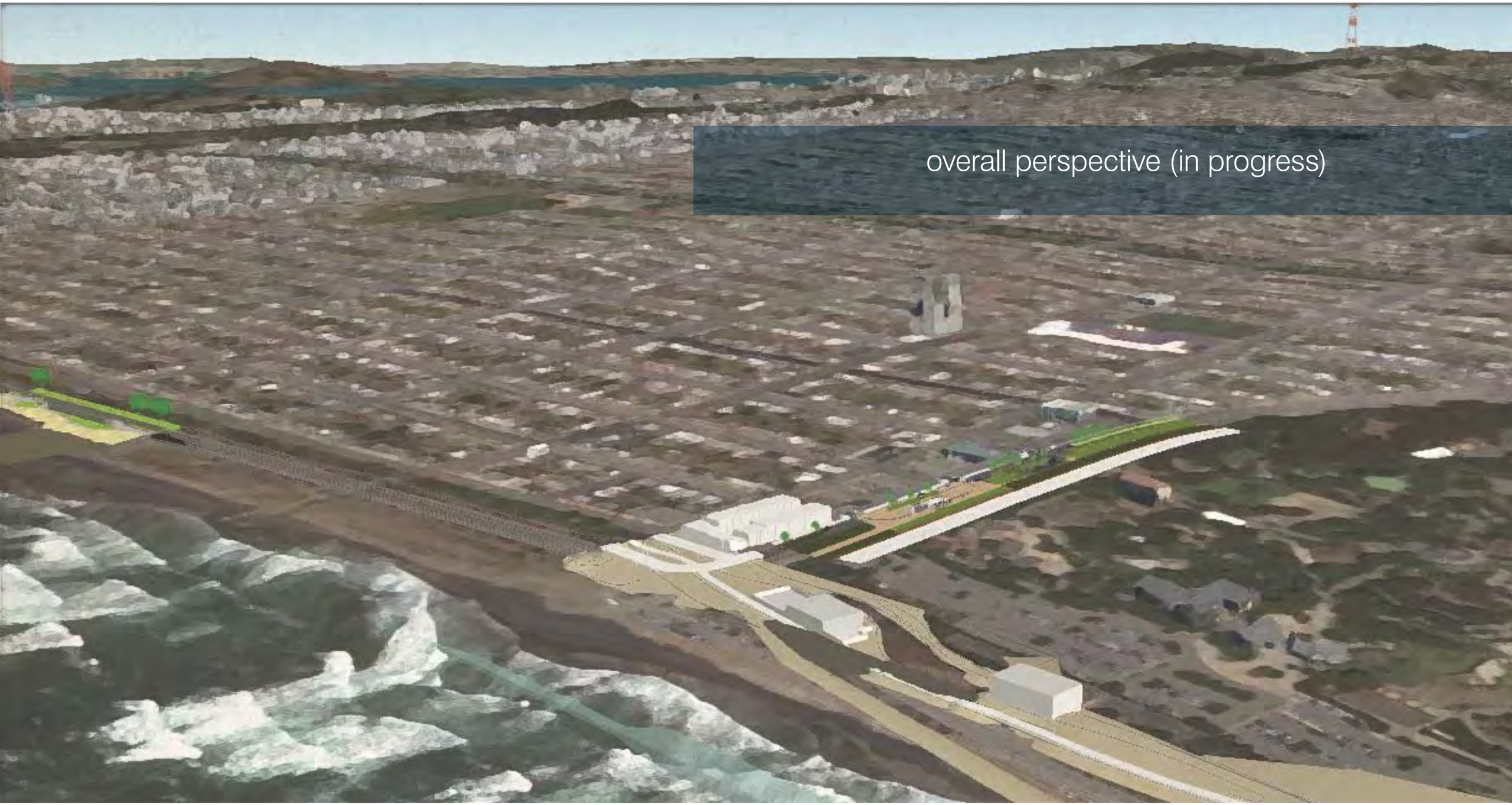




potential pt lobos & 49th intersection

master plan recommendations

These six “Key Moves” outline the Ocean Beach Master Plan’s major recommendations. Each includes many individual recommendations, more than forty in all. They are organized by three geographical reaches as indicated, and will be implemented incrementally over a period of decades.



overall perspective (in progress)