TRANSMITTAL TO CITY COUNCIL

Case No.(s)	Planning Staff Name(s) and Contact No.	C.D. No.
CPC-2013-226-SPE-CU-ZAA-CCMP-SPP RELATED CASE: VTT-72147-CN-1A	CHRISTINA TOY LEE 213-473-9723	1

Items Appealable to Council:	Last Day to Appeal:	Appealed:
SPE-CU-ZAA-CCMP-SPP	JULY 8, 2013	Yes ☑ No ☐

Location of Project (Include project titles, if any.)

119 N. AVENUE 56, 5712 E. MARMION WAY, 123, 125 N. AVENUE 57, 5706, 5708, 5712 E. MARMION WAY, 124 N. AVENUE 59, 124, 128, 132 N. AVENUE 59

Name(s), Applicant / Representative, Address, and Phone Number.

DANIEL FALCON JR.
HPTV APARTMENTS
801 S. GRAND AVE. 780
LOS ANGELES, CA 90017
213-236-2680

REPRESENTATIVE:
ANDIE ADAME
CRAIG LAWSON & CO.
8758 VENICE BLVD.
LOS ANGELES, CA 90034
310-838-2400

Name(s), Appellant / Representative, Address, and Phone Number.

LISA DUARDO
FRIENDS OF ~~HIGLAND~~ HIGHLAND PARK
5615 N. FIGUEROA ST.
LOS ANGELES, CA 90042
323-255-9764
friendsofhighlandpark@gmail.com

REPRESENTATIVE:
DEAN WALLRAFF
ADVOCATES FOR THE ENVIRONMENT
PO BOX 4242
SUNLAND, CA 91401
818-353-4268
dw@aenv.org

Final Project Description (Description is for consideration by Committee/Council, and for use on agendas and official public notices. If a General Plan Amendment and/or Zone Change case, include the prior land use designation and zone, as well as the proposed land use designation and zone change (i.e. "from Very Low Density Residential land use designation to Low Density land use designation and concurrent zone change from RA-1-K to (T)(Q)R1-1-K). In addition, for all cases appealed in the Council, please include in the description only those items which are appealable to Council.)

Construction and maintenance of the Highland Park Transit Village, a new joint public and private development with residential housing and public parking. The three project sites are owned by the Department of Transportation and improved with public surface parking lots. The project includes the demolition of the surface parking lots and the construction of a 20-unit residential condominium building with a maximum height of 45 feet, a 50-unit multi-family residential building with 49 affordable dwelling units and 1 non-restricted manager's unit with a maximum height of 47 feet 6 inches, and a 10-unit affordable multi-family residential building with a maximum height of 39 feet 6 inches. Each site will have a public parking component. The project will be built in two phases. Phase I will include Sites 2 and 3 and Phase II will include Site 1.

Fiscal Impact Statement *Determination states administrative costs are recovered through fees.	Environmental No.	Commission Vote:
Yes ☑ No ☐	ENV-2013-221-MND	8-0

JAMES K. WILLIAMS, Commission Executive Assistant II

Date: July 10, 2013

MASTER APPEAL FORM

City of Los Angeles – Department of City Planning

ORIGINAL

APPEAL TO THE: City of Los Angeles City Council
(DIRECTOR, AREA PLANNING COMMISSION, CITY PLANNING COMMISSION, CITY COUNCIL)

REGARDING CASE #: CPC-2013-226-SPE-CU-ZAA-CUMP-SPP

PROJECT ADDRESS: Site 1 - 119 N. Avenue 56 / Site 2 - 5706, 5708 & 5712 E. Marmion Way, 123 & 125 N. Avenue 57 / Site 3 - 124 & 128 & 132 N. Avenue 59, L.A., CA. 90042

FINAL DATE TO APPEAL: July 8, 2013

TYPE OF APPEAL:

1. ☐ Appeal by Applicant
2. ☒ Appeal by a person, other than the applicant, claiming to be aggrieved
3. ☐ Appeal by applicant or aggrieved person from a determination made by the Department of Building and Safety

APPELLANT INFORMATION – Please print clearly

Name: Lisa Duardo

- Are you filing for yourself or on behalf of another party, organization or company?

☐ Self ☒ Other: Friends of Highland Park

Address: 5615 N. Figueroa street

Los Angeles Zip: 90042

Telephone: 323-255-9764 E-mail: friendsofhighlandpark@gmail.com

- Are you filing to support the original applicant's position?

☐ Yes ☒ No

REPRESENTATIVE INFORMATION

Name: Dean Wallraff - Advocates for the Environment

Address: P.O. Box 4242

Sunland Zip: 91041

Telephone: 818-353-4268 E-mail: dw@aenv.org

This application is to be used for any appeals authorized by the Los Angeles Municipal Code for discretionary actions administered by the Department of City Planning.

JUSTIFICATION/REASON FOR APPEALING – Please provide on separate sheet.

Are you appealing the entire decision or parts of it?

☒ Entire ☐ Part

Your justification/reason must state:

- The reasons for the appeal
- How you are aggrieved by the decision
- Specifically the points at issue
- Why you believe the decision-maker erred or abused their discretion

ADDITIONAL INFORMATION/REQUIREMENTS

- Eight (8) copies of the following documents are required (1 original and 7 duplicates):
  - Master Appeal Form
  - Justification/Reason for Appealing document
  - Original Determination Letter
- Original applicants must provide the original receipt required to calculate 85% filing fee.
- Original applicants must pay mailing fees to BTC and submit copy of receipt.
- Applicants filing per 12.26 K "Appeals from Building Department Determinations" are considered original applicants and must provide notice per 12.26 K 7.
- Appeals to the City Council from a determination on a Tentative Tract (TT or VTT) by the City (Area) Planning Commission must be filed within 10 days of the written determination of the Commission.
- A CEQA document can only be appealed if a non-elected decision-making body (i.e. ZA, APC, CPC, etc...) makes a determination for a project that is not further appealable.

  "If a nonelected decision-making body of a local lead agency certifies an environmental impact report, approves a negative declaration or mitigated negative declaration, or determines that a project is not subject to this division, that certification, approval, or determination may be appealed to the agency's elected decision-making body, if any."
  --CA Public Resources Code § 21151 (c)

I certify that the statements contained in this application are complete and true:

Appellant Signature: _____ Date: July 5, 2013
on behalf of Friends of Highland Park

Planning Staff Use Only

Amount	106.80	**Reviewed and Accepted by**	Steve Kim	**Date**	7/5/13
Receipt No.	12134	**Deemed Complete by**		**Date**	

☑ Determination Authority Notified ☐ Original Receipt and BTC Receipt (if original applicant)

July 3, 2013

Advocates for the Environment
A non-profit public-interest law firm
and environmental advocacy organization

Los Angeles City Council
200 N. Spring St.
Los Angeles, CA 90012

re: Appeal of Los Angeles City Planning Commission Approvals and CEQA Determination for Highland Park Transit Village Project

Dear Los Angeles City Council:

This letter constitutes the appeal of the City Planning Commission's approvals for the Highland Park Transit Village (the **Project**). This appeal is brought by my client, Friends of Highland Park. The members of that organization are aggrieved by the Planning Commission's approval of the Project because they reside or own businesses in the immediate vicinity of the Project.

The Project, as approved, would occupy the following sites in Highland Park:

- Site 1: 119 N. Avenue 56
- Site 2: 5706, 5708 & 5712 E. Marmion Way, 123 & 125 N. Avenue 57
- Site 3: 124, 128 & 132 N. Avenue 59

We hereby appeal the Project approvals, including:

- VTT-72147-CN-1A: Vesting Tentative Tract Map for Site 1
- CPC-2013-226-SPE-CU-ZAA-CCMP-SPP: approval of various Conditional Use Permits, Zoning Administrator's Adjustment, Project Compliance with Avenue 57 Transit-Oriented Specific Plan, and Certificate of Compatibility with Highland Park-Garvanza Historic Preservation Overlay Zone

We also appeal, under Public Resources Code section 21151(c), the City Planning Commission's CEQA determination to approve a Mitigated Negative Declaration for the Project, ENV-2013-221-MND. There is at least a fair argument that the Project may have a substantial adverse effect on the environment, so CEQA requires an Environmental Impact Report (**EIR**) to be prepared.

Los Angeles Municipal Code section 17.54 does not allow for a City-Council appeal of the City Planning Commission's Parcel Map approvals, such as those for Cases AA-2013-222-PMLA-1A and AA-2013-223-PMLA-1A. CEQA, however, requires those approvals to be set aside because of the flawed environmental analysis of the Project, which includes those approvals.

Why the Project Should Not Be Approved

The project could have been improved substantially if the applicant and the Department of City Planning had properly taken into account the concerns of the residents and businesses in the area.

The Project is Incompatible with the Area's Cultural Heritage

The Project is located within one block of the historic Route-66 scenic corridor. As evidenced by the City's enactment of the Highland Park-Garvanza Historic Preservation Overlay Zone, the area is culturally significant. Exhibit 1 shows the way Figueroa Street near the Project looked in 1925. The architecture shown in the photo has remained largely unchanged to this day. The Project would be constructed just behind the buildings shown on the left side of the street in the photo. Since it would be 3 and 4 stories tall, it would be significantly taller than the existing buildings, and would be visible behind them from Figueroa Street.

The City Should Keep Faith with Landowners Who Donated Land for Parking

In 1962, the City of Los Angeles condemned land behind the buildings shown on the left on Exhibit 1. It was a "friendly" condemnation – most of the landowners – who were for the most part the owners of the business fronting on Figueroa Street – voluntarily sold their rear parking lots to the City so that the City could maintain them as public parking for commercial visitors to the area.

The owners of those same businesses today, for the most part, oppose the Project because it will "bury" their parking, i.e. force visitors to park in underground parking garages below the Project. If the Project is built as approved, it won't be obvious to visitors that there is parking below, or that the parking is free, since there is often a fee for parking in municipal garages.

The adjacent landowners also feel it is unjust for a private developer to profit from a project built largely on land they donated to the City as parking for visitors to their businesses. When they gave the land, they understood that it would be maintained as it was for parking.

CEQA Errors

The Initial Study (**IS**) accompanying the Mitigated Negative Declaration adopted by the City Planning Commission erroneously concludes that the Project, with the mitigations agreed to by the applicant, will not have any significant effects on the environment. As will be discussed below, the proposed Project will have significant effects in a number of areas, even with the mitigations listed in the Initial Study. Therefore the City must prepare and circulate an Environmental Impact Report before approving the Project.

Significant Effects on Cultural Resources and Aesthetics

As discussed above, and as evidenced by the federal Route 66 Preservation Act, attached to this appeal as Exhibit 2, the Route 66 corridor is a significant cultural resource. The construction of a mass of buildings several blocks long, just behind and significantly higher than the existing historically-important structures, would have a significant visual effect on the appearance of Figueroa Street. The Project buildings would change the roofline seen looking north from Figueroa Street between Avenue 56 and Avenue 59 because they would be taller than the existing buildings fronting on Figueroa Street. They would also be much more massive than those buildings.

The Project's design would also be incompatible with existing single-family residences in the area, many of which have been restored to their original, period appearance and condition.

In addition to being very visible from Figueroa Street/Route 66, the Project would also, by virtue of its height, block views of the neighborhood and nearby hills as seen from the adjacent Metro Rail, and from residences and other buildings in the vicinity. The Route 66 corridor is also visible from nearby public land owned by the Santa Monica Mountains Conservancy. The Project would harm the views from these vantage points by despoiling the old-fashioned, period look of the neighborhood.

No proper analysis of the Project's effects on views in the neighborhood has been undertaken. The IS states that the Project would have an effect on aesthetics and cultural resources, potentially significant unless mitigated, and then concludes, with no analysis, that the Project's compliance with the Highland Park-Garvanza Preservation Plan (the **HPOZ Plan**) will mitigate the Projects effects in these areas into insignificance. Condition of Approval 11(c) requires certain features on Project buildings to make them superficially resemble existing buildings in the area, such as battered porch columns, decorative horns on windows, and grey or brown roofs. But these requirements fail to address the larger concern that three tall, massive buildings taller than other buildings in the area, visible from Figueroa Street, will markedly change the look of historic Route 66.

Greenhouse Gas Analysis

The Greenhouse Gas mitigation in the IS inexplicably focuses on volatile organic compounds, even though those compounds have a minuscule effect on climate change. (See National Climatic Data Center Frequently Asked Questions about Greenhouse Gasses, Exhibit 3, at p. 4.) The use of only low- and non-VOC-containing paints, sealants, adhesives, and solvents will not mitigate the Project's greenhouse-gas effects to any significant degree.

The IS simply contains no analysis of Greenhouse Gas (GHG) Emissions effects. Those effects are significant because the Project is substantial, comprising 80 dwelling units and concomitant parking. The building sector in the United States accounts for approximately 48% of annual GHG emissions. (Hal S. Knowles, III, Realizing Residential Building Greenhouse Gas Emissions Reductions, Exhibit 4 at p. 2, available from U.S. EPA Web Site: http://www.epa.gov/ttnchie1/conference/ei17/session5/knowles.pdf.)

All construction projects, therefore, have cumulative GHG effects, but projects this large also have significant direct effects. The IS acknowledges that, without mitigation, the Project's GHG emissions may be a significant environmental effect, but requires totally ineffective mitigation measures – reducing VOC emissions. Feasible mitigation measures are available, such as those outlined in the California Attorney General's document (Addressing Climate Change at the Project Level, Exhibit 5.) Such measures include requiring energy efficiency and conservation, use of renewable energy, and water conservation.

Since the Project's GHG emissions will be substantial adverse impacts, and because measures have not been adopted to mitigate these impacts into insignificance, CEQA requires an EIR to be prepared.

Hazardous Materials

The Metro Gold Line runs adjacent to the Project. This rail line was previously used to transport freight, including chemicals. Such rail lines are often contaminated by leakage of toxic chemicals that were shipped by rail over the many decades the rail line was in operation. (See, e.g. Rails-to-Trails Conservancy, Understanding Environmental Contaminants, Exhibit 6 at pp. 5-9.)

The IS, under Hazards and Hazardous Materials," concludes, with no analysis or even discussion, that the Project will not result in significant hazardous-material exposure. Before deciding to construct apartments and condos on a site immediately adjacent to a rail line that has been used for freight for decades, the soil should have been tested for contamination. It is one thing to expose Metro riders briefly to toxic vapors; it is quite another to build housing where toxic vapors can infiltrate and accumulate inside. There is also a strong possibility that digging during construction will expose and diffuse contaminated dust.

The IS' dismissal of the strong possibility of soil contamination, by checking the "No Impact" column for all of the potential Hazards and Hazardous Materials effects, is based on nothing: no evidence, no analysis. Deliberately failing to test the soil so as to avoid discovering the contamination does not comport with CEQA.

Haul Route

There is no analysis of the environmental effects of the haul route. The IS, under "Transportation/Traffic" mentions that "Haul route approval is requested and therefore mitigations are incorporated to minimize impacts," referring to Mitigation Measure XVI-30. But that mitigation measure simply requires the install appropriate traffic signs around the site, and to obtain haul route approval if exporting more than 20,000 cubic yards. Obtaining Building and Safety approval of the haul route is, at best, a deferred mitigation measure, and hence invalid.

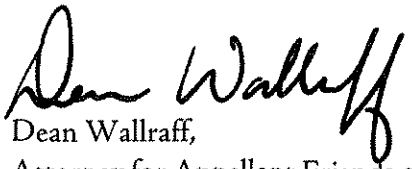
Land Use Errors

As discussed in the documents submitted into the record along with the filing of this appeal, the Project is inconsistent with the Historic Preservation Overlay Zone and the Avenue 57 Transit-Oriented Development Specific Plan.

Conclusion

Because of the incompatibilities of the Project with the applicable land-use plans, and the Project's forseeable substantial adverse environmental effects, the City Council should grant the appeal, and should send the project back to the Dept. of City Planning with instructions to require the Project to be modified to conform to the HPOZ and Specific Plan, and to require an EIR be prepared, in accordance with CEQA.

Sincerely,



Dean Wallraff,
Attorney for Appellant Friends of Highland Park

10211 Sunland Blvd., Sunland, CA 91040 (818) 353-4268 dw@aenv.org

LOS ANGELES CITY PLANNING COMMISSION

200 N. Spring Street, Room 272, Los Angeles, California, 90012-4801, (213) 978-1300
http://planning.lacity.org/

Determination Mailing Date: JUN 21 2013

Case: CPC-2013-226-SPE-CU-ZAA-CCMP-SPP
CEQA: ENV-2013-221-MND
Related Cases: VTT-72147-CN-1A, AA-2013-222-PMLA-1A, AA-2013-223-PMLA-1A

Location: Site 1: 119 N. Avenue 56; Site 2: 5712 E. Marmion Way (123 & 125 N. Avenue 57 and 5706, 5708, & 5712 E. Marmion Way); Site 3: 124 N. Avenue 59 (124, 128, and 132 N. Avenue 59)
Council District: 1 – Reyes
Plan Area: Northeast Los Angeles
Zone: PF-2D-HPOZ

Applicant: Daniel Falcon, Jr., HPTV Apartments, L.P.
Representative: Andie Adame, Craig Lawson & Co., LLC

At its meeting on June 13, 2013, the following action was taken by the City Planning Commission:

1. **Approved** a **Conditional Use** to permit the construction of a joint public and private development with residential housing and public parking that is more intensive than those uses permitted in the most restrictive adjoining zone with the following residential densities: Site 1: 20 units, Site 2: 50, and Site 3: 10 units.
2. **Approved** a **Conditional Use** to permit the construction of a joint public and private development that is more intensive than those uses permitted in the most restrictive adjoining zone with the approval of the following yard setbacks: Site 1: a zero-foot to 20-foot 6-inch front yard setback along Avenues 56 and 57, Site 1: a zero-foot to 22-foot side yard setback along the northern property line and southern property line, Site 2: a zero-foot to 21-foot side yard setbacks along Marmion Way, the abutting alley and the adjoining property, Site 3: a zero-foot to 10-foot side yard setback along Avenue 59 and the western property line, and Site 3: a 10-foot to 15-foot rear yard setback.
3. **Approved** a **Conditional Use** to permit a building height of 47 feet 6 inches on Site 2.
4. **Approved** a **Zoning Administrator's Adjustment** to allow: Site 1: a 9-foot passageway, Site 2: a 9-foot 8-inch passageway between a stair and a wall, Site 2: a 11-foot 3-inch passageway between a stair and a wall and a 12-foot 7-inch passageway, and Site 3: a 9-foot 8-inch passageway between a stair and a wall and a 11-foot 6 inch passageway.
5. **Approved** a **Project Permit Compliance** approval of the Avenue 57 Transit Oriented Specific Plan.
6. **Denied without Prejudice** the **Specific Plan Exception** of the Avenue 57 Transit Oriented District Specific Plan.
7. **Approved** a **Certificate of Compatibility** for the construction of a joint public-private development consisting of 80 multi-family residential units and 221 public parking spaces and 106 resident parking spaces located within the Highland Park – Garvanza Historic Preservation Overlay Zone (HPOZ).
8. **Adopted** the attached **Conditions of Approval**.
9. **Adopted** the attached **Findings**.
10. **Adopted** Mitigated Negative Declaration No. **ENV-2013-221-MND**.
11. **Advised** the applicant that, pursuant to California State Public Resources Code Section 21081.6, the City shall monitor or require evidence that mitigation conditions are implemented and maintained throughout the life of the project and the City may require any necessary fees to cover the cost of such monitoring.
12. **Advised** the applicant that pursuant to State Fish and Game Code Section 711.4, a Fish and Game Fee is now required to be submitted to the County Clerk prior to or concurrent with the Environmental Notice of Determination (NOD) filing.

Fiscal Impact Statement: There is no General Fund impact as administrative costs are recovered through fees.

This action was taken by the following vote:

Moved: Perlman
Seconded: Roschen
Ayes: Cardoso, Eng, Freer, Hovaguimian, Lessin, Romero
Absent: Burton

Vote: 8 - 0

James K. Williams, Commission Executive Assistant II
City Planning Commission

CONDITIONS OF APPROVAL

Pursuant to Los Angeles Municipal Code (LAMC) Sections 12.24-U,21, 12.24-F, 12.28, 11.5.7-C, and 12.20.3, the following conditions are hereby imposed upon the use of the subject property.

A. Entitlement Conditions

1. **Use.** The project is approved for Site 1: 20 residential units, Site 2: 50 residential units, including 49 residential units restricted for Low Income households and 1 non-restricted manager's unit, and Site 3: 10 residential units restricted for Low Income households. The project will also include a public parking component as per Condition 8.

2. **Site Plan.** The use and development of the subject property shall be in substantial conformance with this approval and the plans submitted by the applicant, signed and dated by staff and attached to the case file as Exhibit D. Any changes to the project or these plans shall be approved by the Director of Planning and may require additional review by the HPOZ Board. Each change shall be identified and justified in writing. Modified plans shall be signed and dated by staff and attached to the case file as Modified Exhibit D, etc.

3. **Floor Area.** The total floor area of the new building on the subject property shall not exceed: Site 1: 25,175 square feet, Site 2: 55,115 square feet, and Site 3: 11,169 square feet, for a total of 91,459 square feet.

4. **Height.** The height of the proposed structures shall not exceed a height of:

   a. Site 1: 32 feet to the top of the roof for the two-story structures and 45-feet to the top of the roof for the three-story structures;

   b. Site 2: 44 feet 4 inches to the top of the roof for the three story structures and 47 feet 6 inches to the top of the roof for the four-story structure; and

   c. Site 3: 39 feet 6 inches to the top of the roof.

5. **Density.** The total density at the site shall be limited to no more than: Site 1: 20-units, Site 2: 50-units, and Site 3: 10 units.

6. **Open Space.** A minimum of 3,300 square feet of open space shall be provided on Site 1, a minimum of 7,000 square feet of open space shall be provided on Site 2, and a minimum of 1,400 square feet of open space shall be provided on Site 3, for a total of 11,700 square feet of open space.

7. **Housing Requirements.**

   a. Site 2: Prior to the issuance of a building permit for any rental dwelling unit on the subject property, the applicant shall reserve 49 units and shall execute and record a rental covenant agreement running with the land, to the satisfaction of the Los Angeles Housing Department ("LAHD"). The covenant shall bind the applicant and/or any subsequent property owner to reserve 49 units for occupancy by LOW Income households as restricted affordable rental units. Applicant must provide an affordable unit dispersal proposal to be approved by LAHD to ensure that affordable units are not segregated or otherwise distinguishable from market-rate units.

10. **Setbacks.** The project shall provide a minimum of the following as shown on the project plans labeled "Exhibit D", except as may be revised as a result of this action:

    a. Site 1: a zero-foot to 20-foot 6-inch front yard setback along Avenues 56 and 57,

    b. Site 1: a zero-foot to 22-foot side yard setback along the northern property line and along the southern property line,

    c. Site 2: a zero-foot to 21-foot side yard setbacks along Marmion Way, the abutting alley and the adjoining property,

    d. Site 3: a zero-foot to 10-foot side yard setback along Avenue 59 and the western property line, and

    e. Site 3: a 10-foot to 15-foot rear yard setback.

    f. Sites 1, 2, and 3: The remaining yard setbacks are as shown on the Plot Plan attached to the case file as Exhibit D.

11. **Historic Resources.** The project shall be executed with the following architectural features:

    a. New street trees along Avenue 56 shall match existing street trees along Avenue 56.

    b. A river rock veneer shall be used at planter bases.

    c. All Craftsman style buildings shall include the following details:

        i. Battered porch columns shall be made of wood or painted cement board to achieve a one-hour fire rating requirements for the building pursuant to the 2011 City of Los Angeles Building Code, Table 503 of Chapter 5 (General Building Heights and Areas) and Table 601 of Chapter 6 (Types of Construction).

        ii. Windows shall have decorative horns added to the upper sash and shall match the wood sample provided in Exhibit A.

        iii. Wood entry doors shall use two types of design which shall be alternated at unit entrances: one type shall have six lite glass panels over a single wood panel and the other type shall be a single lite glass panel over a single wood panel.

        iv. Roofs shall be either a grey or brown roof color, and the roof color shall be varied from building to building to achieve a variety of appearance.

        v. Triangular knee brace supports shall be used at the gabled roofs.

        vi. A "1x" cement board shall be used under the roof eaves.

        vii. Side elevations shall incorporate a barge board for decorative detailing.

        viii. Side elevations shall incorporate a false window or decorative vent detail.

        ix. Staff and applicant shall review any existing access and easements to the rear of existing commercial buildings along Figueroa Street, and if easements require any change to the plan, applicant shall review with the HPOZ Board.

b. The construction area shall be kept sufficiently dampened to control dust caused by grading and hauling, and at all times provide reasonable control of dust caused by wind.

c. All clearing, earth moving, or excavation activities shall be discontinued during periods of high winds (i.e., greater than 15 mph), so as to prevent excessive amounts of dust.

d. All dirt/soil loads shall be secured by trimming, watering or other appropriate means to prevent spillage and dust.

e. All dirt/soil materials transported off-site shall be either sufficiently watered or securely covered to prevent excessive amount of dust.

f. General contractors shall maintain and operate construction equipment so as to minimize exhaust emissions.

g. Trucks having no current hauling activity shall not idle but be turned off.

17. **Tree Removal.**

a. Prior to the issuance of any permit, a plot plan shall be prepared indicating the location, size, type, and general condition of all existing trees on the site and within the adjacent public right(s)-of-way.

b. All significant (8-inch or greater trunk diameter, or cumulative trunk diameter if multi-trunked, as measured 54 inches above the ground) non protected trees on the site proposed for removal shall be replaced at a 1:1 ratio with a minimum 24-inch box tree. Net, new trees, located within the parkway of the adjacent public right(s)-of-way, may be counted toward replacement tree requirements.

c. Removal or planning of any tree in the public right-of-way requires approval of the Board of Public Works. Contact Urban Forestry Division at: 213-847-3077. All trees in the public right-of-way shall be provided per the current standards of the Urban Forestry Division the Department of Public Works, Bureau of Street Services.

18. **Cultural Resources.** The project shall comply with the Highland Park-Garvanza Preservation Plan.

19. **Seismic.** The design and construction of the project shall conform to the California Building Code seismic standards as approved by the Department of Building and Safety.

20. **Erosion/Grading/Short-Term Construction Impacts.**

a. The applicant shall provide a staked signage at the site with a minimum of 3-inch lettering containing contact information for the Senior Street Use Inspector (Department of Public Works), the Senior Grading Inspector (LADBS) and the hauling or general contractor.

b. Chapter IX, Division 70 of the Los Angeles Municipal Code addresses grading, excavations, and fills. All grading activities require grading permits from the Department of Building and Safety. Additional provisions are required for grading activities within Hillside areas. The application of BMPs includes but is not limited to the following mitigation measures:

28. **Utilities (Local Water Supplies - Landscaping).** Environmental impacts may result from project implementation due to the cumulative increase in demand on the City's water supplies. However, this potential impact will be mitigated to a less than significant level by the following measures:

    a. The project shall comply with Ordinance No. 170,978 (Water Management Ordinance), which imposes numerous water conservation measures in landscape, installation, and maintenance (e.g, use drip irrigation and soak hoses in lieu of sprinklers to lower the amount of water lost to evaporation and overspray, set automatic sprinkler systems to irrigate during the early morning or evening hours to minimize water loss due to evaporation, and water less in the cooler months and during the rainy season).

    b. In addition to the requirements of the Landscape Ordinance, the landscape plan shall incorporate the following: Weather-based irrigation controller with rain shutoff; matched precipitation (flow) rates for sprinkler heads; drip/microspray/subsurface irrigation where appropriate; minimum irrigation system distribution uniformity of 75 percent; proper hydro-zoning, turf minimization and use of native/drought tolerant plan materials; use of landscape contouring to minimize precipitation runoff; and a separate water meter (or submeter), flow sensor, and master valve shutoff shall be installed for existing and expanded irrigated landscape areas totaling 5,000 sf. and greater.

29. **Utilities (Local Water Supplies - All New Construction).**

    a. If conditions dictate, the Department of Water and Power may postpone new water connections for this project until water supply capacity is adequate.

    b. Install high-efficiency toilets (maximum 1.28 gpf), including dual-flush water closets, and high-efficiency urinals (maximum 0.5 gpf), including no-flush or waterless urinals, in all restrooms as appropriate.

    c. Install restroom faucets with a maximum flow rate of 1.5 gallons per minute.

    d. A separate water meter (or submeter), flow sensor, and master valve shutoff shall be installed for all landscape irrigation uses.

    e. Single-pass cooling equipment shall be strictly prohibited from use. Prohibition of such equipment shall be indicated on the building plans and incorporated into tenant lease agreements. (Single-pass cooling refers to the use of potable water to extract heat from process equipment, e.g. vacuum pump, ice machines, by passing the water through equipment and discharging the heated water to the sanitary wastewater system.)

30. **Utilities (Local Water Supplies - New Residential).**

    a. Install no more than one showerhead per shower stall, having a flow rate no greater than 2.0 gallons per minute.

    b. Install and utilize only high-efficiency clothes washers (water factor of 6.0 or less) in the project, if proposed to be provided in either individual units and/or in a common laundry room(s). If such appliance is to be furnished by a tenant, this requirement shall be incorporated into the lease agreement, and the applicant shall be responsible for ensuring compliance.

c. The width of private roadways for general access use and fire lanes shall not be less than 20 feet, and the fire lane must be clear to the sky.

d. Where fire apparatus will be driven onto the road level surface of the subterranean parking structure, that structure shall be engineered to withstand a bearing pressure of 8,600 pounds per square foot.

e. Submit plot plans indicating access road and turning area for Fire Department approval.

f. Policy Exception:

L.A.M.C. 57.09.03.B Exception:

- When this exception is applied to a fully fire sprinklered residential building equipped with a wet standpipe outlet inside an exit stairway with at least a 2 hour rating the distance from the wet standpipe outlet in the stairway to the entry door of any dwelling unit or guest room shall not exceed 150 feet of horizontal travel AND the distance from the edge of the roadway of an improved street or approved fire lane to the door into the same exit stairway directly from outside the building shall not exceed 150 feet of horizontal travel.

- It is the intent of this policy that in no case will the maximum travel distance exceed 150 feet inside the structure and 150 feet outside the structure. The term "horizontal travel" refers to the actual path of travel to be taken by a person responding to an emergency in the building.

- This policy does not apply to single-family dwellings or to non-residential buildings.

g. Building designs for multi-storied residential buildings shall incorporate at least one access stairwell off the main lobby of the building; But, in no case greater then 150ft horizontal travel distance from the edge of the public street, private street or Fire Lane. This stairwell shall extend unto the roof.

h. Entrance to the main lobby shall be located off the address side of the building.

i. Any required Fire Annunciator panel or Fire Control Room shall be located within 50ft visual line of site of the main entrance stairwell or to the satisfaction of the Fire Department.

j. Where rescue window access is required, provide conditions and improvements necessary to meet accessibility standards as determined by the Los Angeles Fire Department.

k. No building or portion of a building shall be constructed more than 300 feet from an approved fire hydrant. Distance shall be computed along path of travel.

l. Adequate public and private fire hydrants shall be required.

m. Electric Gates approved by the Fire Department shall be tested by the Fire Department prior to Building and Safety granting a Certificate of Occupancy.

41. **Covenant.** Prior to the issuance of any permits relative to this matter, an agreement concerning all the information contained in these conditions shall be recorded in the County Recorder's Office. The agreement shall run with the land and shall be binding on any subsequent property owners, heirs or assign. The agreement must be submitted to the Planning Department for approval before being recorded. After recordation, a copy bearing the Recorder's number and date shall be provided to the Planning Department for attachment to the file.

42. **Definition.** Any agencies, public officials or legislation referenced in these conditions shall mean those agencies, public offices, legislation or their successors, designees or amendment to any legislation.

43. **Enforcement.** Compliance with these conditions and the intent of these conditions shall be to the satisfaction of the Planning Department and any designated agency, or the agency's successor and in accordance with any stated laws or regulations, or any amendments thereto.

44. **Building Plans.** Page 1 of the grant and all the conditions of approval shall be printed on the building plans submitted to the City Planning Department and the Department of Building and Safety.

45. **Corrective Conditions.** The authorized use shall be conducted at all times with due regard for the character of the surrounding district, and the right is reserved to the City Planning Commission, or the Director pursuant to Section 12.27.1 of the Municipal Code, to impose additional corrective conditions, if, in the Commission's or Director's opinion, such conditions are proven necessary for the protection of persons in the neighborhood or occupants of adjacent property.

46. **Indemnification.** The applicant shall defend, indemnify and hold harmless the City, its agents, officers, or employees from any claim, action or proceedings against the City or its agents, officers, or employees relating to or to attack, set aside, void or annul this approval which action is brought within the applicable limitation period. The City shall promptly notify the applicant of any claim, action, or proceeding and the City shall cooperate fully in the defense. If the City fails to promptly notify the applicant of any claim action or proceeding, or if the City fails to cooperate fully in the defense, the applicant shall not thereafter be responsible to defend, indemnify, or hold harmless the City.

47. **Expedited Processing Section.** Prior to the clearance of any conditions, the applicant shall show proof that all fees have been paid to the Department of City Planning, Expedited Processing Section.

FINDINGS

1. **General Plan Land Use Designation.** The subject properties are located in the Northeast Los Angeles Community Plan, which was adopted by the City Council on June 15, 1999. The Plan Map designates the subject properties for Public Facilities land uses with corresponding zone of PF. Site 1 is approximately 34,920 square feet, Site 2 is approximately 38,595 (after dedication) square feet, and Site 3 is 13,160 (after dedication) square and are currently zoned PF-2D-HPOZ. The PF Zone permits agricultural uses, public parking under freeways, fire and police stations, government buildings, public libraries, post offices, public health facilities, and public elementary and secondary schools as specified in the LAMC as well as a joint public and private development that is more intensive than those uses permitted in the most restrictive zone with a Conditional Use permit. The subject site is located within the Avenue 57 Transit Oriented District Specific Plan Area, Highland Park-Garvanza Historic Preservation Overlay Zone, Special Grading Area (BOE Basic Grid Map A-13372), Highland Park Business Improvement District, and in the East Los Angeles State Enterprise Zone.

2. **General Plan Text.** The Northeast Los Angeles Community Plan text includes the following relevant land use goals, objectives and policies:

Residential

Goal 1 A safe, secure, and attractive residential environment for all economic, age, and ethnic segments of the community.

Objective 1-2 To allocate land for new housing to accommodate a growth of population that is consistent with and promotes the health, safety, welfare, convenience, and pleasant environment of those who live and work in the community based on adequate infrastructure and government services, especially schools.

Policy 1-2.1 Designate specific areas to provide for adequate residential development to accommodate anticipated increases in population while maintaining a balance between single-family and multiple-family uses.

Program: The City Planning Department should continue to assist the City Housing Department to identify vacant or underutilized City owned properties that have potential for development for affordable housing.

Policy 1-2.2 Locate higher residential densities near commercial and institutional centers, light rail transit stations, and major bus routes to encourage pedestrian activity and use of public transportation, providing that infrastructure, public service facilities, utilities, and topography will fully accommodate this development.

Objective 1-3 To preserve and enhance the residential character and scale of existing single- and multi-family neighborhoods.

Policy 1-3.1 Protect the quality and scale of the residential environment through attention to the appearance of new construction including site planning and compatible building design.

Policy 4.1.1 Provide sufficient land use and density to accommodate an adequate supply of housing units by type and cost within each City subregion to meet the twenty-year projections of housing needs

Policy 4.1.5 Monitor the growth of housing developments and the forecast of housing needs to achieve a distribution of housing resources to all portions of the City and all income segments of the City's residents.

Policy 4.1.6 Create incentives and give priorities in permit processing for low- and very-low income housing developments throughout the City.

Objective 4.2 Encourage the location of new multi-family housing development to occur in proximity to transit stations, along some transit corridors, and within some high activity areas with adequate transitions and buffers between higher-density developments and surrounding lower-density residential neighborhoods.

Policy 4.2.1 Offer incentives to include housing for very low- and low-income households in mixed-use developments.

3. The **Transportation Element** of the General Plan is not likely to be affected by the recommended action herein. Avenues 56, 57, and 58 are classified as Local Streets and each dedicated to a 60-foot width, Avenue 59 is classified as a Collector Street and dedicated to a 60-foot width, Marmion Way is classified as a Local Street and dedicated with a variable width of approximately 68 feet, and the Alley is dedicated with a 20-foot width. The project is required to comply with the alley and Local and Collector Street standards of the LAMC. The Bureau of Engineering has conditioned the projects to repair and/or replace any bad order curb, gutter and sidewalk along the subdivision; close any unused driveway with street improvements; construct a 25-foot radius curb return at the intersection of Marmion Way and Avenue 57; construct additional sidewalk with filling in concrete in the corner cuts in Avenue 58 and Avenue 57 with Marmion Way; construct additional sidewalk with filling in concrete in the newly dedicated area and the corner cut in Avenue 59; improve the alley; and construct necessary sewer house connection to serve the subdivision. The Department of Transportation has reviewed the revised project and the traffic impact assessment prepared by Lindscott, Law & Greenspan, dated June 13, 2012. In a memo dated June 3, 2012, DOT concurs that the project will generate an additional 462 daily trips with 36 trips in the a.m. peak hour and 42 trips in the p.m. peak hour, however DOT determined that the proposed project will not result in significant traffic impacts at any of the intersections studied.

Bike Plan. The 2010 Bicycle Plan, a component of the Transportation Element, was adopted on March 1, 2011 and will not be affected by the recommended action. The three goals that have been established by the Plan are to: increase the number of types of bicyclists who bicycle in the City; make every street a safe place to ride a bicycle, and make the City of Los Angeles a bicycle friendly community. These goals will be realized by the implementation of policies, programs, and objectives. Policy 1.2.7 of the Plan is to "develop and implement citywide bicycling parking standards," by increasing the supply of secure bicycle parking.

Site 1 is located two blocks east of Avenue 54 and Site 3 is located one block west of Avenue 60. A 1.24 mile stretch of Avenue 54, between Meridian Street to Glen Ellen Place and a 0.84 mile stretch of Avenue 60, between Figueroa Street to Hill Drive, have both been identified as a Neighborhood of the Bicycle Network and are designated Bicycle Friendly Streets. Sites 1-3 are located one block north of Figueroa Street. A 5.12 mile

great job in managing properties, provides a safe environment, and has lowered crime in the area. Thus, the project will enhance the neighborhood by developing a joint public and private development utilizing a City owned lot for public benefit. The project will provide much needed market rate condominiums units and affordable apartment units, and well as including a public parking component that maintains the existing number of public parking spaces.

The buildings on Site 1, 2, and 3 have been designed with a Craftsman style architecture and a Renaissance Revival style for the four-story building on Site 2, blending with the surrounding neighborhood consisting a Craftsman style homes and commercial buildings on Figueroa Street. The proposed buildings will have breaks between the building resembling single-family structures, reducing the massing and scale to be harmonious with the existing neighborhood development. The project will benefit the community by activating the streetscape with the use of front porches at individual residences and providing a use for the Metro Gold Line Highland Park Station commuters and the commercial uses along Figueroa Street.

The Highland Park Transit Village tenants and the many travelers using the Metro Gold Line will support the commercial uses on Figueroa Street. The project will maintain the number of existing public parking spaces that will continue to serve the adjoining commercial properties along Figueroa Street and the adjacent Metro Gold Line Highland Park station. Therefore, the project will enhance the surrounding community by incorporating a joint-public private development on City owned underutilized lots with market rate housing, affordable housing, and public parking.

b. The project's location size, height, operations and other significant features will be compatible with and will not adversely affect or further degrade adjacent properties, the surrounding neighborhood, or the public health, welfare, and safety.

The project sites are located north of Figueroa Street and south of the Avenue 57 Metro Gold Line Station. Each site is located in a separate block, traversed by Avenues 57 and 58. The surrounding uses of Site 1, 2, and 3 generally consist of single and multi-family uses, commercial uses, and the Metro Gold Line Highland Park station. The three project sites are improved with public surface parking lots that will be demolished. The number of public parking spaces will be maintained within the three sites and will continue to serve the neighboring commercial uses and the adjacent Metro Gold Line Highland Park station.

Density.

The sites are zoned PF-2D-HPOZ and with the approval of a Conditional Use, a joint public and private development with residential and public parking uses that is more intensive than those permitted the most restrictive adjoining zone will be allowed. The applicant is requesting the following densities: Site 1: 20 units in lieu of the maximum 17 units permitted in the most restrictive adjoining zone of RD2-1-HPOZ, Site 2: 50 units in lieu of the maximum 27 units permitted in the most restrictive adjoining zone of [Q]C4-2D-HPOZ, and Site 3: 10 units in lieu of the maximum 10 units permitted in the most restrictive adjoining zone of [Q]C4-1VL-HPOZ. Site 1 is requesting 20 market rate condominium units or three additional units than allowed in the most restrictive adjoining zone. The three additional market rate units would provide a benefit to the public by providing more homeownership opportunities to individuals and families at a lower cost than single-family homes. Site 3 is

Site 1. The front yards of Site 1 are along Avenue 56 and Avenue 57. The remaining yards are side yards. The front yard setback requirement for the most restrictive adjoining zone is 15 feet and the applicant is proposing a variable front yard setback of zero to 20 feet 6 inches. On Avenue 56, the setbacks to the front porch columns are 20-foot 6-inches, providing more than the minimum 15 feet. The 15-foot high elevator and enclosed stairway from the subterranean public parking will have an 8-foot front yard setback on Avenue 56 and has been designed to align with the commercial building located at the adjacent property to the south. With the exception of the front porches, the applicant is proposing a 24-foot front yard setback for the residential building (more than the required 15-foot) and is has been designed to align with the residential building located at the adjacent property to the north.

On Avenue 57, the applicant is proposing a variable front yard setback of zero feet to 20 feet 6 inches. The front porch columns are setback 20 feet 6 inches and the main building wall is setback 24 feet, more than the required 15-foot setback. The one-story elevator structure for the required pedestrian access to the subterranean garage public parking is proposed with a zero-foot setback.

The side yards in the most restrictive adjoining zone are 5 feet for two-story buildings and 6 feet for three-story buildings. The applicant is providing a variable side yard setback of zero feet to 22 feet from the south property lines facing the commercial properties to the south. There are two sets of an enclosed one-story stairwell and elevator structure located at the south property line towards Avenue 56 with a zero-foot side yard setback. One of the stairwell and elevator provide access to the public subterranean parking level and the other stairwell and elevator provide access for the residents to the residential parking levels. Many of the side yard setbacks are more than the minimum 5 and 6 feet and will be landscaped to mitigate the stairwell and elevators. The two-story buildings facing the north property line are providing 8 to 11 foot side yard setbacks, more than the required 6-foot required.

Site 2. The front yards of Site 2 are along Avenue 57 and Avenue 58. The remaining yards are side yards. The front yard setback requirement for the most restrictive adjoining zone is zero feet. The applicant is providing a variable front yard setback of 1 foot 6 inches to 5 feet for the three-story residential structures on Avenue 57 and a 5-foot setback for the three-story residential setbacks along Avenue 58, since the front porches are located 5 feet from the front yard. The front yards proposed are more than the zero-foot required.

The side yard setback requirement for the most restrictive adjoining zone is 6 feet for three-story buildings and 7 feet for four-story buildings. Along Marmion Way, the applicant is proposing a 5-foot side yard setback to the front porch and a 8-foot 6-inch side yard setback to the main three-story residential structures. The residential structures that front on Marmion Way are located across the Metro Gold Line Highland Park Station therefore will not impact any residential neighboring properties.

Along the alley and surface parking lot to the south, the applicant is proposing a zero-foot side yard setback for the four-story building. However, the three-story building facing Avenue 57 will have a 15-foot 6-inch side yard and the three-story building facing Avenue 58 will have a 21-foot side yard setback. A transformer and a one-story enclosed elevator to the subterranean public parking will have a 4-foot side yard setback from the alley, near Avenue 57. The adjacent alley to

courtyard space between the buildings and the main pedestrian entry on Marmion Way. The four-story building is internally located at the southeast property line, adjacent to the alley. The building has been located furthest away from the streets fronting property lines. The proposed three-story buildings on Avenues 57 and 58, and Marmion Way buffer the direct views to the four-story building. The resulting overall project massing is stepped back as the taller structures are screened from direct view from the public right-of-ways.

The location is appropriate for a joint public and private development. The project will provide 20 market rate for-sale housing, 59 affordable units, and one non-restricted manager's unit in a neighborhood consisting of single and multiple-family housing and commercial/retail properties. The project is also adjacent to major transit corridors of the Metro Gold Line Rail transit station and Figueroa Street. The development is compatible with the surrounding residential and commercial development in the neighborhood. The location is appropriate for a joint public and private development and McCormack Baron Salazar is a very well respected developer and manager that operates in other parts of the country where the public health, welfare, and safety is maintained and enhanced. Further, the ground floor patio and public parking will help activate the sidewalk in the day and evening hours.

c. The project substantially conforms with the purpose, intent and provisions of the general plan, the applicable community plan, and any applicable specific plan.

The subject properties are located in the Northeast Los Angeles Community Plan. The sites are zoned PF-2D-HPOZ and have a Public Facilities land use designation in the Northeast Los Angeles Community Plan. The subject site is located within the Avenue 57 Transit Oriented District Specific Plan Area.

The proposed project meets a number of goals, objectives, and policies that are outlined in the Northeast Los Angeles Plan area including:

Goal 1 A safe, secure, and attractive residential environment for all economic, age, and ethnic segments of the community.

Objective 1-2 To allocate land for new housing to accommodate a growth of population that is consistent with and promotes the health, safety, welfare, convenience, and pleasant environment of those who live and work in the community based on adequate infrastructure and government services, especially schools.

Policy 1-2.1 Designate specific areas to provide for adequate residential development to accommodate anticipated increases in population while maintaining a balance between single-family and multiple-family uses.

Policy 1-2.2 Locate higher residential densities near commercial and institutional centers, light rail transit stations, and major bus routes to encourage pedestrian activity and use of public transportation, providing that infrastructure, public service facilities, utilities, and topography will fully accommodate this development.

Objective 1-3 To preserve and enhance the residential character and scale of existing single- and multi-family neighborhoods.

Housing - GOAL 4A

An equitable distribution of housing opportunities by type and cost accessible to all residents of the City.

Objective 4.1 Plan the capacity for and develop incentives to encourage production of an adequate supply of housing units of various types within each City subregion to meet the projected housing needs by income level of the future population to the year 2010.

Policy 4.1.1 Provide sufficient land use and density to accommodate an adequate supply of housing units by type and cost within each City subregion to meet the twenty-year projections of housing needs

Policy 4.1.5 Monitor the growth of housing developments and the forecast of housing needs to achieve a distribution of housing resources to all portions of the City and all income segments of the City's residents.

Policy 4.1.6 Create incentives and give priorities in permit processing for low- and very-low income housing developments throughout the City.

Objective 4.2 Encourage the location of new multi-family housing development to occur in proximity to transit stations, along some transit corridors, and within some high activity areas with adequate transitions and buffers between higher-density developments and surrounding lower-density residential neighborhoods.

Policy 4.2.1 Offer incentives to include housing for very low- and low-income households in mixed-use developments.

The subject site is located within the Avenue 57 Transit Oriented District Specific Plan Area. The project is consistent with the following purposes of the Specific Plan:

"Continue and maintain a diverse community, where people of many different ages, incomes, family formation types, and cultural perspectives will live, work and shop in harmony in a neighborhood that supports cultural differences among neighbors by encouraging provisions of a range of housing types to allow a diversity of income ranges, providing for transportation linkages to allow the existing diverse population access to job centers, and assisting in the preservation of a sense of place that brought the diverse population mix here in the first place."

"Maintain a stable community that residents can invest in and live in from childhood through family formation, to retirement, by supporting home ownership, promoting development of family-friendly affordable homes available to local residents to purchase, and supporting new construction of family-sized, affordable homes available to local residents to purchase, and supporting new construction of family sized, affordable housing units.

The PF Zone allows a limited number of public facilities uses and also allows conditional uses pursuant to LAMC Section 12.24-U,21. Approval of the Conditional Use will allow a joint public and private development that is more intensive than those uses permitted in the restrictive zone. The project is consistent with the many goals in the Northeast Los Angeles Community Plan, Framework Element, and the Avenue 57 Transit Oriented District Specific Plan Area. As proposed, the project

a stair and a wall in lieu of the required 12 feet for a three-story building and a 11-foot 3-inch passageway between a stair and a wall and a 12-foot 7-inch passageway in lieu of the required 14 feet adjacent to a four-story building, and Site 3: a 9-foot 8-inch passageway between a stair and a wall and a 11-foot 6 inch passageway in lieu of the required 12 feet passageway required for a three-story building.

The Code requires separation between structures and passageways to provide light, air, privacy, and emergency access. The project has been designed with the following: Site 1 will consist of five residential buildings over two levels of subterranean public and private parking and will consist of three 2-story buildings and two 3-story buildings; Site 2 will consist of three 3-story residential buildings over a one level subterranean garage and one 4-story building (three stories of residential over one ground level of public parking and one subterranean level with public and private parking); and Site 3 will consist of two 3-story residential buildings over one subterranean level of public and private parking and public parking in the alley. The proposed building design is considered to be the most appropriate and efficient building design in order to meet the functional needs of the future occupants and current neighbors, while maintaining the aesthetic integrity of the development:

Site 1: The applicant is requesting a 9-foot passageway in lieu of the required 10 feet for a two-story building that is centrally and internally located on Site 1. The Code required passageways are provided at the majority of the site, with the exception of the narrowest portion of Site 1. A 10% reduction of the Code required passageway is requested to due to the physical constraint caused by the narrow site.

Site 2: The applicant is requesting a 9-foot 8-inch passageway between a stair and a wall in lieu of the required 12 feet for a three-story building and a 11-foot 3-inch passageway between a stair and a wall and a 12-foot 7-inch passageway in lieu of the required 14 feet adjacent to a four-story building. According to the applicant, the configuration of the buildings on the site was designed to maximize the number of affordable units, while providing an aesthetically suitable development that is complementary to adjacent uses. Therefore the site was designed with the 4-story residential building at the southern and the three 3-story buildings located to the west and north of the 4-story building. The majority of Site 2 complies with the Code required passageways, with the exception of the building located on the western side of the site and therefore a 19% reduction is requested for the proposed 9-foot 8-inch passageway and a 10% reduction for the proposed 12-foot 7 inch passageway.

Site 3: The applicant is requesting a 9-foot 8-inch passageway between a stair and a wall and a 11-foot 6 inch passageway in lieu of the required 12 feet passageway required for a three-story building. The space between the two 3-story buildings and the stair is 9 feet 8 inches and 19% less than the required 12-foot and a 11-foot 6-inch passageway and 4% less for the portion of the passageway between the two buildings. The majority of Site 3 provides a 13-foot passageway between the two buildings, more than the minimum required width.

The variable building separations are mostly internal to the project and will have no impact, visual or otherwise, on the adjacent uses. The project design will provide adequate open space, privacy, light, and air.

The applicant is requesting a 9-foot 8-inch passageway between a stair and a wall in lieu of the required 12 feet for a three-story building and a 11-foot 3-inch passageway between a stair and a wall and a 12-foot 7-inch passageway in lieu of the required 14 feet adjacent to a four-story building. The reduced passageways on Site 2 will not adversely affect or further degrade adjacent properties, the surrounding neighborhood, or the public health, welfare and safety. The requested 9-foot 8-ich reduction will only affect one small area within the development. The proposed 11-foot 3-inch and 12-foot 7-inch passageway reductions are located on a limited section of the passageway between the 4-story building located to the south of the site and the building located along Avenue 57. The units in the three-story building affected by this passageways reduction are minimal since the reduced space between the buildings only impacts a portion of the passageway for the building.

Site 3 will contain two buildings connected by walkways, open space, a courtyard, and underground public and private parking. The buildings are three stories (39 feet 6 inches).

The applicant is requesting a 9-foot 8-inch passageway between a stair and a wall and a 11-foot 6 inch passageway in lieu of the required 12 feet passageway required for a three-story building. The reduced passageways on Site 3 and will not adversely affect or further degrade adjacent properties, the surrounding neighborhood, or the public health, welfare and safety. The requested passageway reduction is not significant as it affects a short distance between the two structures located on the site and the affected units have frontages along the adjacent streets and the courtyard.

c. The project is in substantial conformance with the purpose, intent and provisions of the General Plan, the applicable community plan, and any specific plan.

The subject property is located in the Northeast Los Angeles Community Plan. The sites are zoned PF-2D-HPOZ and have a Public Facilities land use designation in the Northeast Los Angeles Community Plan. The subject site is located within the Avenue 57 Transit Oriented District Specific Plan Area. Adjustment requests are technical issues that are not discussed in the Plan. The proposed project meets a number of goals, objectives, and policies that are outlined in the Northeast Los Angeles Community Plan area including:

Goal 1 A safe, secure, and attractive residential environment for all economic, age, and ethnic segments of the community.

Objective 1-2 To allocate land for new housing to accommodate a growth of population that is consistent with and promotes the health, safety, welfare, convenience, and pleasant environment of those who live and work in the community based on adequate infrastructure and government services, especially schools.

Policy 1-2.1 Designate specific areas to provide for adequate residential development to accommodate anticipated increases in population while maintaining a balance between single-family and multiple-family uses.

Objective 3.7Provide for the stability and enhancement of multi-family residential neighborhoods and allow for growth in areas where there is sufficient public infrastructure and services and the residents' quality of life can be maintained or improved.

Housing - GOAL 4A

An equitable distribution of housing opportunities by type and cost accessible to all residents of the City.

Objective 4.1 Plan the capacity for and develop incentives to encourage production of an adequate supply of housing units of various types within each City subregion to meet the projected housing needs by income level of the future population to the year 2010.

Policy 4.1.1 Provide sufficient land use and density to accommodate an adequate supply of housing units by type and cost within each City subregion to meet the twenty-year projections of housing needs

Policy 4.1.5 Monitor the growth of housing developments and the forecast of housing needs to achieve a distribution of housing resources to all portions of the City and all income segments of the City's residents.

Policy 4.1.6 Create incentives and give priorities in permit processing for low- and very-low income housing developments throughout the City.

Objective 4.2 Encourage the location of new multi-family housing development to occur in proximity to transit stations, along some transit corridors, and within some high activity areas with adequate transitions and buffers between higher-density developments and surrounding lower-density residential neighborhoods.

Policy 4.2.1 Offer incentives to include housing for very low- and low-income households in mixed-use developments.

The subject site is located within the Avenue 57 Transit Oriented District Specific Plan Area. The project is consistent with the following purposes of the Specific Plan:

"Continue and maintain a diverse community, where people of many different ages, incomes, family formation types, and cultural perspectives will live, work and shop in harmony in a neighborhood that supports cultural differences among neighbors by encouraging provisions of a range of housing types to allow a diversity of income ranges, providing for transportation linkages to allow the existing diverse population access to job centers, and assisting in the preservation of a sense of place that brought the diverse population mix here in the first place."

"Maintain a stable community that residents can invest in and live in from childhood through family formation, to retirement, by supporting home ownership, promoting development of family-friendly affordable homes available to local residents to purchase, and supporting new construction of family-sized, affordable homes available to local residents to purchase, and supporting new construction of family sized, affordable housing units.

Floor Area Ratio. *The maximum permitted development on any lot or combination of lots forming a single development site shall not exceed a Floor Area Ratio (FAR) of 3:1.*

The FAR for Site 1 is 0.92:1. The FAR for Site 2 is 1.43:1. The FAR for Site 3 is 0.85:1. The proposed range of development falls within the maximum floor area that is permitted by the Specific Plan.

Site Access and Parking. *All site access and parking shall be provided within the combined lot area, without crossing or connecting to any adjoining commercial developments.*

Sites 1, 2, and 3 all provide on-site parking/site access and neither cross nor connect to any other commercial developments. Site 1 includes 45 private residential parking spaces and 116 City of Los Angeles public parking spaces with site access from Avenue 57. Site 2 includes 51 private residential parking spaces and 81 City of Los Angeles public parking spaces with site access from Avenue 58 and the adjacent alley. Site 3 contains 10 private residential parking spaces and 24 City of Los Angeles public parking spaces. Site access is from the adjacent alley.

e. **Historic Preservation Overlay Zone (Section 7.B.).** *The approval requirements and provisions of the Highland Park HPOZ apply to the entire area included within the Avenue 57 Transit Oriented District Specific Plan.*

The proposed Project is subject to the requirements of the Highland Park/Garvanza HPOZ and the subject approval, which includes a Certificate of Compatibility (CCMP).

f. **Lot Assembly Restrictions**. *A lot assembly restriction of a maximum of two lots with a combined area equal to or less than 10,000 square feet for residential development or three lots with a combined area equal to or less than 15,000 square feet for commercial development shall apply to the entire area included within the Avenue 57 Transit Oriented District Specific Plan. Except that Subarea 1 – Major Activity Center and that portion of Subarea 2 – Mixed Use Area bounded by Marmion Way to the north, Figueroa Street to the south, Avenue 59 to the east and Avenue 58 to the west shall have a lot assembly restriction of a maximum of four lots with a combined area equal to or less than 20,000 square feet for residential development or six lots with a combined area equal to or less than 50,000 square feet for commercial or mixed use developments (Avenue 57 TOD, Section 7.B.2, pg. 12).*

This joint public-private Project proposes a mixed-use development containing multiple-family residential uses and public parking. Mixed-use developments within the areas specified above have a lot assembly restriction of a maximum of six lots with a combined area equal to or less than 50,000 square feet. Each of the three proposed sites meet this requirement – Site 1 assembles four lots with a combined area of 34,920 sq. ft., Site 2 assembles six lots with a combined area of 38,595 sq. ft. and Site 3 assembles four lots with a combined area of 13,508 sq. ft., as shown on following chart.

space. The Project will meet this requirement by providing 1200 sq. ft. of common open space and 200 sq. ft. of private open space.

Table 2. Open Space Requirements per LAMC 12.21 G			
Site 3	Units	Open Space Required Per Unit	Total Open Space Required
Units with 3 Habitable rooms	7	125 sq. ft. per unit	875 sq. ft.
Units with more than 3 habitable Rooms	3	175 sq. ft. per unit	525 sq. ft.
Subtotal	10		

Facade Relief. *Building Frontages shall be designed to comply with the following requirements. Compliance with these standards, does not relieve a developer from meeting the HPOZ Ordinance review and approval requirements. These standards do not apply to accessory buildings, additions, remodels, or any change of use in an existing building.*

> ***(a)*** *Horizontal architectural treatments and/or façade articulations such as cornices, friezes, balconies, awnings, pedestrian amenities, or other features shall be provided for every 39 feet of building height visible from a street.*
>
> ***(b)*** *If a Mixed Use Project includes 40 or more feet of Building Frontage visible from a street, then vertical architectural treatments and/or facade articulations such as columns, pilasters, indentations, or other features shall be provided every 25 feet. The minimum width of each vertical break shall be eight feet and the minimum depth shall be two feet.*

Site 3 includes facades with horizontal architectural treatments and/or façade articulations such as eaves, overhangs, balconies, porch and roofs. Site 3 also includes vertical articulation features such as porch columns, window and door trim, pitched roofs and eaves and the change in plane of the façade. The design of all Project structures shall conform to the requirements of the Conditions of Approval herein for the associated Certificate of Compatibility (CCMP).

Signs. *Signs shall comply with the requirements of Section 12.22 A 23 (a) (9) (mini shopping center and commercial corner developments) of the Code.*

A sign program was not submitted as part of the subject request, however, signs shall comply with the Zoning Code and the requirements of LAMC Section 12.22 A.23 (a)(9), as conditioned herein.

Noise Control. *Any dwelling unit exterior wall including windows and doors having a line of sight to Figueroa Street shall be constructed so as to provide a Sound Transmission Code Class of 50 or greater, as defined in the Uniform Building Code Standard No.-1, 1979 edition. The developer, as an alternative, may retain an acoustical engineer to submit evidence, along with the application for a building permit, specifying any alternative means of sound insulation sufficient to reduce interior noise levels below 45dBA in any habitable room.*

proposed Project may have previously been defined as a "Residential" development, the general exception for "Mixed Use" development was more appropriate.

The Avenue 57 TOD Specific Plan definition for Mixed Use Project (Section 4.F) is as follows:

> ***Mixed Use Project.*** *A project containing both commercial and residential uses, including one or more commercial uses and more than one dwelling unit in a single building or in a Unified Development. A Mixed Use Project shall provide the following:*
>
> *(1) A separate, ground floor entrance to the residential component, or a lobby that serves both the residential and commercial use components; and*
>
> *(2) A pedestrian entrance to the commercial use component that is directly accessible from a public street and that is open during the normal business hours posted by the business.*

The proposed Project includes a residential component on each site with 20 dwelling units on Site 1, 50 dwelling units on Site 2 and 10 dwelling units on Site 3. Each site additionally contains a public parking component which is replacement parking for the existing City owned and operated lots where the proposed use will be located.

The Avenue 57 TOD Specific Plan does not define Commercial Uses, nor does it exclude specific uses such as public parking, but defers those definitions back to the Municipal Code. Public parking is a commercial use as defined by the Municipal Code. As each site includes multiple residential structures, and one or two levels of resident and public parking, the Project meets the Mixed Use Project definition of containing both commercial and residential uses. Additionally, each site contains separate pedestrian entrances to the public parking (commercial) component that are directly accessible from the public street and will be open during normal business hours. There are also separate, ground floor pedestrian entrances to the residential component. Vehicle parking for residents is separated from the public parking by either access barriers or use of monthly parking passes. The public parking hours of operation are expected to be seven days a week and 24-hours a day.

At the Public Hearing (conducted 4/24/13), the Applicant's Representative presented testimony indicating that the proposed Project is a Mixed Use development and that the requested Specific Plan Exceptions were not necessary as none of the three sites includes more than 6 lots or a combined lot area greater than 50,000 square feet as indicated in the chart below.

Table 1. Lot Assembly and Square Footage

Site 1		Site 2		Site 3	
Parcel	Square Footage	Parcel	Square Footage	Parcel	Square Footage
1	10,202	1	9,376	1	2,701
2	4,601	2	3,002	2	3,378
3	10,211	3	3,203	3	3,692
4	9,906	4	6,250	4	3,737
		5	7,392		
		6	9,372		
Total	34,920	Total	38,595	Total	13,508

4. Roofs shall be either a grey or brown roof color, and the roof color shall be varied from building to building to achieve a variety of appearance.

5. Triangular knee brace supports shall be used at the gabled roofs.

6. A "1x" cement board shall be used under the roof eaves.

7. Side elevations shall incorporate a barge board for decorative detailing.

8. Side elevations shall incorporate a false window or decorative vent detail.

9. Staff and applicant shall review any existing access and easements to the rear of existing commercial buildings along Figueroa Street, and if easements require any change to the plan, applicant shall review with the HPOZ Board.

The expert opinion of the required HPOZ Board has recommended approval of the subject application. Approval of the subject application is therefore consistent with 12.20.3.L. of the LAMC.

b. 12.20.3 L 4 (b). Standards for Issuance of Certificate of Compatibility for New Building Construction or Replacement, and the Relocation of Buildings or Structures Not Dating from the Preservation Zone's Period of Significance on to a Lot Designated as a Non-Contributing Element, as it relates with the adopted Preservation Plan.

The proposed project, as conditioned in this Determination, substantially complies with LAMC Section 12.20.3.L.4 because the proposed project complies with and is consistent with the adopted Preservation Plan. The guidelines referenced below are for Residential Infill.

Setting, Location and Site Design

9.3.1 - New residential structures should be placed on their lots to harmonize with the existing historic setbacks of the block on which they are located. The depth of the front and side yards should be preserved, consistent with other structures on the same block face.

Site 1 consists of four new Craftsman style buildings, A-1, B-1/C-1, D-1 and E-1, where Buildings B-1 and C-1 are connected. Building A-1 fronts Avenue 56 and Building E-1 fronts Avenue 57. Building A-1 is set back 24'-0" from the existing sidewalk to the face of the building to align with the existing residential buildings to the north of the site. It has a side yard setback of 15'-0" on the south side and an 8'-0" side yard setback on the north side. Building E-1 is also set back 24'-0" from the existing sidewalk to the face of the buildings to align with the existing residential buildings to the north of the site. It has a side yard setback of 22'-0" on the south side and a 20'-7" side yard setback on the north side. Buildings B-1, C-1 and D-1 are located in the interior of the site and do not have public street frontages. However, Buildings B-1 and C-1 are adjacent to residences to the north of the property line. Buildings B-1 and C-1 will be set back 11'-0" (side yard setback) from the property line. The depth of the front and side yards will be preserved, consistent with other structures on the same block.

9.3.5 - Parking areas should be located to the rear of a structure. Designation of parking spaces within a front yard area is generally inappropriate.

All three sites will have public and private resident parking. Site 1 will have two subterranean levels with 161 parking spaces. Site 2 will have one level of subterranean parking with 98 parking spaces, 25 ground floor garage parking spaces and 9 surface parking spaces. Site 3 will have one level of subterranean parking with 29 parking spaces and 5 public parking spaces provided in the surface parking lot off the alley, not visible from the street. There will be no parking areas within the front or rear yards, except Site 3 which includes public parking in a portion of the rear yard, adjacent to the alley.

9.3.6 - Front and side yard areas should be largely dedicated to planting areas. Large expanses of concrete and parking areas are inappropriate.

The front and side yard areas have dedicated landscape planters and the only large expanses of hardscape will be within the interior courtyards of the sites. Parking will be subterranean or off of the rear alley and will not impact the front and side yards.

9.3.7 - The lot coverage proposed for an in-fill project should be substantially consistent with the lot coverage of nearby Contributor properties.

The proposed project, zoned PF (Public Facilities), uses the zoning regulations of the most restrictive adjoining zone for purposes of calculating the Floor Area Ratio (FAR) and maximum floor area allowed for each site in order to conform to the lot coverage of adjacent uses. The most restrictive adjoining zone for Site 1 is RD2-1-HPOZ. The most restrictive adjoining zone for Site 2 is [Q]C4-2D-HPOZ. The most restrictive adjoining zone for Site 3 is [Q]C4-1VL-HPOZ.

9.3.11 - Landscaping should not be so lush or massive that public views of the house are significantly obstructed.

The landscaping proposed, as shown on the landscape plan for each site, will not be so lush or massive that public views of the buildings are significantly obstructed. The planter walls and green screens will be appropriately integrated into the site design.

9.3.12 - Outdoor period details, such as address tiles and mailboxes are encouraged.

The proposed project provides outdoor period details throughout the whole development. For example, the front door entry sconces are of a Craftsman/Mission style. Also, river rock, which replicates the historic Arroyo Stone, will be used as a masonry veneer throughout the development on planters and pilasters.

Massing and Orientation

9.4.1 - New residential structures should harmonize in scale and massing with the existing historic structures in surrounding blocks. For instance, a 2.5 story structure should not be built in a block largely occupied by single-story bungalows.

The buildings on Site 1 include three two-story buildings with a height of 32'-0" and two three-story buildings with a height of 45'-0". Site 2 consists of three three-story buildings with a height of 41'-4" to 44'-4" and one four-story building with a height of 47'-6". Site 3 consists of two three-story buildings with a height of 39'-6". The four-

9.5.2 Roofing materials should appear similar to those used traditionally in surrounding historic residential structures. If modern materials are to be used, such materials should be simple and innocuous.

The Craftsman buildings will use composition shingles with a grey or brown roof color, which will appear similar to the wood shake roofs used historically on Craftsman residences. The four-story courtyard apartment will have a flat roof and only the parapet will be visible from the street.

9.5.4 In HPOZs where roof edge details, such as corbels, rafter tails, or decorative bargeboards are common, new construction should incorporate roof edge details which echo these traditional details in a simplified form.

The proposed Craftsman style buildings incorporate simplified rafter tails and fascia to maintain compatibility with other similar historic structures found in the surrounding neighborhood. As conditioned, a barge board will be used at the side gabled roof elevations.

The proposed four-story courtyard apartment building located on Site 2 incorporates a simplified cornice and vertical and horizontal details to maintain compatibility with other similar historic structures found in the surrounding neighborhood.

Openings

9.6.1 New construction should have a similar façade solid-to-void ratio to those found in surrounding historic structures.

The proposed Craftsman style buildings utilize a more intricate roof pattern to maintain solid-to-void ratio and window groupings similar to other Craftsman style structures.

The proposed four-story courtyard apartment building located on Site 2 uses the design context of Renaissance Revival commercial architecture. The vertical bays on the building are used to maintain a similar façade solid-to-void ratio and symmetry as other similar historic structures found in the Highland Park HPOZ neighborhood, specifically the historic Renaissance Revival building at the corner of Figueroa Street and Avenue 56, as seen in the photographs provided in Exhibit A. Each vertical bay of the proposed building uses a solid-to-void ratio and white trim similar to the historic building.

9.6.2 New construction should use similar window groupings and alignments to those on surrounding historic structures.

The window locations have a symmetry that is consistent with other historic buildings in the neighborhood. Also, to maintain compatibility and symmetry associated with the building styles, single windows are grouped together for a larger window bay instead of using one larger inappropriate window.

9.6.3 Windows should be similar in shape and scale to those found in surrounding historic structures.

All of the windows for the proposed buildings are compatible in size and style to other similar window types found on Craftsman and Renaissance Revival style structures in the surrounding neighborhood.

The main materials used in the proposed Renaissance Revival style building are a smooth stucco finish and brick veneer. Brick and stucco were common materials found on commercial buildings, and although this building is residential, it resembles a historic commercial building.

9.7.2 Materials used in new construction should be in units similar in scale to those used historically. For instance, bricks or masonry units should be of the same size as those used historically.

The shingle siding found on the proposed Craftsman style buildings is a module of approximately 5 ¼ inches in height with 6 inches exposed and the lap siding is a module of approximately 7 ¼ inches in height with 6 inches exposed. The sizing and exposure are consistent with those used historically. The brick veneer found on the proposed Renaissance Revival style building is a module of approximately 3 5/8 inches wide x 7 5/8 inches in height. Historic brick is often not of uniform size, but the sizing proposed is generally consistent with historic brick dimensions.

9.7.3 Architectural details such a newel posts, porch columns, rafter tails, etc., should echo, but not exactly imitate, architectural details on surrounding historic structures. Special attention should be paid to scale and arrangement, and, to a lesser extent, detail.

9.7.4 Use of simplified versions of traditional architectural details is encouraged.

The architectural details on the proposed buildings are similar to other architectural details on historic properties, but do not exactly replicate any of the existing historic architectural details. All of those architectural details (such as rafter tails, covered porch details, decorative trim, cornice, and fascia) on the proposed buildings have been simplified to maintain compatibility to other similar historic structures and to distinguish them as new construction.

9.7.5 If the integration of modern building materials, not present during the Period of Significance, is found to be appropriate, such materials should be subtly use and appear visually innocuous in comparison to surrounding historic structures.

The proposed Craftsman style buildings use fiber cement shingle and lap siding, asphalt shingles, and some fiber cement accents. Although fiber cement is proposed in lieu of traditional wood material, it closely resembles the overall look of the materials originally used.

10. **Environmental.** On April 10, 2013, a Mitigated Negative Declaration, ENV-2013-221-MND, was prepared for the proposed project. On the basis of the whole of the record before the lead agency including any comments received, the lead agency finds that, with imposition of the mitigation measures described in the MND, there is no substantial evidence that the proposed project will have a significant effect on the environment. The attached Mitigated Negative Declaration reflects the lead agency's independent judgment and analysis. The records upon which this decision is based are with the Environmental Review Section of the Planning Department in Room 750, 200 North Spring Street.

11. **Flood Insurance**. The National Flood Insurance Program rate maps, which are a part of the Flood Hazard Management Specific Plan adopted by the City Council by Ordinance No. 172,081, have been reviewed and it has been determined that this project is outside of a Flood Zone.

Exhibit 1


HALL'S

Exhibit 1.1


TODAY
TV

Exhibit 2

Public Law 106–45
106th Congress

An Act

Aug. 10, 1999
[H.R. 66]

To preserve the cultural resources of the Route 66 corridor and to authorize the Secretary of the Interior to provide assistance.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Historic preservation.
16 USC 461 note.

SECTION 1. DEFINITIONS.

In this Act, the following definitions apply:

(1) ROUTE 66 CORRIDOR.—The term "Route 66 corridor" means structures and other cultural resources described in paragraph (3), including—

(A) lands owned by the Federal Government and lands owned by a State or local government within the immediate vicinity of those portions of the highway formerly designated as United States Route 66; and

(B) private land within that immediate vicinity that is owned by persons or entities that are willing to participate in the programs authorized by this Act.

(2) CULTURAL RESOURCE PROGRAMS.—The term "Cultural Resource Programs" means the programs established and administered by the National Park Service for the benefit of and in support of preservation of the Route 66 corridor, either directly or indirectly.

(3) PRESERVATION OF THE ROUTE 66 CORRIDOR.—The term "preservation of the Route 66 corridor" means the preservation or restoration of structures or other cultural resources of businesses, sites of interest, and other contributing resources that—

(A) are located within the land described in paragraph (1);

(B) existed during the route's period of outstanding historic significance (principally between 1926 and 1970), as defined by the study prepared by the National Park Service and entitled "Special Resource Study of Route 66", dated July 1995; and

(C) remain in existence as of the date of the enactment of this Act.

(4) SECRETARY.—The term "Secretary" means the Secretary of the Interior, acting through the Cultural Resource Programs at the National Park Service.

(5) STATE.—The term "State" means a State in which a portion of the Route 66 corridor is located.

SEC. 2. MANAGEMENT. 16 USC 461 note.

(a) IN GENERAL.—The Secretary, in collaboration with the entities described in subsection (c), shall facilitate the development of guidelines and a program of technical assistance and grants that will set priorities for the preservation of the Route 66 corridor. Guidelines.

(b) DESIGNATION OF OFFICIALS.—The Secretary shall designate officials of the National Park Service stationed at locations convenient to the States to perform the functions of the Cultural Resource Programs under this Act.

(c) GENERAL FUNCTIONS.—The Secretary shall—

(1) support efforts of State and local public and private persons, nonprofit Route 66 preservation entities, Indian tribes, State Historic Preservation Offices, and entities in the States for the preservation of the Route 66 corridor by providing technical assistance, participating in cost-sharing programs, and making grants;

(2) act as a clearinghouse for communication among Federal, State, and local agencies, nonprofit Route 66 preservation entities, Indian tribes, State historic preservation offices, and private persons and entities interested in the preservation of the Route 66 corridor; and

(3) assist the States in determining the appropriate form of and establishing and supporting a non-Federal entity or entities to perform the functions of the Cultural Resource Programs after those programs are terminated.

(d) AUTHORITIES.—In carrying out this Act, the Secretary may—

(1) enter into cooperative agreements, including (but not limited to) cooperative agreements for study, planning, preservation, rehabilitation, and restoration related to the Route 66 corridor;

(2) accept donations of funds, equipment, supplies, and services as appropriate;

(3) provide cost-share grants for projects for the preservation of the Route 66 corridor (but not to exceed 50 percent of total project costs) and information about existing cost-share opportunities;

(4) provide technical assistance in historic preservation and interpretation of the Route 66 corridor; and

(5) coordinate, promote, and stimulate research by other persons and entities regarding the Route 66 corridor.

(e) PRESERVATION ASSISTANCE.—

(1) IN GENERAL.—The Secretary shall provide assistance in the preservation of the Route 66 corridor in a manner that is compatible with the idiosyncratic nature of the Route 66 corridor.

(2) PLANNING.—The Secretary shall not prepare or require preparation of an overall management plan for the Route 66 corridor, but shall cooperate with the States and local public and private persons and entities, State historic preservation offices, nonprofit Route 66 preservation entities, and Indian tribes in developing local preservation plans to guide efforts to protect the most important or representative resources of the Route 66 corridor.

16 USC 461 note.

SEC. 3. RESOURCE TREATMENT.

(a) TECHNICAL ASSISTANCE PROGRAM.—

(1) PROGRAM REQUIRED.—The Secretary shall develop a program of technical assistance in the preservation of the Route 66 corridor and interpretation of the Route 66 corridor.

(2) PROGRAM GUIDELINES.—As part of the technical assistance program under paragraph (1), the Secretary shall establish guidelines for setting priorities for preservation needs for the Route 66 corridor. The Secretary shall base the guidelines on the Secretary's standards for historic preservation.

(b) PROGRAM FOR COORDINATION OF ACTIVITIES.—

(1) IN GENERAL.—The Secretary shall coordinate a program of historic research, curation, preservation strategies, and the collection of oral and video histories of events that occurred along the Route 66 corridor.

(2) DESIGN.—The program under paragraph (1) shall be designed for continuing use and implementation by other organizations after the Cultural Resource Programs are terminated.

16 USC 461 note.

SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated $10,000,000 for the period of fiscal years 2000 through 2009 to carry out the purposes of this Act.

Approved August 10, 1999.

LEGISLATIVE HISTORY—H.R. 66 (S. 292):

HOUSE REPORTS: No. 106–137 (Comm. on Resources).
SENATE REPORTS: No. 106–20 accompanying S. 292 (Comm. on Energy and Natural Resources).
CONGRESSIONAL RECORD, Vol. 145 (1999):
June 30, considered and passed House.
July 27, considered and passed Senate.

○

Exhibit 3

National Climatic Data Center

Greenhouse Gases
Frequently Asked Questions
National Oceanic and Atmospheric Administration
National Climatic Data Center

Introduction

What are greenhouse gases?

Many chemical compounds present in Earth's atmosphere behave as 'greenhouse gases'. These are gases which allow direct sunlight (relative shortwave energy) to reach the Earth's surface unimpeded. As the shortwave energy (that in the visible and ultraviolet portion of the spectra) heats the surface, longer-wave (infrared) energy (heat) is reradiated to the atmosphere. Greenhouse gases absorb this energy, thereby allowing less heat to escape back to space, and 'trapping' it in the lower atmosphere. Many greenhouse gases occur naturally in the atmosphere, such as carbon dioxide, methane, water vapor, and nitrous oxide, while others are synthetic. Those that are man-made include the chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs) and Perfluorocarbons (PFCs), as well as sulfur hexafluoride (SF_6). Atmospheric concentrations of both the natural and man-made gases have been rising over the last few centuries due to the industrial revolution. As the global population has increased and our reliance on fossil fuels (such as coal, oil and natural gas) has been firmly solidified, so emissions of these gases have risen. While gases such as carbon dioxide occur naturally in the atmosphere, through our interference with the carbon cycle (through burning forest lands, or mining and burning coal), we artificially move carbon from solid storage to its gaseous state, thereby increasing atmospheric concentrations.

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Water Vapor

Water Vapor is the most abundant greenhouse gas in the atmosphere, which is why it is addressed here first. However, changes in its concentration is also considered to be a result of climate *feedbacks* related to the warming of the atmosphere rather than a direct result of industrialization. The feedback loop in which water is involved is critically important to projecting future climate change, but as yet is still fairly poorly measured and understood.

As the temperature of the atmosphere rises, more water is evaporated from ground storage (rivers, oceans, reservoirs, soil). Because the air is warmer, the absolute humidity can be higher (in essence, the air is able to 'hold' more water when it's warmer), leading to more water *vapor* in the

atmosphere. As a greenhouse gas, the higher concentration of water vapor is then able to absorb more thermal IR energy radiated from the Earth, thus further warming the atmosphere. The warmer atmosphere can then hold more water vapor and so on and so on. This is referred to as a 'positive feedback loop'. However, huge scientific uncertainty exists in defining the extent and importance of this feedback loop. As water vapor increases in the atmosphere, more of it will eventually also condense into clouds, which are more able to reflect incoming solar radiation (thus allowing less energy to reach the Earth's surface and heat it up). The future monitoring of atmospheric processes involving water vapor will be critical to fully understand the feedbacks in the climate system leading to global climate change. As yet, though the basics of the hydrological cycle are fairly well understood, we have very little comprehension of the complexity of the feedback loops. Also, while we have good atmospheric measurements of other key greenhouse gases such as carbon dioxide and methane, we have poor measurements of global water vapor, so it is not certain by how much atmospheric concentrations have risen in recent decades or centuries, though satellite measurements, combined with balloon data and some in-situ ground measurements indicate generally positive trends in global water vapor.

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Carbon Dioxide

The natural production and absorption of carbon dioxide (CO_2) is achieved through the terrestrial biosphere and the ocean. However, humankind has altered the natural carbon cycle by burning coal, oil, natural gas and wood and since the industrial revolution began in the mid 1700s, each of these activities has increased in scale and distribution. Carbon dioxide was the first greenhouse gas demonstrated to be increasing in atmospheric concentration with the first conclusive measurements being made in the last half of the 20th century. Prior to the industrial revolution, concentrations were fairly stable at 280ppm. Today, they are around 370ppm, an increase of well over 30 percent. The atmospheric concentration has a marked seasonal oscillation that is mostly due to the greater extent of landmass in the northern hemisphere (NH) and its vegetation. A greater drawdown of CO_2 occurs in the NH spring and summer as plants convert CO_2 to plant material through photosynthesis. It is then released again in the fall and winter as the plants decompose.

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Methane

Methane is an extremely effective absorber of radiation, though its atmospheric concentration is less than CO_2 and its lifetime in the atmosphere is brief (10-12 years), compared to some other greenhouse gases (such as CO_2, N_2O, CFCs). Methane(CH_4) has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas and mining coal have added to the atmospheric concentration of methane. Direct atmospheric measurement of atmospheric methane has been possible since the late 1970s and its concentration rose from 1.52 ppmv in 1978 by around 1 percent per year to 1990, since when there has been little sustained increase. The current

atmospheric concentration is approximately 1.77 ppmv, and there is no scientific consensus on why methane has not risen much since around 1990.

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Tropospheric Ozone

Ultraviolet radiation and oxygen interact to form ozone in the stratosphere. Existing in a broad band, commonly called the 'ozone layer', a small fraction of this ozone naturally descends to the surface of the Earth. However, during the 20th century, this tropospheric ozone has been supplemented by ozone created by human processes. The exhaust emissions from automobiles and pollution from factories (as well as burning vegetation) leads to greater concentrations of carbon and nitrogen molecules in the lower atmosphere which, when it they are acted on by sunlight, produce ozone. Consequently, ozone has higher concentrations in and around cities than in sparsely populated areas, though there is some transport of ozone downwind of major urban areas. Ozone is an important contributor to photochemical smog. Though the lifetime of ozone is short, and is therefore not well-mixed through the atmosphere, there is a general band of higher ozone concentration during NH spring and summer between 30°N and 50°N resulting from the higher urbanization and industrial activity in this band. Concentrations of ozone have risen by around 30 percent since the pre-industrial era, and is now considered by the IPCC to be the third most important greenhouse gas after carbon dioxide and methane. An additional complication of ozone is that it also interacts with and is modulated by concentrations of methane.

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Nitrous Oxide

Concentrations of nitrous oxide also began to rise at the beginning of the industrial revolution and is understood to be produced by microbial processes in soil and water, including those reactions which occur in fertilizer containing nitrogen. Increasing use of these fertilizers has been made over the last century. Global concentration for N_2O in 1998 was 314 ppb, and in addition to agricultural sources for the gas, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production and vehicle emissions) also contribute to its atmospheric load.

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Chlorofluorocarbons

Chlorofluorocarbons (CFCs) have no natural source, but were entirely synthesized for such diverse uses as refrigerants, aerosol propellants and cleaning solvents. Their creation was in 1928 and since then concentrations of CFCs in the atmosphere have been rising. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful. So much so that levels of the major CFCs are now remaining level or declining. However, their long atmospheric lifetimes determine that some concentration of the CFCs will remain in the atmosphere for over 100 years. Since they are also greenhouse gas, along with such other long-lived synthesized gases as CF_4 (carbontatrafuoride), SF_6 (sulfurhexafluoride), they

are of concern. Another set of synthesized compounds called HFCs (hydrofluorcarbons) are also greenhouse gases, though they are less stable in the atmosphere and therefore have a shorter lifetime and less of an impact as a greenhouse gas.

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Carbon Monoxide and other reactive gases

Carbon monoxide (CO) is not considered a direct greenhouse gas, mostly because it does not absorb terrestrial thermal IR energy strongly enough. However, CO is able to modulate the production of methane and tropospheric ozone. The Northern Hemisphere contains about twice as much CO as the Southern Hemisphere because as much as half of the global burden of CO is derived from human activity, which is predominantly located in the NH. Due to the spatial variability of CO, it is difficult to ascertain global concentrations, however, it appears as though they were generally increasing until the late 1980s, and have since begun to decline somewhat. One possible explanation is the reduction in vehicle emissions of CO since greater use of catalytic converters has been made.

Volatile Organic Compounds (VOCs) also have a small direct impact as greenhouse gases, as well being involved in chemical processes which modulate ozone production. VOCs include non-methane hydrocarbons (NMHC), and oxygenated NMHCs (eg. alcohols and organic acids), and their largest source is natural emissions from vegetation. However, there are some anthropogenic sources such as vehicle emissions, fuel production and biomass burning. Though measurement of VOCs is extremely difficult, it is expected that most anthropogenic emissions of these compounds have increased in recent decades.

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Additional Information

- Intergovernmental Panel on Climate Change
- U.S. Environmental Protection Agency
- World Data Center for Greenhouse Gases
- A Paleoclimate perspective on global warming

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Exhibit 4

Realizing residential building greenhouse gas emissions reductions: The case for a Web-based geospatial building performance and social marketing tool

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ABSTRACT

As the United States joins the global effort to mitigate climate change, we will need to develop and deploy a variety of tools for catalyzing, monitoring, and verifying greenhouse gas (GHG) emissions reductions in diverse economic sectors. This paper proposes a Web-based geospatial building performance and social marketing tool that will: (1) effectively and transparently track the GHG emissions associated with energy and water consumption in residential buildings; (2) provide tailored feedback to foster household behavior change toward energy conservation and efficiency improvements; (3) speed the integration of building performance and GHG emissions reductions into property valuations and real estate transactions; and (4) standardize residential GHG emissions data sharing among utility providers and within carbon markets.

In making the case for the tool, this paper addresses a range of questions about the science, technology, and market factors currently converging in its support. What does the growing body of social science research suggest about social networks, social norms, and maximizing behavior change interventions in energy efficiency and conservation? How is this tool unique within the industry? In what ways does it expand upon a foundation of current information technologies? How will the tool interface with existing third-party green building programs such as the U.S. EPA ENERGY STAR® and the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) Rating System? Why do emerging carbon markets and energy efficiency policies and programs in the European Union and the United States necessitate transparency in GHG emissions data at the household level? What will utility providers, building professionals, REALTORs®, and homeowners respectively gain from utilization of the tool?

INTRODUCTION

At its core, this paper makes the following four major points and associated sub-points:

1. The climate challenge is fundamentally a built environment & behavior change challenge.
    a. Energy efficiency interventions & programs are failing to live up to their potential primarily due to the failure to facilitate building occupant and building industry behavior change.
    b. Building science cannot be separated from its associated social science counterparts.
2. Feedback is critically needed but is scarce.
    a. Distributed energy and water consumptive use transparency is imperative for the following purposes:
        i. Improving energy modeling tools,
        ii. Catalyzing behavior change,
        iii. Fostering carbon market products such as energy efficiency certificates (EECs) as one or more climate stabilization mitigation wedge(s).

3. A Web 2.0 strategy merged with community-based social marketing (CBSM) can provide both a platform & a process for energy efficient behavior change.
   a. CBSM offers tools and strategies to unify social science with building science.
   b. Web 2.0 philosophies and practices can allow for creative adaptation and building marketplace transformation through data transparency and social networking phenomena.
4. Climate change & peak oil are synergistic in both positive and negative ways.
   a. Both challenges are real and appear to be already affecting the linked environmental, social, and economic systems underlying sustainability.
   b. Both challenges need mitigation immediately and potential solutions for each will fail if both are not addressed in tandem.

CLIMATE CHANGE AND BUILDINGS

The Intergovernmental Panel on Climate Change Fourth Assessment Report (AR4) Synthesis Report states "warming of the climate system is unequivocal...[and] most of the observed increase in global average temperatures since the mid-20th century is *very likely* (>90%) due to the observed increase in anthropogenic greenhouse gas [GHG] concentrations" an increase in likelihood since the IPCC Third Assessment Report [1, pp. 2, 6]. Of these anthropogenic GHGs, "the largest known contribution comes from the burning of fossil fuels" which lead primarily to atmospheric increases in carbon dioxide (CO_2), though human activities also result in emissions of other greenhouse gases such as methane (CH_4), nitrous oxide (N_2O), and the halocarbons [2, p. 100].

The Building Sector: A Heavy Footprint

Globally, buildings use 30 to 40% of primary energy [3]. Though this energy is typically generated from biomass in low income countries, it comes mostly from the burning of fossil fuels in middle and high income nations [3]. Within the United States, the building sector accounts for approximately 48% of annual GHG (greenhouse gas) emissions, with 36% of the direct energy related GHG emissions and an additional 8-12% of total GHG emissions related to the production of materials used in building construction [4-6]. Incorporating the transportation of materials and other activities related to constructing buildings would add even more CO2 emissions to the building sector [4]. Additionally, the ratio of embodied energy consumption for the building sector is estimated at approximately 15-25% from the construction phase and 75-85% from the operations phase assuming a 50-year building lifespan [4, 7].

Specifically, the residential sector within the U.S. consumes approximately 20-25% of primary energy use meaning households account for about 50% of the CO2 emissions within the U.S. building sector [8-10]. Grid connected utilities provide the vast majority of the electricity to power these buildings and are expected to undergo market pressures to reduce these associated GHG emissions.

The Building Sector: Wedge(s) of Efficiency

The greatest potential for an effective near-term mitigation wedge for climate change comes from energy conservation and efficiency improvements in the built environment [11]. The climate stabilization triangle envisioned by Pacala and Socolow proposes GHG emissions reductions via "seven [originally, but now eight] equal pieces, or 'wedges,' each representing one billion tons a year of averted emissions 50 years from now (starting from zero today)" [12]. As there is no silver bullet for mitigating climate change, the 15 wedges proposed by Pacala and Socolow transcend all sources of GHG emissions and sequestration strategies and must be used in combination [11]. However, each 25% reduction in combined electricity use in residential and commercial buildings worldwide can account for one mitigation wedge [12].

The IPCC AR4 Working Group 3 concluded with "*high agreement, much evidence*" that the building sector can substantially reduce GHG emissions by "using existing, mature technologies for energy efficiency that already exist widely...have been successfully used...[and are] cost-effective,...[but] to a significant extent [have] not as yet been widely adopted" [13, p. 406]. A recent report by the U.S. Climate Change Science Program estimates that homes can achieve carbon emission reductions up to 70% with current best practices [14], and the U.S. Department of Energy Building America program aims to reduce the energy use of new homes by 70% by 2020 [15].

Furthermore, the American Institute of Architects estimates that the U.S. built environment will undergo 75% turnover via new or significantly renovated buildings and infrastructure during the thirty year period from 2005 to 2035 [5, 6]. With the technology available to improve residential energy efficiency, existing programs in use to promote these technologies, and major redevelopment trends anticipated in the next quarter century, one could argue that the primary limiting factors to achieving these efficiencies are individual behavior change and the public policies necessary to catalyze these changes.

The Building Sector: Cost Negative U.S. GHG Emissions Abatement Potential

In one estimate of U.S. GHG emissions abatement potential per year through 2030, energy efficiency in buildings and appliances is projected to eliminate 710 megatons (mid-range) to 870 megatons (high-range) of GHG emissions [16, p. xiv]. The authors of the McKinsey & Company report [16, p. 20] go on to state that slightly over 50% of the abatement potential for either their mid-range or high-range cases can be attributed to the combination of the buildings-and-appliances and the power sectors. Most importantly, the report concludes that many of the mitigation strategies in the buildings-and-appliance sectors are negative cost options, meaning they provide a higher long-term monetary savings than the immediate-term investments necessary for implementation.

> "This large cluster of negative-cost options includes: lighting retrofits; improved heating, ventilation, air conditioning systems, building envelopes, and building control systems; higher performance for consumer and office electronics and appliances, among other options" [16, p. xiv]. "[However,] misaligned incentives that pervade the utility system today...often place power producers' sustained earnings at odds with resource efficiency" [16, p. 20].

Green Building Rating Systems: Proliferating But Questionable Effectiveness

Green building rating systems and other metrics are proliferating at the international, national, statewide, and regional scales. National scale government run programs include the U.S. EPA ENERGY STAR® program and the U.S. DOE Building America program. Examples of non-governmental organizations at the international and national scale include Audubon International, the Green Building Initiative's Green Globes, and the most widely known of all programs, the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) suite of rating systems. Statewide programs include non-governmental organizations such as the Florida Green Building Coalition, while regional programs include utility led efforts such as the Green Built Homes of Florida and a host of diverse local government controlled voluntary ordinances and incentives often based on one or more of these other independent third-party systems.

However, one might question the effectiveness of these programs. Since its inception in 1992, the ENERGY STAR® program has gained recognition and increased in scope of impact. According to the ENERGY STAR® Qualified New Homes program Web site, the national market presence averaged 12% in 2006. Though ten states have over 20% participation, in many parts of the country its suite of services are

still under utilized. Florida is a prime example. Despite having led the United States in new single-family homes permitted for 12 of the last 16 years [17], in any given year, less than 3% of the homes permitted in Florida have utilized the ENERGY STAR® Qualified New Homes program. It could be argued that the scope of this program and many others is failing as judged by the low market presence of participating buildings. Yet, even if their scope of impact were to be judged a success, the mere use of these programs and the award of their various labels may belie the true scale or depth of their impact. As described later in this paper, these programs are typically based on theoretical models of building performance that often stop short of measuring the actual performance of buildings, which is highly dependent on occupant behavior.

As evidenced in these passages, the building sector is a prime mover in the global economy that also results in its extraordinary contribution to anthropogenic climate change. However, within the U.S., mitigation opportunity abounds as this sector is anticipated to undergo rapid turnover in the next three decades. The knowledge and technology to make our buildings more energy efficient, less carbon-intensive, and less expensive to operate exists today. Programs to foster green building abound. The question remains, will we collectively act on this knowledge?

DISTRIBUTED NON-POINT EMISSIONS SOURCES AND THE INTERACTION OF SOCIETY AND TECHNOLOGY

Arguably, the most persistent barrier to market implementation of building energy efficiency strategies is the complex and dynamic nature of behavior change. More specifically, a "lack of information and lack of financing," seem to disrupt the significant potential for energy efficiency improvements [10]. Trends in recent years show a shift in the proportionate impact of pollution vectors from large point-sources (such as large companies, factories, etc.) to smaller, more distributed non-point sources (such as small groups, households, and individuals) [18-22]. Policymakers and researchers are increasingly recognizing the behavioral considerations of diverse challenges and the potential for solutions via social processes and interventions to modify individual choices [18-22].

> "Paul Stern, who directs the Committee on Human Dimensions of Global Change for the National Research Council...said one recent test suggests that about 30 percent of U.S. contributions to climate change are 'attributable to individual choices.'...Stern said that in the long run, the nation needs to 'make it easy to change individual choices' by making environmentally friendly actions easier. He cited automobile fuel-efficiency mandates, now up for debate in Congress, and land-use policies that discourage sprawl as examples." [22]

Buildings, Cars, and Complex Social-Technological Systems

Unfortunately, making it easier to change individual choices isn't so easy after all. For better and for worse, the energy efficiency wedge is an intricate mix of building science and social science. Occupied buildings are complex social-technological systems, not unlike organisms and their collective populations. An organism's or population's ability to adapt to its environment and new selection stressors such as climate change can be expressed as a combination of its ability to disperse to more suitable habitats, its genotypic response (the evolutionary component) and its phenotypic response (the plastic component) [23, 24]. Metaphorically within a residential building, one could describe the less changeable components, such as the building envelope and the mechanical, electrical, and plumbing (MEP) systems, as a home's DNA or "hardware." This genetic hardware is based on forms and functions inspired by previous construction generations and lessons learned. As such, a home's genotypic response is slow to change, requires higher capital investment, and likely follows only after the simple phenotypic (i.e., operational) responses have been exhausted.

A residential building's phenotypic responses might include the home's occupant behavior and other controls. These operating system or "software" style characteristics are controlled in relation to environmental response, occupant identity, cultural norms, economic cost/benefit ratios, and a variety of socially driven processes. As such, a home's phenotypic response is rapidly mutable, requires lower capital investment, and is likely the first line of attack in a building's shift toward energy efficiency.

Evolution and Plasticity of Light-Duty Vehicles: The Example of Producer and Consumer Behavior Change

A good metaphor for understanding the relationship between the genotypic and the phenotypic responses of a social-technological system is the ebb and flow of automobile purchasing trends and driving trends in the face of rising energy costs. In their April 2008 monthly sales reports, all of the major automobile makers reported markedly lower sales of light trucks (which includes pickup trucks and SUVs) while posting either gains in car sales or decreases in car sales that were much less than the steep declines in light truck sales [25]. This response to higher gas prices could be described as a genotypic response as car buyers look for more efficient "hardware" solutions and thus selection pressure drives the evolution of vehicles toward more efficient models.

Simultaneously, drivers that either cannot afford or are not in a position to switch out their current vehicles for a more fuel efficient model are now becoming aware of the behavioral and maintenance conditions that can contribute to poor fuel economy (*Table 1*). In other words, the social part of a car's social-technological system offers a phenotypic response by making "software" changes to maximize the efficiency available in their existing "hardware." Recently, the European Petroleum Industry Association in association with the European Commission created an "eco-driving" campaign to foster the rapid behavior change strategies possible within the personal vehicle sector [26].

Table 1. Phenotypic (or Plastic) Conditions Affecting Vehicular Fuel Economy

Behavioral or Maintenance Condition	Affect on Vehicular Fuel Economy
Aggressive driving	↓ up to 33% highway and 5% city
Excessive speed	↓ between 7 – 23% for speeds above 60 mph
Excessive weight	↓ of 1 – 2% per 100 lbs of excess weight with increased effects for smaller vehicles
Others: excessive idling, using roof racks, not using cruise control, not using overdrive gears, etc.	Uncalculated
Improperly tuned engine	↓ approximately 4% for minimally out of tune, up to ↓ 40% for serious maintenance issues such as a faulty oxygen sensor
Dirty air filter	↓ up to 10% for clogged air filter
Improper tire inflation (both under and over inflated)	↓ approximately 0.4% for every 1 psi drop in pressure for all four tires
Improper motor oil	↓ approximately 1 – 2% for using improper motor oil for vehicle's engine type

Source: U.S. Department of Energy

Other phenotypic conditions include the frequency of vehicular use, distance driven, and the number of occupants within the vehicle (i.e., driving alone or carpooling). Given enough time, rise in energy prices, and increase in consumer demand, the vehicles with poor fuel economy will either fill an increasingly narrow market niche, change their genetic design heritage to improve efficiency, or they will go extinct to

be replaced by some competing design that will be selected for in the new socioeconomic conditions of a climate change and peak oil induced carbon constrained future.

When Building Technologies Fail Society

Similarly, behavioral and maintenance issues are critical factors in the real world energy consumption and associated GHG emissions for buildings. For example, recent field studies from the Energy Center of Wisconsin have suggested that programmable thermostats may be achieving lower savings than their estimated potential [27]. These social "software" failures of a technologically proven "hardware" product result from misuse, misunderstanding, indifference, or other behaviorally driven factors. This has led the EPA to withdraw this product's ENERGY STAR® certification mark as of May 1, 2008 [27].

There is evidence that a similar phenomenon may cause some ENERGY STAR® Qualified New Homes to fall short of their pre-occupant U.S. Home Energy Rating System (HERS) Index [10]. "Research has shown that actual occupant behavior is probably the single most significant determinant of actual energy use...even if there are no HERS system differences, the predicted energy use or energy cost can be off by 50% or more due to occupant behavior" [10, p. 342]. The best levers for influencing energy efficient genotypic and phenotypic responses in the residential built environment are likely to be those that alter social norms, skew cost/benefit ratios toward energy efficient investment, and provide rapid feedback on relative comparable homes, occupants, and systems. Together these levers will lead to cross generational hardware improvements in new construction and/or renovations and ultimately foster evolutionary change in energy efficiency through an adaptive management paradigm.

BUILDING ENERGY ANALYSIS TOOLS

Building energy software tools arose in the 1970s, followed by refinement within the professional realm in the 1980s, and expansion of scope, scale, and diverse user applicability in the 1990s [28]. Today, the U.S. Department of Energy lists 342 tools on their Web directory [29]. There is clearly no dearth of options for our collective energy efficiency toolbox. In a thorough review of North American residential energy analysis tools, Mills suggests the ideal status these tools may achieve is as follows [28, p. 865]:

> "The long-term vision held by many in the building science community is one [energy analysis tool] involving virtual (collaborative) 'life-cycle' building tools that simulate actual buildings and their construction coupled with intelligent systems that monitor and archive design intent and performance and feed the results back to the simulation tools, which in turn, grow more refined through integrating better empirical data."

Information Obscurity: The Limiting Factor for Energy Analysis Tools

Though this vision is logical and worthwhile, there are many existing limitations to the usefulness of these tools as they currently exist. The primary limitation involves "the availability of measured end-use data, and manipulations of that data (e.g., weather normalization) to facilitate meaningful comparisons to tool outputs" [28, p. 874]. The scarcity of feedback regarding actual energy and/or cost savings from residential energy efficiency retrofits also hampers tool validation and improvement [28].

After reading the thorough Mills [28] review, one is left wondering how effectively these tools foster end-user energy efficient behavior and drive market transformation toward high performance buildings. Despite the reality that millions of grid-connected households across the country have records of their

energy and water consumptive end-use on file in disparate utility databases, Mills [28] found it expedient to test the various analysis tools on only two actual residential building historical records.

In one of the few studies systematically comparing the U.S. Home Energy Rating System (HERS), the authors lament, "there exist very little published data on HERS' predictive ability" and despite "tens of thousands of houses [having] been rated in the last several years, few HERS providers were willing and able to supply us with data" [10, p. 343, 345]. Even worse, the utility which sponsored the research (Florida Power and Light), prevented the authors from making a full public disclosure of the report or data [10, p. 344].

Buildings and Society: The Needed Convergence of Two Sciences

Mills [28, pp. 878-879] concluded by stating, "the design of residential energy analysis tools should be grounded in social science as well as engineering, with close attention given to the intended use and audience." While Stein and Meier [10, p. 344] announced, "perhaps the most valuable finding of the FSEC analysis is the fact that it was possible to improve significantly the predictive ability of the rating tool based on the data collected." Both of these papers only accentuate the need for massive data transparency and the creation of a more powerful performance monitoring system that incorporates feedback loops for both behavior change and continual tool improvement. In order for building energy analysis tools to realize their potential to serve as catalysts for a more efficient built environment, they will need to infuse social science into their building science protocols.

COMMUNITY-BASED SOCIAL MARKETING

People often fail to change their behavior or engage in a new activity because they either don't know about the activity and its benefits, they perceive of significant internal or external barriers to activity engagement, or they perceive of benefits in the continuation of present behaviors [30, p. 2]. Community-based social marketing (CBSM) has been proposed as a process to overcome these obstacles. As described by McKenzie-Mohr and Smith [30, p. 150], "community-based social marketing involves four steps: (1) identifying the barriers and benefits to an activity, (2) developing a strategy that utilizes tools that have been shown to be effective in changing behavior, (3) piloting the strategy, and (4) evaluating the strategy once it has been implemented across a community."

Perceptions of barriers and benefits to new activities can vary dramatically among individuals and the choice to undertake one behavior often limits the ability or desire to adopt another behavior [30]. Because of these complex dynamics, the tools of behavior change work best in combination and include: (1) commitment; (2) prompts; (3) norms; (4) communication; (5) incentives; and (6) removing external barriers [30]. The previous sections of this paper detailed some evidence within scientific literature and popular media of how and why we are failing to achieve the vast potential for energy efficiency in buildings. Community-based social marketing offers one potential avenue to unify social science with building science and engineering in an effort to foster energy efficiency in the social-technological systems of our built environment. Later in this paper, the connection between CBSM and the Web 2.0 meme is made.

The Power of Commitment and Social Norms

In general, household energy conservation interventions have shown mixed results with the most successful interventions consisting of combined campaigns using both antecedent (specifically goal setting and commitment) and consequence (specifically feedback) protocols [9, 31-35]. Part of these mixed results arise from the fact that approximately 80% of Americans regularly express strong environmental concern,

yet barely 20% of Americans actually translate this concern into concrete changes in their everyday practices [36, 37].

However, insights into potential pathways for bridging the "value-action gap" are emerging in the social sciences. When social capital and information networks are strong and interconnected, sustainability and environmental planning initiatives tend toward greater degrees of success [38, 39]. Meaningful social norms and networks visibly convey social approval/disapproval, group performance feedback, and allow for the establishment of group identity [40, 41]. Congruently, buildings and land may suitably serve as tangible indicators of group identity [42]. Actively engaging individuals and groups in energy efficiency interventions via non-coerced commitment and the clear visualization of new social norms and peer performance can help people to view themselves as concerned about mitigating climate change and improve the speed and depth of behavior change [30].

Incentivizing Efficiency through Transparent Markets

Additionally, these "communicative tools are more likely to be effective when combined with regulatory or economic instruments" [43]. Potential regulatory and economic instruments, such as cap-and-trade carbon markets and carbon tax schemes, are currently transpiring at scales from local to international. It is specifically these trends in building science know-how, social science research, recognition of the need to address the numerous disparate non-point source causes of energy resource depletion and GHG emissions, the emergence of carbon markets, and the confluence of software and hardware in the Web 2.0 paradigm that raise the possibility for a Web-based geospatial building performance and social marketing tool.

The Emergence of Building-Related Consumptive Use Transparency

In response to the growing realization that energy efficiency efforts are stalling under the weight of data scarcity, California has taken the call for data transparency to a new level. On October 12, 2007, the State of California approved Assembly Bill No. 1103, Chapter 533, Section 25401.10 of the Public Resources Code which mandates that by January 1, 2009, all electric and gas utilities will disclose "energy consumption data of all nonresidential buildings to which they provide service, in a format compatible for uploading to the United States Environmental Protection Agency's Energy Star Portfolio Manager (Energy Star Portfolio Manager), for at least the most recent 12 months" [44].

Europe is entering the 21st century information age as well. Beginning on December 14, 2007, all for sale properties in England and Wales will be required to include Home Information Packs in the property transaction [45, 46]. These packs are "designed to reduce the stress of both buying and selling by containing all essential information about the property you are considering buying upfront," including the Energy Performance Certificate, a European Union mandate for energy performance labeling for buildings by January 2009 [45-47]. In contrast, the ENERGY STAR® for Homes program in the U.S. uses the HERS Index to rate new construction, but doesn't actually keep records of the scores for each certified address. ENERGY STAR® for Homes does not have a similar rating system for existing dwellings.

Information Alone is an Insufficient Driver of Behavior Change

Though these preliminary efforts are a meaningful first step, the problem with programs such as the European Union Energy Performance Certificate and ENERGY STAR® for Homes are that they are very static, require accredited energy assessors such as HERS raters, and assume simply providing basic information will lead to behavior change. Using accredited energy assessors is important and provides third-party verification, but a system that allows for more continual feedback and social networking,

especially at the moment that renovation decisions are made, is likely to provide a significantly more meaningful affect on actual behavior change especially when linked to regulatory policies.

As suggested earlier, meaningful social norms (e.g., those that may foster energy efficient behavior) require visible feedback on policies (e.g., taxes or incentives), performance (e.g., existing consumption behavior), and perceptions (e.g., attitudes of what is acceptable) [34, p. 10]. Another paper suggesting that the European home energy label is only a partial solution and an incomplete one at that, states as follows:

> "In general, through the analysis of the interviews, we have shown that people are not empty recipients of the new information given by the energy-performance label. They rather are actors that interpret or reject new information on the basis of their previous knowledge and of the norms of their social network...Summing up, this paper shows that the idea of households as rational economical actors who will renovate their homes in an energy efficient way if they are just given the right knowledge has to be abandoned. This does not mean that people in general are irrational or that they do not take care for their own interest, it rather means that rational behaviour from an everyday life perspective includes many other elements than just economy, as for instance identity and social comparison, convenience, time use, etc. This does however not mean that they energy labels on buildings are a bad idea but that should be seen as one input among others to people's own knowledge and communication about their house and its renovation." [33, p. 2886-2887]

These studies and the references regarding behavior change in the previous sections provide the impetus to move beyond merely logging the GHG emissions performance data from the built environment, to fully integrated interdisciplinary feedback and monitoring platforms that foster energy efficient social norms through a social marketing process. Government agencies and academia have long known the value of tracking pollutants and generating emissions inventories. The growing body of social science has opened the door for these regulatory and research efforts to move beyond backdoor tracking and into the limelight offering useful feedback for the average consumer.

A NEW INFORMATION REVOLUTION

Should building energy and water consumptive use data stay private or enter into the public domain? If the data were publicly availably, how might it affect the marketplace? In states with both municipally owned utilities and sunshine laws for governmental operations, this utility data already resides in the public domain. It is merely invisible until someone makes the appropriate request for the data. Unfortunately, these requests are rare and come only when a proactive potential renter or homebuyer wants to investigate the operational costs of a dwelling under consideration. Most people do not realize the data is out there nor how it might affect their behavior through the establishment of social norms. Just like the computer software industry has begun a shift toward open source programs and platforms, maybe it is time for a new information revolution in building performance, one that makes transparent each individual source of energy and water consumptive end-use so that the cultural chips will fall where they may.

From Conspicuous Consumption to Conspicuous Reduction

Some people or organizations might question a call to release the data, as evidenced in the Stein and Meier account of Florida Power and Light's reticence to share the full results of research they funded. However, many types of consumptive end-use are already highly conspicuous and have a significant affect on consumer behavior. Expensive designer products from clothing brands to watches, from cars and SUVs to certain desirable addresses in town have been suggested as means of conspicuous consumption to visibly

reflect social status or "serve as a signal of non-observable abilities" [48]. A simple search for the term "conspicuous consumption" on Google Scholar returned 21,200 articles as of May 2008.

Conspicuous feedback plays a critical role in social networks, cultural norms, and behavior change. "A consumer's choices are not isolated acts of rational decision making...[but rather] significant parts of an individual's attempt to find meaning, status, and identity" [49, p. 14]. In a world seemingly defined by the race to "keep up with the Joneses," those striving for sustainability or a stabilized climate all-too-often view production as the problem and regulating production as the answer [49, p. 5]. However, Princen, Maniates, and Conca [49] suggest if we stop viewing "consumption as sacrosanct" and we tap into the "significant portion of American society [that] yearns for a less harried, less materialist, less time-pressed way of life, and that [knows] that their individual consumption and consumption of their society as a whole are threatening environmental life-support systems" we may be able find solutions via the beneficial use and modification of the phenomena that have thus far led to the "social embeddedness of consumption" [49, pp. 5, 13-15].

Reinforcement for this perspective can be found in two recent medical studies documenting the power of social networks in both facilitating the obesity and smoking epidemics while also offering solutions through healthy social networks and intervention programs that utilize peer support strategies based on positive social norms [50, 51]. In layman's terms, both positive and negative behaviors concerning personal health (or environmental protection for that matter) are highly dependent on the dynamics of social networks and group identity.

The U.S. EPA Fuel Economy Label: A Catalyst for Social Norms

Light-duty vehicles are a good example of both the conspicuousness of energy end-use in consumer behavior but also the subtle difficulties in understanding the difference between estimated or perceived performance and actual performance. Most Americans would likely answer a question correctly about which vehicle has better fuel economy when given a choice between a 2008 Cadillace Escalade (12 mpg city / 18 mpg highway) and a 2008 Honda Civic DX Sedan (26 mpg city / 34 mpg highway). Yet, all is not always what it seems, especially when comparing vehicles within the same class or even within the same model line. When looking at a Honda Civic, one might have trouble differentiating between the Honda Civic DX Sedan and the Honda Civic Hybrid Sedan since the cues are subtle changes such as different rims and the Hybrid nameplate on the trunk.

The story of the Toyota Prius is slightly different and may reveal why its sales record has been so strong and it has become the poster car for fuel efficiency. Highlighting the important motivational power of social networks and conspicuous consumption, a recent CNW Marketing Research study cited by a July 4, 2007 New York Times story on why Toyota Priuses have enjoyed such success even while other hybrid models struggled to sell, determined the most obvious choice of higher fuel economy was third (at 34% of respondents) on the list of top reasons customers cited for purchasing the model [52]. The top choice, at 57%, was that the Toyota Prius "makes a statement about me" [52]. And why does the Toyota Prius make a better statement than its competitor, the Honda Civic Hybrid? It is likely because the Toyota Prius is a stand alone hybrid model with no alternative lower fuel efficient drivetrain options. One Prius looks and performs like all Prius models, but the somewhat less obvious drivetrain of the multiple model Civic line is important to know if one wants to make an identity statement.

Though it is tough to make the guts of a Civic visible to the outside world and a bit tougher to make truly accurate comparisons of different vehicles fuel economies upon first glance, the federal government understands the value in making the energy performance of vehicles visible in the public domain. At the point of sale, all new cars are required to have a U.S. Environmental Protection Agency (EPA) Fuel Economy Estimate sticker on the window. This also allows buyers and sellers in the used car marketplace to incorporate the fuel economy of a vehicle into its valuation at the point of transaction though historical

fuel economy records available at www.fueleconomy.gov and ultimately picked up by the major automobile research and sales sites such as www.edmunds.com, www.autotrader.com, and others.

Models vs. Reality

However, as mentioned earlier, models do not always reflect reality. These U.S. EPA Fuel Economy Estimates are based on a series of testing assumptions and are not necessarily indicative of real world performance. As described in the previous section about genotypic and phenotypic responses, driving behaviors are very fluid. Though these driving behaviors have changed over time, the process for evaluating a vehicle's fuel economy has stayed relatively the same leading to a growing gap between modeled performance and actual results. As a result, the U.S. EPA altered its vehicle evaluation methodology to come up with a more accurate estimate starting with the 2008 vehicle model year. This alteration to the US EPA evaluation process was made possible through the comparison of modeled outputs with actual data collected in the real world fuel efficiency performance of vehicles.

Though people likely make their purchase decisions about a new or used car on a wide variety of characteristics such as comfort, safety, design, cargo capacity, and a multitude of others, the very fact that the marketplace can place a value on the energy performance of vehicles should the marketplace so desire it, is dependent on freely shared and clearly visible performance information. The same cannot be said for buildings. Even though the size of a home might offer an approximation as to the energy and water performance and their associated GHG emissions, just like the vehicle example, the devil is in the details and the relationship of the internal "hardware" and operational "software."

In support of previous studies suggesting energy models do not necessarily reflect reality, preliminary evidence from research being undertaken at the University of Florida suggests that there are large discrepancies in the energy performance between geographically and demographically comparable homes qualified under similar programs such as Energy Star® and Building America. Energy and water use at the meter is what matters and labels may only cause confusion if they are a poor reflection of reality and the uncertainties that come from the combination of a home's hardware and software. Is it possible to replace the "conspicuous consumption" model of the latter half of the twentieth century with a twenty-first century model of "conspicuous reduction" whereby social networks and community norms foster a non-linear and interconnected web of GHG emissions reduction behavior. Maybe, but it will hinge on the freedom and usefulness of information.

THE WEB 2.0, TAILORED FEEDBACK, AND A CBSM TOOL FOR BHEAVIOR CHANGE

In a follow-up to their paper, *A review of intervention studies aimed at household energy conservation* [32], Abrahamse, Steg, Vlek, & Rothengatter [9] highlight "the internet as a potentially effective medium for tailored [energy efficient behavior change] interventions, because it offers the possibility of reaching a relatively large number of households, while at the same time providing custom-made information and electronic feedback to individual users." The authors key messages include the benefit of multi-disciplinary approaches to intervention, the value of web tools, the impact of linking direct and indirect energy use, and the need for larger sample sizes to validate the findings [9]. Taking into account all that has been discussed in this paper to this point, it seems intuitive that the World Wide Web offers a platform for unifying building science and social science.

Though there is debate about what Web 2.0 is, and is not, this philosophical paradigm offers at least a different way of looking at what the Web can be [53]. In the Web 2.0 meme (i.e., culturally shared way of thinking or behaving), the Web is viewed as a platform based on characteristics such as the following [53]:

1. Potential for emergent functionality without predetermined user behavior.

2. Joyful and rich user experience.
3. Trust in the users as they add value.
4. Adaptable and self-improving the more people use it with the right for user remixes (though some rights reserved).
5. Power of the Web as vehicle for harnessing collective intelligence.
6. Existing in a state of perpetual beta.
7. Data and database management as the core or the "Intel Inside" where "SQL is the new HTML" and software evolves into "infoware."

A Vision for a Web-Based Geospatial Building Performance and Social Marketing Tool

A geospatial Web-based tool based on the Web 2.0 meme could offer a foundational building block to help realize residential energy efficiency and GHG emissions reductions. A Web 2.0 response to the critical need for data transparency in building related energy and water consumptive use might look like a fusion of the geospatial and database management of www.zillow.com and the data from disparate grid-based utility providers, energy modeling tools, and green building rating systems. Whereas www.zillow.com has put a user friendly, interactive face on property valuation for the real estate marketplace, a similar building performance Web tool would remove the obligate need for the user to input their own utility bill records into the various self-assessed energy audit tools such as the Home Energy Saver (http://hes.lbl.gov/) and the Home Energy Yardstick (http://www.energystar.gov/index.cfm?c=home_energy_yardstick.index). These existing energy audit tools would become value-added features instead of hurdles for the average person.

The Benefit to the Marketplace: Decisions Driven by Data

With a "data driven" mentality, this fully transparent interface would ideally be programmed to automatically calculate consumptive use data and trends for each address and provide relative comparisons across different house sizes and different geographic scales including medians, baselines, while also providing a more accurate representation of models versus reality. The importance of these relative comparisons and the value of more meaningful information is documented through research into the concept of "Innovative Billing," which provides "individualized energy information for a mass audience – the entire residential customer base of an electric or gas utility" via comparison groups with the best groups based on "street name, meter book, or multiple house characteristics" [54]. This tailored feedback functionality would not require end-user input but it would necessitate the sharing of energy (e.g., electricity, natural gas, etc.) and water consumptive use data from grid connected utilities. The participation of all utility providers nationwide would optimize comparison groups across geographic regions, maximize the number of households reachable, and offer the most useful feedback for existing building energy analysis tools.

Currently, most energy efficiency campaigns are developed and delivered via individual utilities with financing available through a combination of the utilities and local, state, and federal government incentives. The campaigns are often prescriptive in that they provide rebates or other incentives based on end users installing energy efficient technologies such as solar thermal water heaters, solar photovoltaics, more efficient HVAC systems, improved R-value insulation, compact fluorescent lighting, etc. However, they rarely verify the actual effectiveness of these technologies and the incentives are provided even if the estimated efficiency gains are not realized. A transparent Web tool such as the one proposed here would allow for campaigns based on performance, thus rewarding both technological and behavior improvements. It would also detach these campaigns from the sole direction of utilities by allowing local governments and

the free market to visualize which individual homes, streets, neighborhoods, or any variety of groups are most in need of energy efficiency retrofits.

Free market campaigns to improve energy efficiency and reduce GHG emissions, such as the San Francisco Climate Challenge (http://www.sfclimatechallenge.org), a collaboration between the local government and two non-governmental organizations, could more easily evolve and prosper in a transparent data driven paradigm. The San Francisco Climate Challenge was unaffiliated with PG&E, the local utility, and provided teams of five or more households an opportunity to compete for prizes (including cash) by lowering their utility bills during the competition billing period as compared to the same billing period one year prior. With a transparent Web tool, performance could be tracked such that annual competitions could reward early adopters and allow for floating baselines that would foster continuous improvement over time. It would also allow for multi-year averages to be used for baseline quantification reducing the potential for unusual behavioral or weather conditions in one particular period to lead to over or under reporting of energy efficiency gains.

The Benefit to the Marketplace: Integrated, Participatory, and Continuously Improving

Another benefit of this type of Web tool would be the unification of the disparate green building rating systems via common performance benchmarks. Each system offers its own protocols and marketing benefits, and though their respective means are important, their respective ends also matter. With an open and transparent Web tool, the green building rating system used and its associated modeled energy performance could be documented for each individual residential address and ultimately compared to actual performance over time. This would offer more accurate marketing benefits by showing how the designed performance of specific rating systems, specific energy raters, and/or specific architects and builders reflected the real world operational conditions of their intent. This clarity of models vs. operations would reduce the market value of poorly predictive rating systems, raters, and builders while simultaneously increasing the value of those that lived up to their claims.

The cycle of continuous improvement of energy models could also be mirrored through a cycle of continuous improvement of the Web tool itself. This might take the form of a three tiered structure of participation and data quality. Tier One data would consist of raw consumptive end use data from grid connected utilities and raw building characteristics from property appraisers or the Multiple Listing Service (MLS) used by REALTORS®. This would be the lowest quality data, but offer the most accessible user interface because the basic performance of each individual address and groups of addresses would already be logged into the system with trends and comparables rapidly and readily visible to all users of the Web site. This would minimize the selection bias concerns inherent in the current energy analysis Web tools whose comparisons are based on the small number of participants who voluntarily enter their utility billing data. Tier One data would also offer simplistic green building case studies by merely archiving the green building rating system used, the certified score and the credits pursued, and the actual performance as a result of these green design and construction principles.

Tier Two data would consist of end-user self-assessment and information posting. In this tier users would voluntarily perform a self-assessed energy audit (e.g., the Home Energy Saver previously discussed) to update the details on their individual home, such as window size and type, attic insulation R-value, water heater type and fuel source, etc. Here, much like users of www.zillow.com can claim their house and post photographs and other information about improvements that might increase their market valuation of their property, users of the Web tool would be able to document the date and type of energy efficiency improvements made to the house. Each technological or behavior improvement might show up as an icon on the long-term trend graph of energy and water use which would provide a means of visualizing how and why trends may improve over time. As property appraiser and MLS data may be incomplete and/or incorrect, this would allow end-users an opportunity to increase the quality of the building characteristics

archived on the Web site. However, since Tier Two relies on end-user input, there is still a chance for errors and/or "gaming the system."

Tier Three data would consist of "certified" building and consumptive use data from one or more independent third party agents. These agents might include the HERS raters currently used for the ENERGY STAR® program and the various green building rating systems, home inspectors used during real estate transactions, local building inspectors, or any other agent of the local government or another approved program. The Web tool might offer standardized Web-applications and downloadable forms for these agents to use for collecting and posting the data on the Web site. This is the realm where the Web tool would most effectively integrate with the existing green building rating systems and the real estate marketplace. By utilizing a multi-tiered approach to continual data quality improvement, such as the approach proposed above, the Web tool can combine the best of near-term functionality for social networking and cultural norms that lead to energy efficient behavior change with the long-term functionality of improving building science research and diversifying the type and source of energy efficiency incentives. Tracking the three tiers and placing a premium on the quality of the data would drive the marketplace toward self improvement and third party verification.

The Benefit to the Marketplace: Mitigating GHG Emissions Via Carbon Markets

Though the timing is uncertain and the details unspecific, most near-term projections point to a mandatory cap-and-trade carbon marketplace being initiated in the United States similar to the marketplace(s) in other countries which began implementing the Kyoto Protocol in January 2008. "As of mid-February 2008, lawmakers [in the 110th U.S. Congress] had introduced more than 180 bills, resolutions, and amendments specifically addressing global climate change and greenhouse gas (GHG) emissions"[55]. Additional statewide and regional efforts have begun emerging across the country increasing the likelihood that some form of carbon market and/or carbon taxes will be implemented in the United States.

The three most significant challenges to voluntary carbon offset markets are defining additionality, monitoring and verification of the actual offsets, and enforcement of ownership [56]. Other critical considerations include establishing baselines, leakage, securitization, and permanence. With regards to mitigating GHG emissions via energy efficiency, many of these challenges will necessitate the behavior change campaigns, energy modeling, actual building performance tracking, and address-based archives of carbon offset purchases only made possible through an interface similar to the Web tool described in this paper. Background on energy efficiency related carbon market products, establishing baselines, and these challenges to voluntary carbon offset markets are discussed in further detail in an unpublished white paper from the Conservation Clinic at the University of Florida Levin College of Law [57]. Mandatory carbon markets will pose many of the same challenges.

The Benefit to the Marketplace: Meaningful Norms, Prompts, Communication, and Incentives

As discussed earlier, energy efficiency interventions are most effective when they combine behavior change and communication tools with public policies in a seamless interface of social networks, free market innovation, and a thoughtful invisible hand of combined governmental regulations and voluntary incentives. By making the energy and water consumptive end use data freely available and grouped into a variety of relevant comparables, utilities will allow the natural social networking phenomena to motivate individuals and groups to create new social norms of conspicuous reduction. Though social norms will self emerge, they must be guided toward valuing energy and water efficiency through noticeable, self-explanatory, and timely prompts closest in proximity to where action is taken and decisions are made [30]. This guidance will be dependent on the communication of captivating and useful information with comparative feedback from credible sources [30]. Lastly, these new norms must be reinforced through highly visible incentives

closely paired with the desired behaviors offering rewards based on early and continuous adoption of established and increasingly more stringent performance thresholds [30].

A functional Web tool would help foster these norms, prompts, communication, and incentives by evolving over time into a holistic platform for the diverse processes of community-based social marketing. For example, in the near-term, the Web tool might only serve as a platform for the visualization and valuation of building performance within the real estate and home building markets. The Web tool might eventually piggy-back on existing home energy audit tools to provide end users with customized reports of the most effective strategies to reduce energy and water use. These reports might take the form of printable spreadsheets consumers could bring with them to home improvement or hardware stores as they search for new products to buy.

Over the long-term, these auditing and product recommendation services might become more dynamic and self-evident. Emerging technology is already allowing Japanese consumers to use their mobile phones to scan various product bar codes to download useful information such as nutritional information from McDonald's hamburgers, house details from real estate sales signs, movie trailers from outdoor billboards, expiration dates and source farm names on meat and eggs, and ticketless air travel using the phone as the key to board [58]. With a Web tool such as this, consumers who have completed a self-assessed energy audit and/or had the details of their home updated via an authorized third party could be offered extremely tailored feedback from product manufacturers, retail stores, and green building rating systems. Theoretically, if product bar codes included detailed information about a product's manufacture and performance characteristics, a consumer walking the aisles of a home improvement store might be able to use their mobile phone to scan the codes and evaluate the projected energy and water performance benefits of a particular product according to their home's unique characteristics.

Furthermore, the potential rebates or other incentives that could be realized by installing a particular product or technology could be tagged to the product's bar code as well. Even the Tier Three independent certifying agents could be provided with a process for smoothing the reporting and tracking of energy efficient retrofits by scanning bar codes of energy efficient products, signing off that these products have been installed, and tagging these products to the individual address where they are being used. Incentives might then take the form of a dual benefit where a partial discount is provided at the point of purchase and installation and the remaining discount is only realized when actual performance achieves a specified acceptable percentage of its designed intent. The Web tool could create a platform for creative incentives such as feebate structures rewarding good energy performers and penalizing poor energy performers based on comparable classifications revolving around floating pivot points tied to GHG emissions reduction goals at local, national, and/or international scales.

PEAK OIL AND CLIMATE CHANGE

With the case for Web tool presented and some potential benefits of the tool described, one other critical point must be made. Climate change mitigation will take place in an era of depleting and cost-escalating conventional oil resources. This era will be defined by a global peak in oil production driven by a combination of geology, geopolitics, economics, and uncontrolled energy demand as a result of global population growth. There is the potential for both positive and negative synergies in the success of climate change mitigation depending on how the world collectively responds to this changing paradigm of petroleum.

Peak Oil: Past, Present, and Future

Peak oil, or the point at which maximum rate of oil production is reached followed by terminal decline, originated in 1956 when M. King Hubbert, a Shell geoscientist, accurately predicted the United States domestic oil production would peak around the late 1960s to early 1970s [59]. Peak oil theory applies across scales to individual oil fields, producing countries, and the globe as a whole. A recent report from the U.S. General Accounting Office described the importance and context of oil in the global economy, concluding oil has no known energetic equal in terms of "extractability, transportability, versatility, and cost," has a finite supply, will undergo a voluntary and/or involuntary peak, and will subsequently decline [60, pp. 6-7].

Estimates of global peak oil vary considerably with the "pessimists" projecting an imminent peak and fairly steep decline anytime within the next 1-10 years while the "optimists" project a peak with an extended plateau and slow decline beginning in about 30 years [60-63]. Khebab, a regular contributor to The Oil Drum, regularly provides updates to major international peak oil models dividing production estimates into three categories based on their respective major prediction agencies and individuals as follows [61]:

(1) *Business as usual* (EIA, IEA, CERA) projecting peak oil generally within the 2030-2038 window.

(2) *Bottom-up analysis* (Skrebowski, ASPO, Koppelaar, Bakhtiari, Smith, Robelius, ACE from The Oil Drum) projecting peak oil generally within the 2005-2012 window.

(3) *Curve fitting* (Deffeyes, Laherrere, Hubbert linearization via Staniford, loglet analysis, Generalized Bass Model via Guseo, Shock Model via WebHubbleTelescope from The Oil Drum, Hybrid Shock Model) projecting peak oil generally within the 2005-2018 window.

"Key uncertainties in trying to determine the timing of peak oil are the (1) amount of oil throughout the world; (2) technological, cost, and environmental challenges to produce that oil; (3) political and investment risk factors that may affect oil exploration and production; and (4) future world oil demand." [60] Regardless of these uncertainties and the disagreement in the timing of a global peak in oil production, a U.S. Government sanctioned report concluded a peak oil crash mitigation program would require initiation a minimum of 20 years before the peak occurs in order to avoid a world liquid fuels shortfall and serious economic damage [64].

Only the most optimistic predictions for oil production provide more than a 20 year cushion, but just barely. Every year we delay a mitigation program shrinks the gap. However, some speculate a transition to unconventional oil resources and other fossil energy alternatives (e.g., oil sands, oil shale, and coal liquefaction) may negate the peak in global conventional oil production [65, 66]. Although this perspective raises increasingly difficult questions about our ability to mitigate climate change as discussed in the next section. Unfortunately, recent trends news stories seem to reinforce the pessimists projections for a near term peak within the 2005-2018 window with many influential leaders in the energy and transportation industries extolling the virtues of conservation and efficiency improvements [67-72].

Why Peak Oil Matters to Building Energy Efficiency and Climate Change Mitigation

The building and transport sectors currently utilize separate energy resources. The global transportation sector is almost entirely (i.e., > 95%) petroleum based [60, 73]. More specifically, the transportation sector accounts for approximately two-thirds of all U.S. petroleum consumption with approximately 60% of transportation uses coming from light vehicles [60, pp. 9-10]. Conversely, the U.S. building sector is reliant on utility-based electricity from a mix of fuels with approximately 49% coal, 20% natural gas, 19% nuclear, 7% hydroelectric, <3% other renewables, and <2% petroleum [73].

Future climate change and peak oil mitigation strategies may lead to competition for common energy sources between the transportation and building sectors through both direct and indirect means [64, 66, 74]. Direct competition may include grid connected light rail, plug-in hybrid electric vehicles, hydrogen fuel production via electrolysis, and other means. Indirect competition may include synthetic liquid transportation fuels derived from coal liquefaction, oil sands (whose production requires significant energetic inputs such as natural gas), and other processes that use energy resources previously used primarily in the generation of electricity for building operation.

A recent energy and climate change policy paper for the Garnaut Climate Change Review, an independent study commissioned by Australia's State and Territory Governments, projects the electrification of the transportation sector to result in "a currently unforeseen 20 – 50% addition to [Australian] national electricity demand by 2030" [74, p. 2]. Furthermore, Farrell & Brandt [66, p. 5] state:

> "the oil transition brings more long-term environmental concerns than long-term economic or security threats because tradeoffs have strong potential to be resolved by accepting increased environmental damage in order to avoid economic or security risks...other technologies could also diversify the supply of transportation energy such as advanced, environmentally friendly biofuels; hydrogen; or partially or fully electric vehicles utilizing low carbon electricity (possibly including fossil fuels plus CCS [carbon capture and storage], renewables, or nuclear power). Demand reduction, through fuel efficiency and better transportation planning should also play a role. These other approaches have their own challenges, but at least they do not have the climate change risks of fossil SCPs [substitutes for conventional petroleum]."

Taking a lowest cost and/or SCPs approach to mitigating peak oil without considering the environmental impacts at local, regional, and international scales will only hinder the worldwide effort to mitigate climate change [65, 66]. Simultaneously, mitigating climate change without considering the need for a rapid response to peak oil and the dynamics of the global petroleum industry will only place nation-states and individual households at economic risk as oil resources become more expensive and less available. The increasing politicization of this oil transition may even facilitate and accelerate global military conflict.

The near term focus on mitigating each challenge should be in technologies and strategies that have dual benefits for both challenges. Energy efficiency in the building sector offers these dual benefits by reducing the use of fossil fuels to heat, cool, and light buildings while simultaneously creating an opportunity for the transportation sector to move toward grid-based electrification. The horizontal infrastructure corollary to energy efficiency in the vertical built environment includes urban planning and design elements that foster walkable communities with multi-modal transportation options. Though not discussed in this paper, the visualization and cultural norming of these multi-modal design elements may also be incorporated into the proposed energy efficiency Web tool. Additional synergies such as utility peak load shaving may be realized as the transportation sector moves toward electrification and vehicle batteries are available for charging off-peak and discharging on-peak. No matter how the issues are approached, the climate change and peak oil challenges along with our potential to mitigate both are as inseparable as building science and social science are to successfully implementing energy efficiency strategies.

CONCLUSION

This paper aims to make a case for infusing building energy and water consumptive use data into a Web-based geospatial building performance and social marketing tool designed to foster energy efficiency in residential dwellings in a completely transparent interface. In making this case and describing some potential benefits of the tool, attention is mostly paid to the potential positive implications of a Web tool of

this type. It is important to note that there are also potential negative implications, or at least critical challenges, to be evaluated such as utility database standardization, personal privacy, confidentiality, and the legality of making this data transparent and tagged to its unique address [75]. However, it is the belief of this paper's author that these challenges are not insurmountable and that the risks of failing to dramatically accelerate the depth and breadth of energy efficiency in the existing and future U.S. building infrastructure far exceed the risks posed by these challenges.

As described in this paper, the building sector is one of the most significant contributors to anthropogenic climate change, especially so in the United States. Yet within the problem of the built environment, a solution also awaits. Over the next 50 years the full realization of the potential for energy efficiency in both commercial and residential buildings worldwide could lead to between two and three of the eight mitigation wedges described by Pacala and Socolow as necessary to stabilize the climate [11]. This potential is limited not by technology, nor by cost, but by the very behaviors of the building occupants and the building professionals who perpetuate vast energy inefficiencies in our building stock.

Thus far, behavior change campaigns have failed to achieve the desired energy efficiency improvements. This paper describes why these campaigns appear to be failing and one pathway to improve their rate of success. The central tenet of this pathway involves the public release of the all-too-often private building performance data. This proposed data transparency would improve energy modeling tools and green building rating systems, catalyze behavior change, improve carbon inventories, and facilitate the use and verification of carbon market products based on building energy efficiency. These benefits would not arise out of merely publishing the data in a transparent manner, but as a result of an ever-evolving interdisciplinary collaboration and social marketing process founded upon a Web platform inspired by the Web 2.0 meme. The need for this Web tool and its potential to accelerate climate change mitigation via energy efficiency of the building sector is magnified by the synergistic challenge of peak oil. Ultimately, the building sector and the transportation sector are inexplicably united in a built environment only as good as the people who live, work, play, and move within its space.

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have made possible a basic beta version of this Web tool that we all hope will serve as a catalyst for collaboration and change.

DISCLAIMER

Though this paper offers many unique insights specific to the presentation given at the U.S. EPA's 17th International Emission Inventory Conference, it is based upon, and in many places, excerpted verbatim from three major sources as follows below. Unless otherwise noted, all verbatim excerpts from these three sources were written by the author of this paper in their original sources.

1. Knowles, H., C. Manning, and T.T. Ankersen, *Climate change, peak oil, and greenhouse gas emissions reductions: Mitigating the convergence via energy efficiency in the built environment*, in *University of Florida Levin College of Law: Conservation Clinic Papers and Work Products*. 2008: Gainesville, FL. p. 44. http://www.law.ufl.edu/conservation/pdf/EmissionsReductions.pdf
2. Unawarded grant proposal (February 2008). American Public Power Association (APPA) Demonstration of Energy-Efficient Developments (DEED) Grant Program. Proposed Project Title: *Establishment of Interdisciplinary Consortium and Development of Geospatial Building Performance Web Tool for Tailoring Demand-Side Management Social Marketing and Tracking GHG Emissions for Carbon Market White Tags*^{TM}.
3. Unawarded grant proposal (August 2007). U.S. EPA RFP No.: EPA-OAR-CPPD-07-08. RFP Title: Market-Based Approaches to Reducing Greenhouse Gas Emissions Through Energy Efficiency in Homes and Buildings. Proposed Project Title: *A Performance-Based Online Social Marketing and Mapping Tool: Changing Community Norms for Household Greenhouse Gas Emissions*.

KEYWORDS
Behavior change; building performance feedback; community-based social marketing; climate change mitigation; energy efficiency; geospatial; greenhouse gas emissions tracking; peak oil; transparency, Web 2.0

Exhibit 5

Under the California Environmental Quality Act (CEQA), local agencies have a very important role to play in California's fight against global warming – one of the most serious environmental effects facing the State today. Local agencies can lead by example in undertaking their own projects, insuring that sustainability is considered at the earliest stages. Moreover, they can help shape private development. Where a project as proposed will have significant global warming related effects, local agencies can require feasible changes or alternatives, and impose enforceable, verifiable, feasible mitigation to substantially lessen those effects. By the sum of their actions and decisions, local agencies will help to move the State away from "business as usual" and toward a low-carbon future.

Included in this document are various measures that may reduce the global warming related impacts at the individual project level. (For more information on actions that local governments can take at the program and general plan level, please visit the Attorney General's webpage, "CEQA, Global Warming, and General Plans" at http://ag.ca.gov/globalwarming/ceqa/generalplans.php.)

As appropriate, the measures can be included as design features of a project, required as changes to the project, or imposed as mitigation (whether undertaken directly by the project proponent or funded by mitigation fees). The measures set forth in this package are examples; the list is not intended to be exhaustive. Moreover, the measures cited may not be appropriate for every project. The decision of whether to approve a project – as proposed or with required changes or mitigation – is for the local agency, exercising its informed judgment in compliance with the law and balancing a variety of public objectives.

Mitigation Measures by Category

Energy Efficiency

Incorporate green building practices and design elements.	The California Department of Housing and Community Development's Green Building & Sustainability Resources handbook provides extensive links to green building resources. The handbook is available at http://www.hcd.ca.gov/hpd/green_build.pdf. The American Institute of Architects (AIA) has compiled fifty readily available strategies for reducing fossil fuel use in buildings by fifty percent. AIA "50 to 50" plan is presented in both guidebook and wiki format at http://wiki.aia.org/Wiki%20Pages/Home.aspx.

Meet recognized green building and energy efficiency benchmarks.	For example, an ENERGY STAR-qualified building uses less energy, is less expensive to operate, and causes fewer greenhouse gas emissions than comparable, conventional buildings. http://www.energystar.gov/index.cfm?c=business.bus_index. California has over 1600 ENERGY STAR-qualified school, commercial and industrial buildings. View U.S. EPA's list of Energy Star non-residential buildings at http://www.energystar.gov/index.cfm?fuseaction=labeled_buildings.locator. Los Angeles and San Francisco top the list of U.S. cities with the most ENERGY STAR non-residential buildings. http://www.energystar.gov/ia/business/downloads/2008_Top_25_cities_chart.pdf. Qualified ENERGY STAR homes must surpass the state's Title 24 energy efficiency building code by at least 15%. Los Angeles, Sacramento, San Diego, and San Francisco-Oakland are among the top 20 markets for ENERGY STAR homes nationwide. http://www.energystar.gov/ia/new_homes/mil_homes/top_20_markets.html. Builders of ENERGY STAR homes can be more competitive in a tight market by providing a higher quality, more desirable product. See http://www.energystar.gov/ia/partners/manuf_res/Horton.pdf. There are a variety of private and non-profit green building certification programs in use in the U.S. See U.S. EPA's Green Building / Frequently Asked Questions website, http://www.epa.gov/greenbuilding/pubs/faqs.htm. Public-Private Partnership for Advancing Housing Technology maintains a list of national and state Green Building Certification Programs for housing. See http://www.pathnet.org/sp.asp?id=20978. These include the national Leadership in Energy and Environmental Design (LEED) program, and, at the state level, Build it Green's GreenPoint Rated system and the California Green Builder program. Other organizations may provide other relevant benchmarks.
Install energy efficient lighting (e.g., light emitting diodes (LEDs)), heating and cooling systems, appliances, equipment, and control systems.	Information about ENERGY STAR-certified products in over 60 categories is available at http://www.energystar.gov/index.cfm?fuseaction=find_a_product. The California Energy Commission maintains a database of all appliances meeting either federal efficiency standards or, where there are no federal efficiency standards, California's appliance efficiency standards. See http://www.appliances.energy.ca.gov/. The Electronic Product Environmental Assessment Tool (EPEAT) ranks computer products based on a set of environmental criteria, including energy efficiency. See http://www.epeat.net/AboutEPEAT.aspx. The nonprofit American Council for an Energy Efficient Economy maintains an Online Guide to Energy Efficient Commercial Equipment, available at http://www.aceee.org/ogeece/ch1_index.htm. Utilities offer many incentives for efficient appliances, lighting, heating and cooling. To search for available residential and commercial incentives, visit Flex Your Power's website at http://www.fypower.org/.

Use passive solar design, e.g., orient buildings and incorporate landscaping to maximize passive solar heating during cool seasons, minimize solar heat gain during hot seasons, and enhance natural ventilation. Design buildings to take advantage of sunlight.	See U.S. Department of Energy, Passive Solar Design (website) http://www.energysavers.gov/your_home/designing_remodeling/index.cfm/mytopic=10250. See also California Energy Commission, Consumer Energy Center, Passive Solar Design (website) http://www.consumerenergycenter.org/home/construction/solardesign/index.html. Lawrence Berkeley National Laboratories' Building Technologies Department is working to develop innovative building construction and design techniques. Information and publications on energy efficient buildings, including lighting, windows, and daylighting strategies, are available at the Department's website at http://btech.lbl.gov.
Install light colored "cool" roofs and cool pavements.	A white or light colored roof can reduce surface temperatures by up to 100 degrees Fahrenheit, which also reduces the heat transferred into the building below. This can reduce the building's cooling costs, save energy and reduce associated greenhouse gas emissions, and extend the life of the roof. Cool roofs can also reduce the temperature of surrounding areas, which can improve local air quality. See California Energy Commission, Consumer Energy Center, Cool Roofs (webpage) at http://www.consumerenergycenter.org/coolroof/. See also Lawrence Berkeley National Laboratories, Heat Island Group (webpage) at http://eetd.lbl.gov/HeatIsland/.
Install efficient lighting, (including LEDs) for traffic, street and other outdoor lighting.	LED lighting is substantially more energy efficient than conventional lighting and can save money. See http://www.energy.ca.gov/efficiency/partnership/case_studies/TechAsstCity.pdf (noting that installing LED traffic signals saved the City of Westlake about $34,000 per year). As of 2005, only about a quarter of California's cities and counties were using 100% LEDs in traffic signals. See California Energy Commission (CEC), Light Emitting Diode Traffic Signal Survey (2005) at p. 15, available at http://www.energy.ca.gov/2005publications/CEC 400 2005 003/CEC 400 2005 003.PDF. The California Energy Commission's Energy Partnership Program can help local governments take advantage of energy saving technology, including, but not limited to, LED traffic signals. See http://www.energy.ca.gov/efficiency/partnership/.
Reduce unnecessary outdoor lighting.	See California Energy Commission, Reduction of Outdoor Lighting (webpage) at http://www.energy.ca.gov/efficiency/lighting/outdoor_reduction.html.

Use automatic covers, efficient pumps and motors, and solar heating for pools and spas.	During the summer, a traditional backyard California pool can use enough energy to power an entire home for three months. Efficiency measures can substantially reduce this waste of energy and money. See California Energy Commission, Consumer Energy Center, Pools and Spas (webpage) at http://www.consumerenergycenter.org/home/outside/pools_spas.html. See also Sacramento Municipal Utilities District, Pool and Spa Efficiency Program (webpage) at http://www.smud.org/en/residential/saving-energy/Pages/poolspa.aspx.
Provide education on energy efficiency to residents, customers and/or tenants.	Many cities and counties provide energy efficiency education. See, for example, the City of Stockton's Energy Efficiency website at http://www.stocktongov.com/energysaving/index.cfm. See also "Green County San Bernardino," http://www.greencountysb.com at pp. 4-6. Businesses and development projects may also provide education. For example, a homeowners' association (HOA) could provide information to residents on energy-efficient mortgages and energy saving measures. See The Villas of Calvera Hills, Easy Energy Saving Tips to Help Save Electricity at http://www.thevillashoa.org/green/energy/. An HOA might also consider providing energy audits to its residents on a regular basis.

Renewable Energy and Energy Storage

Meet "reach" goals for building energy efficiency and renewable energy use.	A "zero net energy" building combines building energy efficiency and renewable energy generation so that, on an annual basis, any purchases of electricity or natural gas are offset by clean, renewable energy generation, either on-site or nearby. Both the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC) have stated that residential buildings should be zero net energy by 2020, and commercial buildings by 2030. See CEC, 2009 Integrated Energy Policy Report (Dec. 2009) at p. 226, available at http://www.energy.ca.gov/2009publications/CEC-100-2009-003/CEC-100-2009-003-CMF.PDF; CPUC, Long Term Energy Efficiency Strategic Plan (Sept. 2008), available at http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/.
Install solar, wind, and geothermal power systems and solar hot water heaters.	The California Public Utilities Commission (CPUC) approved the California Solar Initiative on January 12, 2006. The initiative creates a $3.3 billion, ten-year program to install solar panels on one million roofs in the State. Visit the one-stop GoSolar website at http://www.gosolarcalifornia.org/. As mitigation, a developer could, for example, agree to participate in the New Solar Homes program. See http://www.gosolarcalifornia.org/builders/index.html. The CPUC is in the process of establishing a program to provide solar water heating incentives under the California Solar Initiative. For more information, visit the CPUC's website at http://www.cpuc.ca.gov/puc/energy/solar/swh.htm. To search for available residential and commercial renewable energy incentives, visit Flex Your Power's website at http://www.fypower.org/.

Install solar panels on unused roof and ground space and over carports and parking areas.	In 2008 Southern California Edison (SCE) launched the nation's largest installation of photovoltaic power generation modules. The utility plans to cover 65 million square feet of unused commercial rooftops with 250 megawatts of solar technology – generating enough energy to meet the needs of approximately 162,000 homes. Learn more about SCE's Solar Rooftop Program at http://www.sce.com/solarleadership/solar-rooftop-program/general-faq.htm. In 2009, Walmart announced its commitment to expand the company's solar power program in California. The company plans to add solar panels on 10 to 20 additional Walmart facilities in the near term. These new systems will be in addition to the 18 solar arrays currently installed at Walmart facilities in California. See http://walmartstores.com/FactsNews/NewsRoom/9091.aspx. Alameda County has installed two solar tracking carports, each generating 250 kilowatts. By 2005, the County had installed eight photovoltaic systems totaling over 2.3 megawatts. The County is able to meet 6 percent of its electricity needs through solar power. See http://www.acgov.org/gsa/Alameda%20County%20-%20Solar%20Case%20Study.pdf. In 2007, California State University, Fresno installed at 1.1-megawatt photovoltaic (PV)-paneled parking installation. The University expects to save more than $13 million in avoided utility costs over the project's 30-year lifespan. http://www.fresnostatenews.com/2007/11/solarwrapup2.htm.
Where solar systems cannot feasibly be incorporated into the project at the outset, build "solar ready" structures.	U.S. Department of Energy, A Homebuilder's Guide to Going Solar (brochure) (2008), available at http://www.eere.energy.gov/solar/pdfs/43076.pdf.
Incorporate wind and solar energy systems into agricultural projects where appropriate.	Wind energy can be a valuable crop for farmers and ranchers. Wind turbines can generate energy to be used on-site, reducing electricity bills, or they can yield lease revenues (as much as $4000 per turbine per year). Wind turbines generally are compatible with rural land uses, since crops can be grown and livestock can be grazed up to the base of the turbine. See National Renewable Energy Laboratory, Wind Powering America Fact Sheet Series, Wind Energy Benefits, available at http://www.nrel.gov/docs/fy05osti/37602.pdf. Solar PV is not just for urban rooftops. For example, the Scott Brothers' dairy in San Jacinto, California, has installed a 55-kilowatt solar array on its commodity barn, with plans to do more in the coming years. See http://www.dairyherd.com/directories.asp?pgID=724&ed_id=8409 (additional California examples are included in article.)

Include energy storage where appropriate to optimize renewable energy generation systems and avoid peak energy use.	See National Renewable Energy Laboratory, Energy Storage Basics (webpage) at http://www.nrel.gov/learning/eds_energy_storage.html. California Energy Storage Alliance (webpage) at http://storagealliance.org/about.html. Storage is not just for large, utility scale projects, but can be part of smaller industrial, commercial and residential projects. For example, Ice Storage Air Conditioning (ISAC) systems, designed for residential and nonresidential buildings, produce ice at night and use it during peak periods for cooling. See California Energy Commission, Staff Report, Ice Storage Air Conditioners, Compliance Options Application (May 2006), available at http://www.energy.ca.gov/2006publications/CEC-400-2006-006/CEC-400-2006-006-SF.PDF.
Use on-site generated biogas, including methane, in appropriate applications.	At the Hilarides Dairy in Lindsay, California, an anaerobic-lagoon digester processes the run-off of nearly 10,000 cows, generating 226,000 cubic feet of biogas per day and enough fuel to run two heavy duty trucks. This has reduced the dairy's diesel consumption by 650 gallons a day, saving the dairy money and improving local air quality. See http://www.arb.ca.gov/newsrel/nr021109b.htm; see also Public Interest Energy Research Program, Dairy Power Production Program, Dairy Methane Digester System, 90-Day Evaluation Report, Eden Vale Dairy (Dec. 2006) at http://www.energy.ca.gov/2006publications/CEC 500 2006 083/CEC 500 2006 083.PDF. Landfill gas is a current and potential source of substantial energy in California. See Tom Frankiewicz, Program Manager, U.S. EPA Landfill Methane Outreach Program, Landfill Gas Energy Potential in California, available at http://www.energy.ca.gov/2009_energypolicy/documents/2009-04-21_workshop/presentations/05-SCS_Engineers_Presentation.pdf. There are many current and emerging technologies for converting landfill methane that would otherwise be released as a greenhouse gas into clean energy. See California Integrated Waste Management Board, Emerging Technologies, Landfill Gas-to-Energy (webpage) at http://www.ciwmb.ca.gov/LEACentral/TechServices/EmergingTech/default.htm.

Use combined heat and power (CHP) in appropriate applications.	Many commercial, industrial, and campus-type facilities (such as hospitals, universities and prisons) use fuel to produce steam and heat for their own operations and processes. Unless captured, much of this heat is wasted. CHP captures waste heat and re-uses it, e.g., for residential or commercial space heating or to generate electricity. See U.S. EPA, Catalog of CHP Technologies at http://www.epa.gov/chp/documents/catalog_of_%20chp_tech_entire.pdf and California Energy Commission, Distributed Energy Resource Guide, Combined Heat and Power (webpage) at http://www.energy.ca.gov/distgen/equipment/chp/chp.html. The average efficiency of fossil-fueled power plants in the United States is 33 percent. By using waste heat recovery technology, CHP systems typically achieve total system efficiencies of 60 to 80 percent. CHP can also substantially reduce emissions of carbon dioxide. http://www.epa.gov/chp/basic/efficiency.html. Currently, CHP in California has a capacity of over 9 million kilowatts. See list of California CHP facilities at http://www.eea-inc.com/chpdata/States/CA.html. The Waste Heat and Carbon Emissions Reduction Act (Assembly Bill 1613 (2007), amended by Assembly Bill 2791 (2008)) is designed to encourage the development of new CHP systems in California with a generating capacity of not more than 20 megawatts. Among other things, the Act requires the California Public Utilities Commission to establish (1) a standard tariff allowing CHP generators to sell electricity for delivery to the grid and (2) a "pay as you save" pilot program requiring electricity corporations to finance the installation of qualifying CHP systems by nonprofit and government entities. For more information, see http://www.energy.ca.gov/wasteheat/.

Water Conservation and Efficiency

Incorporate water-reducing features into building and landscape design.	According to the California Energy Commission, water-related energy use – which includes conveyance, storage, treatment, distribution, wastewater collection, treatment, and discharge – consumes about 19 percent of the State's electricity, 30 percent of its natural gas, and 88 billion gallons of diesel fuel every year. See http://www.energy.ca.gov/2007publications/CEC 999 2007 008/CEC 999 2007 008.PDF. Reducing water use and improving water efficiency can help reduce energy use and greenhouse gas emissions.
Create water-efficient landscapes.	The California Department of Water Resources' updated Model Water Efficient Landscape Ordinance (Sept. 2009) is available at http://www.water.ca.gov/wateruseefficiency/landscapeordinance/technical.cfm. A landscape can be designed from the beginning to use little or no water, and to generate little or no waste. See California Integrated Waste Management Board, Xeriscaping (webpage) at http://www.ciwmb.ca.gov/organics/Xeriscaping/.

Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls and use water-efficient irrigation methods.	U.S. Department of Energy, Best Management Practice: Water-Efficient Irrigation (webpage) at http://www1.eere.energy.gov/femp/program/waterefficiency_bmp5.html. California Department of Water Resources, Landscape Water Use Efficiency (webpage) at http://www.water.ca.gov/wateruseefficiency/landscape/. Pacific Institute, More with Less: Agricultural Water Conservation and Efficiency in California (2008), available at http://www.pacinst.org/reports/more_with_less_delta/index.htm.
Make effective use of graywater. (Graywater is untreated household waste water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines. Graywater to be used for landscape irrigation.)	California Building Standards Commission, 2008 California Green Building Standards Code, Section 604, pp. 31-32, available at http://www.documents.dgs.ca.gov/bsc/2009/part11_2008_calgreen_code.pdf. California Department of Water Resources, Dual Plumbing Code (webpage) at http://www.water.ca.gov/recycling/DualPlumbingCode/. See also Ahwahnee Water Principles, Principle 6, at http://www.lgc.org/ahwahnee/h2o_principles.html. The Ahwahnee Water Principles have been adopted by City of Willits, Town of Windsor, Menlo Park, Morgan Hill, Palo Alto, Petaluma, Port Hueneme, Richmond, Rohnert Park, Rolling Hills Estates, San Luis Obispo, Santa Paula, Santa Rosa, City of Sunnyvale, City of Ukiah, Ventura, Marin County, Marin Municipal Water District, and Ventura County.
Implement low-impact development practices that maintain the existing hydrology of the site to manage storm water and protect the environment.	Retaining storm water runoff on-site can drastically reduce the need for energy-intensive imported water at the site. See U.S. EPA, Low Impact Development (webpage) at http://www.epa.gov/nps/lid/. Office of Environmental Health Hazard Assessment and the California Water and Land Use Partnership, Low Impact Development at http://www.coastal.ca.gov/nps/lid-factsheet.pdf.
Devise a comprehensive water conservation strategy appropriate for the project and location.	The strategy may include many of the specific items listed above, plus other innovative measures that are appropriate to the specific project.
Design buildings to be water-efficient. Install water-efficient fixtures and appliances.	Department of General Services, Best Practices Manual, Water-Efficient Fixtures and Appliances (website) at http://www.green.ca.gov/EPP/building/SaveH2O.htm. Many ENERGY STAR products have achieved their certification because of water efficiency. See California Energy Commission's database, available at http://www.appliances.energy.ca.gov/.

Offset water demand from new projects so that there is no net increase in water use.	For example, the City of Lompoc has a policy requiring new development to offset new water demand with savings from existing water users. See http://www.cityoflompoc.com/utilities/pdf/2005_uwmp_final.pdf at p. 29.
Provide education about water conservation and available programs and incentives.	See, for example, the City of Santa Cruz, Water Conservation Office at http://www.ci.santa-cruz.ca.us/index.aspx?page=395; Santa Clara Valley Water District, Water Conservation at http://www.valleywater.org/conservation/index.shtm; and Metropolitan Water District and the Family of Southern California Water Agencies, Be Water Wise at http://www.bewaterwise.com. Private projects may provide or fund similar education.

Solid Waste Measures

Reuse and recycle construction and demolition waste (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard).	Construction and demolition materials account for almost 22 percent of the waste stream in California. Reusing and recycling these materials not only conserves natural resources and energy, but can also save money. For a list of best practices and other resources, see California Integrated Waste Management Board, Construction and Demolition Debris Recycling (webpage) at http://www.ciwmb.ca.gov/condemo/.
Integrate reuse and recycling into residential industrial, institutional and commercial projects.	Tips on developing a successful recycling program, and opportunities for cost-effective recycling, are available on the California Integrated Waste Management Board's Zero Waste California website. See http://zerowaste.ca.gov/. The Institute for Local Government's Waste Reduction & Recycling webpage contains examples of "best practices" for reducing greenhouse gas emissions, organized around waste reduction and recycling goals and additional examples and resources. See http://www.ca-ilg.org/wastereduction.
Provide easy and convenient recycling opportunities for residents, the public, and tenant businesses.	Tips on developing a successful recycling program, and opportunities for cost effective recycling, are available on the California Integrated Waste Management Board's Zero Waste California website. See http://zerowaste.ca.gov/.
Provide education and publicity about reducing waste and available recycling services.	Many cities and counties provide information on waste reduction and recycling. See, for example, the Butte County Guide to Recycling at http://www.recyclebutte.net. The California Integrated Waste Management Board's website contains numerous publications on recycling and waste reduction that may be helpful in devising an education project. See http://www.ciwmb.ca.gov/Publications/default.asp?cat=13. Private projects may also provide waste and recycling education directly, or fund education.

Land Use Measures

Ensure consistency with "smart growth" principles – mixed-use, infill, and higher density projects that provide alternatives to individual vehicle travel and promote the efficient delivery of services and goods.	U.S. EPA maintains an extensive Smart Growth webpage with links to examples, literature and technical assistance, and financial resources. See http://www.epa.gov/smartgrowth/index.htm. The National Oceanic and Atmospheric Administration's webpage provides smart growth recommendations for communities located near water. See Coastal & Waterfront Smart Growth (webpage) at http://coastalsmartgrowth.noaa.gov/. The webpage includes case studies from California. The California Energy Commission has recognized the important role that land use can play in meeting our greenhouse gas and energy efficiency goals. The agency's website, Smart Growth & Land Use Planning, contains useful information and links to relevant studies, reports, and other resources. See http://www.energy.ca.gov/landuse/. The Metropolitan Transportation Commission's webpage, Smart Growth / Transportation for Livable Communities, includes resources that may be useful to communities in the San Francisco Bay Area and beyond. See http://www.mtc.ca.gov/planning/smart_growth/. The Sacramento Area Council of Governments (SACOG) has published examples of smart growth in action in its region. See Examples from the Sacramento Region of the Seven Principles of Smart Growth / Better Ways to Grow, available at http://www.sacog.org/regionalfunding/betterways.pdf.
Meet recognized "smart growth" benchmarks.	For example, the LEED for Neighborhood Development (LEED-ND) rating system integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design. LEED-ND is a collaboration among the U.S. Green Building Council, Congress for the New Urbanism, and the Natural Resources Defense Council. For more information, see http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148.
Educate the public about the many benefits of well-designed, higher density development.	See, for example, U.S. EPA, Growing Smarter, Living Healthier: A Guide to Smart Growth and Active Aging (webpage), discussing how compact, walkable communities can provide benefits to seniors. See http://www.epa.gov/aging/bhc/guide/index.html. U.S. EPA, Environmental Benefits of Smart Growth (webpage) at http://www.epa.gov/dced/topics/eb.htm (noting local air and water quality improvements). Centers for Disease Control and Prevention (CDC), Designing and Building Healthy Places (webpage), at http://www.cdc.gov/healthyplaces/. The CDC's website discusses the links between walkable communities and public health and includes numerous links to educational materials. California Department of Housing and Community Development, Myths and Facts About Affordable and High Density Housing (2002), available at http://www.hcd.ca.gov/hpd/mythsnfacts.pdf.

Incorporate public transit into the project's design.	Federal Transit Administration, Transit-Oriented Development (TOD) (webpage) at http://www.fta.dot.gov/planning/planning_environment_6932.html (describing the benefits of TOD as "social, environmental, and fiscal.") California Department of Transportation (Caltrans), Statewide Transit-Oriented Development Study: Factors for Success in California (2002), available at http://transitorienteddevelopment.dot.ca.gov/miscellaneous/StatewideTOD.htm Caltrans, California Transit-Oriented Development Searchable Database (includes detailed information on numerous TODs), available at http://transitorienteddevelopment.dot.ca.gov/miscellaneous/NewHome.jsp. California Department of Housing and Community Development, Transit Oriented Development (TOD) Resources (Aug. 2009), available at http://www.hcd.ca.gov/hpd/tod.pdf.
Preserve and create open space and parks. Preserve existing trees, and plant replacement trees at a set ratio.	U.S. EPA, Smart Growth and Open Space Conservation (webpage) at http://www.epa.gov/dced/openspace.htm.
Develop "brownfields" and other underused or defunct properties near existing public transportation and jobs.	U.S. EPA, Smart Growth and Brownfields (webpage) at http://www.epa.gov/dced/brownfields.htm. For example, as set forth in the Local Government Commission's case study, the Town of Hercules, California reclaimed a 426-acre brownfield site, transforming it into a transit-friendly, walkable neighborhood. See http://www.lgc.org/freepub/docs/community_design/fact_sheets/er_case_studies.pdf. For financial resources that can assist in brownfield development, see Center for Creative Land Recycling, Financial Resources for California Brownfields (July 2008), available at http://www.cclr.org/media/publications/8-Financial_Resources_2008.pdf.
Include pedestrian and bicycle facilities within projects and ensure that existing non-motorized routes are maintained and enhanced.	See U.S. Department of Transportation, Federal Highway Administration, Bicycle and Pedestrian Program (webpage) at http://www.fhwa.dot.gov/environment/bikeped/. Caltrans, Pedestrian and Bicycle Facilities in California / A Technical Reference and Technology Transfer Synthesis for Caltrans Planners and Engineers (July 2005), available at http://www.dot.ca.gov/hq/traffops/survey/pedestrian/TR_MAY0405.pdf. This reference includes standard and innovative practices for pedestrian facilities and traffic calming.

Transportation and Motor Vehicles

Meet an identified transportation-related benchmark.	A logical benchmark might be related to vehicles miles traveled (VMT), e.g., average VMT per capita, per household, or per employee. As the California Energy Commission has noted, VMT by California residents increased "a rate of more than 3 percent a year between 1975 and 2004, markedly faster than the population growth rate over the same period, which was less than 2 percent. This increase in VMT correlates to an increase in petroleum use and GHG production and has led to the transportation sector being responsible for 41 percent of the state's GHG emissions in 2004." CEC, The Role of Land Use in Meeting California's Energy and Climate Change Goals (Aug. 2007) at p. 9, available at http://www.energy.ca.gov/2007publications/CEC-600-2007-008/CEC-600-2007-008-SF.PDF. Even with regulations designed to increase vehicle efficiency and lower the carbon content of fuel, "reduced VMT growth will be required to meet GHG reductions goals." *Id.* at p. 18.
Adopt a comprehensive parking policy that discourages private vehicle use and encourages the use of alternative transportation.	For example, reduce parking for private vehicles while increasing options for alternative transportation; eliminate minimum parking requirements for new buildings; "unbundle" parking (require that parking is paid for separately and is not included in rent for residential or commercial space); and set appropriate pricing for parking. See U.S. EPA, Parking Spaces / Community Places, Finding the Balance Through Smart Growth Solutions (Jan. 2006), available at http://www.epa.gov/dced/pdf/EPAParkingSpaces06.pdf. Reforming Parking Policies to Support Smart Growth, Metropolitan Transportation Commission (June 2007) at http://www.mtc.ca.gov/planning/smart_growth/parking_seminar/Toolbox_Handbook.pdf. See also the City of Ventura's Downtown Parking and Mobility Plan, available at http://www.cityofventura.net/community_development/resources/mobility_parking_plan.pdf, and Ventura's Downtown Parking Management Program, available at http://www.ci.ventura.ca.us/depts/comm_dev/downtownplan/chapters.asp.
Build or fund a major transit stop within or near the development.	"'Major transit stop' means a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods." (Pub. Res. Code, § 21064.3.) Transit Oriented Development (TOD) is a moderate to higher density development located within an easy walk of a major transit stop. http://transitorienteddevelopment.dot.ca.gov/miscellaneous/NewWhatisTOD.htm. By building or funding a major transit stop, an otherwise ordinary development can become a TOD.

Provide public transit incentives such as free or low-cost monthly transit passes to employees, or free ride areas to residents and customers.	See U.S. Department of Transportation and U.S. EPA, Commuter Choice Primer / An Employer's Guide to Implementing Effective Commuter Choice Programs, available at http://www.its.dot.gov/JPODOCS/REPTS_PR/13669.html. The Emery Go Round shuttle is a private transportation service funded by commercial property owners in the citywide transportation business improvement district. The shuttle links a local shopping district to a Bay Area Rapid Transit stop. See http://www.emerygoround.com/. Seattle, Washington maintains a public transportation "ride free" zone in its downtown from 6:00 a.m. to 7:00 p.m. daily. See http://transit.metrokc.gov/tops/accessible/paccessible_map.html#fare.
Promote "least polluting" ways to connect people and goods to their destinations.	Promoting "least polluting" methods of moving people and goods is part of a larger, integrated "sustainable streets" strategy now being explored at U.C. Davis's Sustainable Transportation Center. Resources and links are available at the Center's website, http://stc.ucdavis.edu/outreach/ssp.php.
Incorporate bicycle lanes, routes and facilities into street systems, new subdivisions, and large developments.	Bicycling can have a profound impact on transportation choices and air pollution reduction. The City of Davis has the highest rate of bicycling in the nation. Among its 64,000 residents, 17 percent travel to work by bicycle and 41 percent consider the bicycle their primary mode of transportation. See Air Resources Board, Bicycle Awareness Program, Bicycle Fact Sheet, available at http://www.arb.ca.gov/planning/tsaq/bicycle/factsht.htm. For recommendations on best practices, see the many resources listed at the U.S. Department of Transportation, Federal Highway Administration's Bicycle and Pedestrian website at http://www.fhwa.dot.gov/environment/bikeped/publications.htm. See also Caltrans Division of Research and Innovation, Designing Highway Facilities To Encourage Walking, Biking and Transit (Preliminary Investigation) (March 2009), available at http://www.dot.ca.gov/research/researchreports/preliminary_investigations/docs/pi-design_for_walking_%20biking_and_transit%20final.pdf.
Require amenities for non-motorized transportation, such as secure and convenient bicycle parking.	According to local and national surveys of potential bicycle commuters, secure bicycle parking and workplace changing facilities are important complements to safe and convenient routes of travel. See Air Resources Board, Bicycle Awareness Program, Bicycle Fact Sheet, available at http://www.arb.ca.gov/planning/tsaq/bicycle/factsht.htm.

Ensure that the project enhances, and does not disrupt or create barriers to, non-motorized transportation.	See, e.g., U.S. EPA's list of transit-related "smart growth" publications at http://www.epa.gov/dced/publications.htm#air, including Pedestrian and Transit-Friendly Design: A Primer for Smart Growth (1999), available at www.epa.gov/dced/pdf/ptfd_primer.pdf. See also Toolkit for Improving Walkability in Alameda County, available at http://www.acta2002.com/ped toolkit/ped_toolkit_print.pdf. Pursuant to the California Complete Streets Act of 2008 (AB 1358, Gov. Code, §§ 65040.2 and 65302), commencing January 1, 2011, upon any substantive revision of the circulation element of the general plan, a city or county will be required to modify the circulation element to plan for a balanced, multimodal transportation network that meets the needs of all users.
Connect parks and open space through shared pedestrian/bike paths and trails to encourage walking and bicycling. Create bicycle lanes and walking paths directed to the location of schools, parks and other destination points.	Walk Score ranks the "walkability" of neighborhoods in the largest 40 U.S. cities, including seven California cities. Scores are based on the distance to nearby amenities. Explore Walk Score at http://www.walkscore.com/. In many markets, homes in walkable neighborhoods are worth more than similar properties where walking is more difficult. See Hoak, *Walk appeal / Homes in walkable neighborhoods sell for more: study*, Wall Street Journal (Aug. 18, 2009), available at http://www.marketwatch.com/story/homes-in-walkable-neighborhoods-sell-for-more-2009-08-18. By creating walkable neighborhoods with more transportation choices, Californians could save $31 million and cut greenhouse gas emissions by 34 percent, according to a study released by Transform, a coalition of unions and nonprofits. See Windfall for All / How Connected, Convenient Neighborhoods Can Protect Our Climate and Safeguard California's Economy (Nov. 2009), available at http://transformca.org/windfall-for-all#download-report.
Work with the school districts to improve pedestrian and bike access to schools and to restore or expand school bus service using lower-emitting vehicles.	In some communities, twenty to twenty-five percent of morning traffic is due to parents driving their children to school. Increased traffic congestion around schools in turn prompts even more parents to drive their children to school. Programs to create safe routes to schools can break this harmful cycle. See California Department of Public Health, Safe Routes to School (webpage) and associated links at http://www.cdph.ca.gov/HealthInfo/injviosaf/Pages/SafeRoutestoSchool.aspx. See also U.S. EPA, Smart Growth and Schools (webpage), available at http://www.epa.gov/dced/schools.htm. California Center for Physical Activity, California Walk to School (website) at http://www.cawalktoschool.com Regular school bus service (using lower-emitting buses) for children who cannot bike or walk to school could substantially reduce private vehicle congestion and air pollution around schools. See Air Resources Board, Lower Emissions School Bus Program (webpage) at http://www.arb.ca.gov/msprog/schoolbus/schoolbus.htm.

Institute teleconferencing, telecommute and/or flexible work hour programs to reduce unnecessary employee transportation.	There are numerous sites on the web with resources for employers seeking to establish telework or flexible work programs. These include U.S. EPA's Mobility Management Strategies: Commuter Programs website at http://www.epa.gov/otaq/stateresources/rellinks/mms_commprograms.htm; and Telework, the federal government's telework website, at http://www.telework.gov/. Through a continuing FlexWork Implementation Program, the Traffic Solutions division of the Santa Barbara County Association of Governments sponsors flexwork consulting, training and implementation services to a limited number of Santa Barbara County organizations that want to create or expand flexwork programs for the benefit of their organizations, employees and the community. See http://www.flexworksb.com/read_more_about_the_fSBp.html. Other local government entities provide similar services.
Provide information on alternative transportation options for consumers, residents, tenants and employees to reduce transportation-related emissions.	Many types of projects may provide opportunities for delivering more tailored transportation information. For example, a homeowner's association could provide information on its website, or an employer might create a Transportation Coordinator position as part of a larger Employee Commute Reduction Program. See, e.g., South Coast Air Quality Management District, Transportation Coordinator training, at http://www.aqmd.gov/trans/traing.html.
Educate consumers, residents, tenants and the public about options for reducing motor vehicle-related greenhouse gas emissions. Include information on trip reduction; trip linking; vehicle performance and efficiency (e.g., keeping tires inflated); and low or zero-emission vehicles.	See, for example U.S. EPA, SmartWay Transport Partnership: Innovative Carrier Strategies (webpage) at http://www.epa.gov/smartway/transport/what-smartway/carrier-strategies.htm. This webpage includes recommendations for actions that truck and rail fleets can take to make ground freight more efficient and cleaner. The Air Resources Board's Drive Clean website is a resource for car buyers to find clean and efficient vehicles. The web site is designed to educate Californians that pollution levels range greatly between vehicles. See http://www.driveclean.ca.gov/. The Oregon Department of Transportation and other public and private partners launched the Drive Less/Save More campaign. The comprehensive website contains fact sheets and educational materials to help people drive more efficiently. See http://www.drivelesssavemore.com/.
Purchase, or create incentives for purchasing, low or zero-emission vehicles.	See Air Resources Board, Low-Emission Vehicle Program (webpage) at http://www.arb.ca.gov/msprog/levprog/levprog.htm. Air Resource Board, Zero Emission Vehicle Program (webpage) at http://www.arb.ca.gov/msprog/zevprog/zevprog.htm. All new cars sold in California are now required to display an Environmental Performance (EP) Label, which scores a vehicle's global warming and smog emissions from 1 (dirtiest) to 10 (cleanest). To search and compare vehicle EP Labels, visit www.DriveClean.ca.gov.

Create a ride sharing program. Promote existing ride sharing programs e.g., by designating a certain percentage of parking spaces for ride sharing vehicles, designating adequate passenger loading and unloading for ride sharing vehicles, and providing a web site or message board for coordinating rides.	For example, the 511 Regional Rideshare Program is operated by the Metropolitan Transportation Commission (MTC) and is funded by grants from the Federal Highway Administration, U.S. Department of Transportation, the Metropolitan Transportation Commission, the Bay Area Air Quality Management District and county congestion management agencies. For more information, see http://rideshare.511.org/. As another example, San Bernardino Associated Governments works directly with large and small employers, as well as providing support to commuters who wish to share rides or use alternative forms of transportation. See http://www.sanbag.ca.gov/commuter/rideshare.html. Valleyrides.com is a ridesharing resource available to anyone commuting to and from Fresno and Tulare Counties and surrounding communities. See http://www.valleyrides.com/. There are many other similar websites throughout the state.
Create or accommodate car sharing programs, e.g., provide parking spaces for car share vehicles at convenient locations accessible by public transportation.	There are many existing car sharing companies in California. These include City CarShare (San Francisco Bay Area), see http://www.citycarshare.org/; and Zipcar, see http://www.zipcar.com/. Car sharing programs are being successfully used on many California campuses.
Provide a vanpool for employees.	Many local Transportation Management Agencies can assist in forming vanpools. See, for example, Sacramento Transportation Management Association, Check out Vanpooling (webpage) at http://www.sacramento-tma.org/vanpool.html.
Create local "light vehicle" networks, such as neighborhood electric vehicle systems.	See California Energy Commission, Consumer Energy Center, Urban Options - Neighborhood Electric Vehicles (NEVs) (webpage) at http://www.consumerenergycenter.org/transportation/urban_options/nev.html. The City of Lincoln has an innovative NEV program. See http://www.lincolnev.com/index.html.
Enforce and follow limits idling time for commercial vehicles, including delivery and construction vehicles.	Under existing law, diesel-fueled motor vehicles with a gross vehicle weight rating greater than 10,000 pounds are prohibited from idling for more than 5 minutes at any location. The minimum penalty for an idling violation is now $300 per violation. See http://www.arb.ca.gov/enf/complaints/idling_cv.htm.
Provide the necessary facilities and infrastructure to encourage the use of low or zero-emission vehicles.	For a list of existing alternative fuel stations in California, visit http://www.cleancarmaps.com/. See, e.g., Baker, *Charging-station network built along 101*, S.F. Chron. (9/23/09), available at http://articles.sfgate.com/2009-09-23/news/17207424_1_recharging-solar-array-tesla-motors.

Agriculture and Forestry (additional strategies noted above)

Require best management practices in agriculture and animal operations to reduce emissions, conserve energy and water, and utilize alternative energy sources, including biogas, wind and solar.	Air Resources Board (ARB), Economic Sectors Portal, Agriculture (webpage) at http://www.arb.ca.gov/cc/ghgsectors/ghgsectors.htm. ARB's webpage includes information on emissions from manure management, nitrogen fertilizer, agricultural offroad equipment, and agricultural engines. "A full 90% of an agricultural business' electricity bill is likely associated with water use. In addition, the 8 million acres in California devoted to crops consume 80% of the total water pumped in the state." See Flex Your Power, Agricultural Sector (webpage) at http://www.fypower.org/agri/. Flex Your Power, Best Practice Guide / Food and Beverage Growers and Processors, available at http://www.fypower.org/bpg/index.html?b=food_and_bev. Antle et al., Pew Center on Global Climate Change, Agriculture's Role in Greenhouse Gas Mitigation (2006), available at http://www.pewclimate.org/docUploads/Agriculture's%20Role%20in%20GHG%20Mitigation.pdf.
Preserve forested areas, agricultural lands, wildlife habitat and corridors, wetlands, watersheds, groundwater recharge areas and other open space that provide carbon sequestration benefits.	"There are three general means by which agricultural and forestry practices can reduce greenhouse gases: (1) avoiding emissions by maintaining existing carbon storage in trees and soils; (2) increasing carbon storage by, e.g., tree planting, conversion from conventional to conservation tillage practices on agricultural lands; (3) substituting bio-based fuels and products for fossil fuels, such as coal and oil, and energy-intensive products that generate greater quantities of CO2 when used." U.S. EPA, Carbon Sequestration in Agriculture and Forestry, Frequently Asked Questions (webpage) at http://www.epa.gov/sequestration/faq.html. Air Resources Board, Economic Sectors Portal, Forestry (webpage) at http://www.arb.ca.gov/cc/ghgsectors/ghgsectors.htm.
Protect existing trees and encourage the planting of new trees. Adopt a tree protection and replacement ordinance.	Tree preservation and planting is not just for rural areas of the state; suburban and urban forests can also serve as carbon sinks. See Cal Fire, Urban and Community Forestry (webpage) at http://www.fire.ca.gov/resource_mgt/resource_mgt_urbanforestry.php.

Off-Site Mitigation

If, after analyzing and requiring all reasonable and feasible on-site mitigation measures for avoiding or reducing greenhouse gas-related impacts, the lead agency determines that additional mitigation is required, the agency may consider additional off-site mitigation. The project proponent could, for example, fund off-site mitigation projects that will reduce carbon emissions, conduct an audit of its other existing operations and agree to retrofit, or purchase verifiable carbon "credits" from another entity that will undertake mitigation.

The topic of off-site mitigation can be complicated. A full discussion is outside the scope of this summary document. Issues that the lead agency should consider include:

- The location of the off-site mitigation. (If the off-site mitigation is far from the project, any additional, non-climate related co-benefits of the mitigation may be lost to the local community.)

- Whether the emissions reductions from off-site mitigation can be quantified and verified. (The California Registry has developed a number of protocols for calculating, reporting and verifying greenhouse gas emissions. Currently, industry-specific protocols are available for the cement sector, power/utility sector, forest sector and local government operations. For more information, visit the California Registry's website at http://www.climateregistry.org/.)

- Whether the mitigation ratio should be greater than 1:1 to reflect any uncertainty about the effectiveness of the off-site mitigation.

Offsite mitigation measures that could be funded through mitigation fees include, but are not limited to, the following:

- Energy efficiency audits of existing buildings.

- Energy efficiency upgrades to existing buildings not otherwise required by law, including heating, ventilation, air conditioning, lighting, water heating equipment, insulation and weatherization (perhaps targeted to specific communities, such as low-income or senior residents).

- Programs to encourage the purchase and use of energy efficient vehicles, appliances, equipment and lighting.

- Programs that create incentives to replace or retire polluting vehicles and engines.

- Programs to expand the use of renewable energy and energy storage.

- Preservation and/or enhancement of existing natural areas (e.g., forested areas, agricultural lands, wildlife habitat and corridors, wetlands, watersheds, and groundwater recharge areas) that provide carbon sequestration benefits.

- Improvement and expansion of public transit and low- and zero-carbon transportation alternatives.

Exhibit 6

Understanding Environmental Contaminants

Lessons Learned and Guidance to Keep Your Rail-Trail Project on Track

PREPARED BY RAILS-TO-TRAILS CONSERVANCY

Understanding Environmental Contaminants —

Lessons Learned and Guidance to Keep Your Rail-Trail Project on Track

September 24, 2004

TRAILDART
TRAIL DEVELOPMENT ASSISTANCE RESPONSE TEAM

A Service of Rails-to-Trails Conservancy

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MISSION:
The purpose of Rails-to-Trails Conservancy
is to enrich America's communities and countryside
by creating a nationwide network of public trails
from former rail lines and connecting corridors.

Special thanks to

Craig Della Penna, Barbara Richey and Jennifer Simmons,

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PREFACE

LETTER COMING

INTRODUCTION

Throughout Rails-to-Trails Conservancy's (RTC) 18 years of experience, contamination has generally not been an obstacle when developing rail-trails. Communities wishing to convert rail corridors into multi-use paths sometimes find themselves in the difficult position of dealing with known, potential or perceived contamination along a railbed. Questions arise during all phases of trail development, from land acquisition to management. Future trail users may ask about potential exposure at public meetings. Trail opponents may raise concerns about contamination as a means to impede or thwart trail development or property acquisition. Elected officials may fear contaminant clean-up could escalate project costs. Abutters may worry about dust kicked up during construction. Trail managers need answers to questions about contamination to keep projects on track, however no comprehensive source of information existed to aid trail developers in addressing these complex issues.

This report serves as a national resource guide to assist communities in utilizing new and existing brownfield programs to understand and address environmental clean-up issues that may inhibit the conversion of unused rail rights-of-way (ROW) into multi-use trails. RTC's objective was to address brownfield concerns by researching appropriate legal, funding and construction issues related to rail-to-trail conversions. The findings of this research will assist local communities to resolve potentially complex contamination occurrences by employing successful strategies outlined in this report.

To address this problem and provide guidance to communities struggling to convert rail corridors into multi-use trails, this report seeks to answer the following questions:

- What potential contamination may be encountered along rail-lines?
- What steps need to be taken when contamination is found?
- How have other communities effectively addressed the legal, funding and construction issues of a contaminated site?
- What are the federal and state resources available to assist communities as they deal with legal, funding, testing, remediation and construction issues?

To answer these questions, the research team conducted a survey of trail mangers to report the incidence of contamination and any remediation efforts, and case studies were chosen to analyze how other communities have addressed these issues. In the following pages you will also find a review of legal issues, funding sources and other state and federal resources available to trail developers. Finally, guidelines have been provided to the trail developer who must tackle the issue of remediation on a rail corridor.

This national resource guide has been created to aid communities where a potential hazard has been identified. Each rail corridor is unique and contamination may not exist or varies depending on uses of the corridor. However based on the survey conducted for this report – Lexis search on media over the past 20 years and contact with trail managers – Rails-to-Trails Conservancy has found that, overall, potential contamination along a corridor has not hindered the creation of rail-trails.

RAIL-TRAILS – A BACKGROUND

HISTORY OF THE RAIL-TRAIL MOVEMENT

It began in the mid-1960s, quietly, gradually, hesitatingly. There wasn't much fanfare. It was primarily a Midwestern phenomenon, barely noticed in places like Los Angeles, New York or Washington, D.C. People didn't say, "Is that the latest fad?" They said, "That's a really *smart* idea!"

The idea was to convert unused or abandoned rail corridors into public trails. A simple concept, unlike the complex railroad system that was crumbling physically and financially. It didn't require or even claim an inventor. Once the tracks were removed, people naturally started walking along the grades, socializing, exploring, discovering old railroad relics, and marveling at old industrial facilities such as bridges, tunnels, abandoned mills, sidings and switches. In the snows of winter the unconventional outdoor enthusiast skied or snowshoed on the corridor. In the days before even running and all-terrain bicycling were common pastimes, the predominant activity was walking. Of course, none of the corridors were paved or even graded. They were simply abandoned stretches of land.

"Rails-to-Trails" is what people started calling the movement, and the name was catchy and descriptive enough to give the concept a tiny niche in the fledgling environmental movement that was gathering momentum and bracing for huge battles shaping over clean air and water. However, it was destined to move into the mainstream of the conservation and environmental protection. After all, it had all the ingredients: recycling, land conservation, wildlife habitat and historical preservation, non-motorized transportation, physical fitness, recreation access for wheelchair users and numerous other benefits.

In 1965 few Americans understood the national importance of rail-trails. Rails-to-trails was still a highly localized movement. But gradually a realization emerged that America desperately needed a national trails system and that abandoned rail corridors were the perfect backbone for that network. Today, more than 35 years later, rail-trails have begun to make a significant mark, with 12,585 miles of rail-trails and approximately 100 million users per year.

THE VALUE OF RAIL-TRAILS

Rail-trails provide places for cyclists, hikers, walkers, runners, inline skaters, cross-country skiers, equestrians and physically challenged individuals to exercise and experience the many natural and cultural wonders of the nation's urban, suburban and rural environments. Rail-trails not only serve as independent community amenities, they also enhance existing recreation resources by linking neighborhoods and schools to parks, waterfronts, recreation centers and other facilities.

Multiple Recreation Opportunities. Rail corridors are flat or have gentle grades, making them perfect for multiple users, including walkers, inline skaters, bicyclists and people with disabilities. Trails are multimodal and versatile passageways.

Economic Renewal and Growth. Trail users spend money on products and services related to recreational activities. Bicycle and inline skate shops, food stores, hotels and tourist locations report an increase in business as a result of trails. Trail-related businesses spring up in communities with trail, spurring economic growth in the area.

Increased Property Values. Studies have shown that properties on land adjacent to trails and greenways often increase in value. People are willing to pay more money to have a multi-use trail in their

neighborhood. Trails have become an important amenity that homebuyers seek when choosing where to live.

Healthy Living. The U.S. Surgeon General estimates that 60 percent of American adults are not regularly active and 25 percent are not active at all. In communities across the country, people do not have access to trails, parks or other recreation areas close to their homes. Trails and greenways provide safe, inexpensive avenues for regular exercise.

Environmental Protection. Trails and greenways help improve air and water quality. Communities with trails provide enjoyable and safe options for clean transportation, which reduces air pollution. By protecting land along rivers and streams, greenways prevent soil erosion and filter pollution caused by agricultural and road runoff.

Connecting People and Communities. Trails serve as utilitarian transportation corridors between neighborhoods and workplaces. They connect congested urban areas with open space. By bringing people to greenways for their daily commutes, trails unite people and their natural surroundings.

Regional Systems. Bringing trails together to form networks dramatically increases the positive impact trails can have on their communities by creating threads of green linkages within and between communities. Regional trail systems increase the value of the whole by connecting the parts, forming a more cohesive transportation system allowing people to travel to other communities or to work and combine trail use with other forms of transit.

NATIONAL PERSPECTIVE: RAIL-TRAIL CONVERSIONS AND ENVIRONMENTAL CONTAMINATION

LEGACY OF THE RAILROADS

By the beginning of the 20th century railroad transportation was synonymous with industry and success. Having a railroad in town was considered a great status symbol and communities often bid against one another to entice the railroad to come to town. In the United States, railroads reached a peak in total mileage around World War I with approximately 270,000 miles of track. The system has since shrunk to the current total of about 105,000 miles. The collapse of the railroad industry can be generally attributed to the loss of cargo traffic to trucks in the 1950s and loss of passenger traffic to increased automobile travel.

In the early 1980s the rapid abandonment of corridors by railroads and the dismantling of this valuable network set off alarms, and Congress passed an amendment to the National Trails System Act in 1983. This law allowed unneeded rail lines to be "railbanked," or set aside for use in the future as a transportation corridor, while being used as a trail in the interim.

The collapse of the railroad industry has left a network of linear transportation corridors, which if lost today would be difficult, if not impossible, to recreate. While no longer needed for rail use, these important corridors are being recycled and offer communities the opportunity to create multi-use trails. Today, in 2004, we are nearing 13,000 miles of open rail-trails that are used for a variety of purposes including physical activity, recreation and transportation.

RECYCLING RAILROAD CORRIDORS — CONTEXT AND ISSUES

In addition to leaving an intricate network of linear corridors, the railroad industry left contamination associated with its other activities. Discarded materials used by adjacent industries, contamination associated with regular railroad management and repair such as weed control, leaks from material transfers or accidents, loading practices and other instances of contamination may be found in varying degrees along rail corridors, depending on the railroad's management practices and type of industry along the corridor. The type and extent of contamination falls into two general categories, residual contamination that may be found along any stretch of corridor — urban, suburban or rural — and contamination associated with industrial uses along the corridor.

The most common contamination found along rail corridors is residual contamination from railroad operations. The most commonly reported contaminants along rail corridors include arsenic, which was used as an herbicide to control weeds, metals and constituents of oil or fuel (petroleum products), which likely dripped from the rail cars as they passed over the corridor. Other possible

THE GREENBUSH LINE CORRIDOR in Hingham, Mass., was tested for contamination in 2003 as part of a project to reconstruct and re-open this line for commuter rail use, which had previously operated for about 100 years, but was shutdown in 1959. The Massachusetts Bay Transportation Authority collected 622 soil samples along the corridor. A review of that data shows that 11 percent of the samples exceed the Massachusetts Department of Environmental Protection's standards that indicate the presence of an imminent hazard and that more than 20 percent exceed contaminant reporting levels for arsenic.

SOURCE: Massachusetts Department of Environmental Protection, "Best Management Practices for Controlling Exposure to Soil during the Development of Rail Trails."

contaminants include creosote used to preserve wood ties, coal ash from engines, and polynuclear aromatic hydrocarbons (PAHs) from diesel exhaust. Data collected in Massachusetts during the development of a commuter rail serves as one example of the results of extensive testing for residual contamination. Trail development can often serve as the most practical method to deal with risks posed by residual contamination.

Industrial activities either in railyards or adjoining the rail also contribute contaminants. These areas are often associated with switching and rail yards, where higher levels of petroleum, metals, pesticides and other substances associated with repairs and general maintenance can be found. In addition, higher contamination levels have been found on sidings or in areas adjacent to industries where contaminants have spread onto the rail bed. These areas may warrant targeted investigations to identify if elevated or more hazardous levels of contamination require specific clean-ups are present. (See Case Study 1: Manhan Rail Trail.)

NATIONAL SURVEYS

In order to assess the degree to which the issue of contamination impacted rail-to-trail conversions, Rails-to-Trails Conservancy (RTC) conducted a national review of what was done on current rail-trails as well as a survey of coverage of this issue in the media.

SUMMARY OF RAIL-TRAIL MANAGER SURVEY RESULTS

In an effort to assess the actual efforts of rail-trail developers around the country to uncover traces of contaminated residue from past railroad operations, and any subsequent effort to mitigate any such substances found in the corridor being developed for trail use, RTC developed a questionnaire designed to elicit any actions or discoveries of consequence (See appendix A for questionnaire.)

This survey was e-mailed to 715 trail contacts. Of these, 112 returned the survey filled out either in whole or in part and 81 were discovered to be defunct e-mail addresses. Of the active e-mails, the survey received an 18 percent response rate. A summary of the responses is below and an itemization of responses to key questions is reproduced in Appendix B.

As shown below in the Summary of Responses, the survey shows that most rail-trail developers and managers followed due diligence procedures (including Phase I assessment and visual inspection), surveying the corridor, to one degree or another, and finding nothing, continued with development plans.

SUMMARY OF RESPONSES	
Trails indicating Phase I Assessment	20
Trails indicating Phase II Assessment	3
Trails indicating visual inspection	16
Trails indicating soil samples	10
Trails finding toxic residue	10
Trails finding "no evidence" of contamination	15

In addition to surveying trail managers on the trail corridor, they were asked about railroad sidings and operations years. RTC was curious as to whether these parcels of land were more likely to be contaminated. Only two respondents remarked on this situation and concluded that they tested and found no contamination of concern.

SUMMARY OF LEXIS SEARCH — MEDIA

Project managers may be concerned that public attention could unduly focus on the contamination and detract from efforts to promote trail development. One way to gauge potential public concern about contamination on rail corridors is to look at the news articles reported in the media. Rails-to-Trails Conservancy conducted a search of newspaper articles on Lexis. Search criteria included major newspapers and were subject to Lexis search exclusions and rules. The search revealed that while there were more than 3,000 articles that mentioned rail-trails, few mentioned the most common residual contaminants; arsenic and creosote. Criteria for the search and exclusions can be found in Appendix D. The table below summarizes the number of articles found with each set of search criteria.

RESULTS OF LEXIS RESEARCH ON "RAIL TRAILS" AND "TOXINS"

Terms	Hits: All News (English)	Hits: Major Newspapers
Rail trails	more than 3000	more than 3000
Rail trails, toxins	22	8
Rail trails, toxins, arsenic	4	0
Rail trails, toxins, arsenic, creosote	0	0
Rail trails, toxins, creosote	1	1
Rail trails, creosote	13	6
Rail trails, arsenic	19	3
Rail trails, arsenic, creosote	0	0

RISK MANAGEMENT STRATEGIES

When dealing with a corridor that may be contaminated, it is important that the trail developer employ a risk management strategy that includes planning, designing, constructing and maintaining the trail to reduce risks to construction workers, maintenance crews and trail users. This is also the best defense against liability. This section provides some steps that trail developers should take when building and managing a trail.

Why should a Trail Manager be concerned about hazardous materials in a rail corridor?

- Protect human health and the environment;
- Liability which may result in litigation;
- Funding sources or lending institutions may require investigation (due diligence);
- Regulatory requirements, and;
- Construction and maintenance considerations.

When should you be concerned about potential contamination?

PRE-PURCHASE

Prior to purchasing the corridor and after finalizing a preliminary agreement with the railroad representatives, the buyer should complete due diligence procedures and become familiar with federal and state regulations concerning liability. This process entails examining the state of the title, surveying the property, appraising the corridor's value, assessing the integrity of structures within the corridor and conducting an environmental assessment of the corridor. After these steps are complete, if the due diligence raises new issues or reveals contamination problems, the buyer should meet with the railroad representatives or landowner to renegotiate the terms of the agreement. Following this meeting, if the buyer is content with the new terms of the agreement then the acquisition of the corridor should be finalized.

POST-PURCHASE

For the following reasons, you will still want to be concerned about contamination even if you have acquired the property without following the ASTM requirements:

- People using the right-of-way prior to construction may be exposed to contaminants at unsafe levels;
- Construction contractors may need to test soil that looks contaminated in order to comply with Occupational Safety and Health Administration requirements for their workers;
- Any soil removed during construction may be subject to either federal and state hazardous waste disposal requirements;
- Identifying contaminated soil prior to construction allows you to properly manage and budget for handling of contaminants. You may even be able to relocate soils to other parts of your project area to avoid off-site disposal costs.

TYPICAL CONTAMINANTS — WHAT YOU MIGHT FIND

What constitutes a contaminant?

In general a contaminant is any physical, chemical, biological or radiological substance such as an element, compound, mixture, solution, etc. that can be found in any media (air, surface water, groundwater or soil) that may be harmful to human health or have adverse effects on the environment. In terms of federal regulations and statutes, a contaminant has been defined as a hazardous substance, hazardous waste or pollutant by various policies including the Comprehensive Environmental Response Compensation Liability Act (CERCLA), the Solid Waster Disposal Act, Clean Water Act and the Clean Air Act. In Section 40 CFR302 of the CERCLA, there are 717 substances listed as hazardous materials. CERCLA and state laws that were surveyed appear to exempt the normal applications of pesticide from clean-up laws. In some states this exemption also applies to herbicides and fertilizers.

What are the contaminants I should be aware of when acquiring a rail corridor?

- Railroad ties (wood-treating chemicals including creosote)
- Spilled or leaked liquids (oil, gasoline, diesel fuel, cleaning solvents and detergents)
- Herbicides
- Fossil fuel combustion products (PAHs)
- Roofing shingles (asbestos)
- Air Compressors (used in braking and for starting engines)
- Transformers and Capacitors (used in train controls and electric generation)
- Metals (arsenic — pesticides, wood preservatives, fossil fuel combustion; mercury — combustion products, leaking gauges)

DUE DILIGENCE

The term "due diligence" represents the process of evaluating the risks and value of a corridor that is to be purchased. To exercise due diligence a corridor buyer must implement a plan to identify possible hazards and carry out the appropriate corrective action to prevent acquisition of an environmentally contaminated area. Due diligence is important in legal matters as a buyer could face potential lawsuits pertaining to the health and safety of the corridor's patrons.

The level of due diligence warranted will depend on the

BASIC PROCESS STEPS

- *Conduct due diligence, inventory potential hazards along the corridor;*
- *Analyze potential adverse health effects caused by hazardous substances released to human and ecological receptors;*
- *Determine what, if any, additional mitigation steps need to be taken;*
- *Examine both risks and benefits associated with various remedial alternatives;*
- *Provide information needed by regulators and the public;*
- *Design and locate the trail to avoid dangers. Warnings of potential hazards should be provided and hazards should be mitigated to the extent possible;*
- *Follow state and federal laws regarding construction in a contaminated area and removal of contaminated soils and other materials;*
- *Once the trail is open for use, a comprehensive management plan that includes risk management should be in place;*
- *A qualified person should regularly inspect the trail to identify potential hazards and maintenance problems, and;*
- *Signage and fencing should be posted to protect trail users when needed.*

situation and the state's regulations. As can be seen by the survey responses and the Lexis search, contamination has not been a hinderance to trail development. However starting with some basic due diligence will help the trail developer decide what levels of assessment are needed.

STATE REGULATIONS

Unless a rail-trail happens to run through a Federal National Priority List or "Superfund" site, the EPA will probably not have direct regulatory involvement in any clean-up actions. EPA policies and federal brownfield legislation often limit EPA regulatory involvement when a clean-up follows state requirements. Each state has different requirements. The American Society for Testing and Materials (ASTM) has developed inquiry standards that EPA has adopted, which may also be adopted by the state. The state's lead environmental agency will be the best place to find state contamination clean-up requirements. Most states now have a division that works on clean-up or remediation that is often found in the state environmental protection agency. A trail developer could also consult an environmental professional about what the state requires for levels of investigation.

Many state programs have similar steps but differ in how involved state officials will be in each step. Generally the steps in the clean-up process are as follows:

EVOLUTION OF CLEAN-UP LAWS

IN 1970 THE CLEAN AIR AND CLEAN WATER ACTS banned many pollution discharges into air and water. Companies initially complied by capturing pollutants and storing them in drums, lagoons or dumping them in landfills. By the late 1970s those wastes had seeped into soil and groundwater, and harmed or threatened to harm people, plants and wildlife. In reaction to major waste sites such as Love Canal in Upstate New York, in 1980 Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund. CERCLA authorized the EPA to undertake clean-ups and then sue polluters and property owners for those costs.

CERCLA had an important prospective impact--polluters became much more aware of where any hazardous wastes were going and began to seek facilities to destroy the wastes rather than dump them. Many industrial and commercial property purchasers began inspecting and testing properties for the presence of contamination to protect themselves from legal liability and clean-up costs.

In the early 1980s, many states enacted laws similar to CERCLA to spur waste site clean-up. Agencies hired staff to oversee each step of work. Although enacted in reaction to "Love Canal," EPA and state agencies began to find everyday practices of common businesses such as gas stations, repair shops, dry cleaners and manufacturers also resulted in releases of contamination. The list of locations that may have posed a risk to health and the environment grew at a rapid rate and quickly outstripped the federal and state government resources available to undertake clean-up or force polluters to do so.

New testing technologies allowed soil and water testing with accuracies in the parts per billion range. The accuracy of these tests stood in contrast to the knowledge of whether such levels of contamination posed a risk to either people's health or the environment. Faced with this uncertainty agencies took the position that contaminants must be reduced to nondetectable limits, or to limits that would protect any foreseeable use. Many less contaminated properties began to linger on the federal and state lists. Prospective buyers started to avoid acquiring these properties do avoid regulatory delays and clean-up costs that were often uncertain.

- An initial assessment (the due diligence report should suffice for this step);
- A follow-up assessment that includes sampling areas of concern identified in the Initial Assessment;
- Determination of existing risks and target clean-up levels;
- Development of a remedial plan to cost-effectively achieve the clean-up levels;
- Implementation of the remedial plan, and;
- Post clean-up close-out.

The level of a state's involvement determines the pace of clean-up and can also affect overall costs. Some states will review and approve each assessment report and clean-up plan before a developer can proceed to the next step. A clean-up agreement with the state may need to be signed requiring the trail developer to pay the costs of state review. More and more states have developed programs that allow private parties to proceed with assessments and clean-ups supervised by licensed environmental professionals. In Massachusetts, for instance, most clean-ups proceed entirely under the direction of private clean-up professionals and do not require any approval by the state.

Determining the level of clean-up for a corridor fundamentally determines how much mitigation is necessary. Several approaches have been developed on determining how much clean-up is necessary. Initially most states developed site-specific standards based on a methodology of extrapolating health risks from contaminant levels known as "risk assessment." Risk assessment methods contain many variables and assumptions. As a result the development of site-specific standards can be time-consuming. Some states have developed generic clean-up levels based on the current and expected use of the site. These generic levels greatly simplify the clean-up decision-making process and create a "bright finish line."

States using generic clean-up standards require developers to file deed notices if contaminant levels remaining on-site will not protect people in all situations. The deed notice may include the following information: (1) a plan indicating the location covered by the notice, (2) a description of the contaminants of concern, (3) a list of allowable and restricted uses, (4) a plan to maintain any cap or barrier and 5) steps that must be taken when contaminated soils need to be excavated.

Once clean-up levels have been established, clean-up alternatives are reviewed, costs and a clean-up plan are developed. Many states now allow asphalt and landscaping to serve as protective barriers for contaminated soils. An environmental consultant or state environmental agency should be able to recommend the thickness of asphalt and ground cover that has been found acceptable in other locations in the state. In some instances, half-a-foot to two feet of contaminated soil may need to be removed or treated. Any soil removed off-site must be transported to an appropriate location. For instance, Massachusetts prohibits contaminated soils from being transported to any location significantly less contaminated than the soil. This helps prevent circumstances where slightly contaminated soil ends up in the backyards of new residential developments.

The clean-up plan must be developed into a detailed scope of work to be included in the construction contract. The scope should be as detailed as possible and discuss how contamination will be addressed, including test protocols, quantities and types of contaminants to be cleaned-up.

Often the contractor that constructs the trail will also be responsible for removing railroad ties and contaminated soil. A contractor can make more money removing contaminated soil than clean soil.

HIRING AN ENVIRONMENTAL PROFESSIONAL

AN ENVIRONMENTAL PROFESSIONAL can quickly gather information from national and state databases and records sources, such as Sanborn Maps, speeding the understanding of what areas along the rail-trail are of most concern. Trail advocacy groups can assist with this effort by gathering historical information about industries along the line and property ownership.

Many states keep lists of environmental consultants, however, these lists will not provide much guidance on the right consultant for the project. Consult with staff within the trail organization or other government agencies that deal regularly with buying and redeveloping property, and who have hired environmental consultants in the past. Government agencies may also have to follow procurement requirements for hiring service professionals.

Here's a brief list of questions to ask any environmental professional:

- *Does the professional have licenses for and experience performing due diligence investigations for real estate transactions in the local area? Do they have experience with the American Society for Testing and Materials standards?*
- *Have they directed soil removal and other remedial actions, and understand the proper regulatory steps and costs for those actions?*
- *Is the firm familiar with sample collection of soil, ground water and surface water?*
- *Has the firm performed on-site testing of soil for pesticides and herbicides typically found on rail lines? Are they familiar with analytical requirements? What laboratory do they use for testing?*
- *Does the firm comply with Occupational Safety and Health Administration's Hazardous Waste Operations and Emergency Response Standard certification and safety training requirements?*

Depending on the procurement requirements discuss general needs and obtain fixed price quotes from several firms on the due diligence investigation.

An engineer or consultant independent of the construction contractor can confirm the quantities of material the construction contractor removes and that the correct testing procedures have been followed. The construction contract should require the construction company to make reasonable efforts to minimize unwanted off-site disposal of contaminated soil.

LEVELS OF INVESTIGATION

Is the corridor a brownfield?

According to the U.S. Environmental Protection Agency (EPA), the word "brownfield" is used to describe areas of abandoned or underused land that is perceived to be, or in fact is, environmentally contaminated due to past industrial or commercial use. Railroad corridors, or sections of corridors, can be considered brownfields. If a corridor or an adjacent property is suspected to be a brownfield, the state natural resources or environmental protection agency should be contacted to determine if the property has been identified as a brownfield. If this is not the case, a Phase I, and possibly a Phase II environmental site assessment may be necessary.

ENVIRONMENTAL ASSESSMENT

If there is a possibility that a trail corridor may be contaminated, an environmental expert should be enlisted to conduct an environmental assessment, especially before negotiations for or a purchase of the property. The nature of the assessment will depend on the property and the potential for contamination, but should include, at a minimum, the equivalent of a Phase I assessment.

A Phase I assessment combines research into the property's history with a visual inspection. Courthouse records, title abstracts, historic aerial photographs and newspaper accounts offering background on the past uses of the site might provide some insight into the

property's history. Interviews with local government representatives, adjacent landowners, and state and federal officials may also uncover historical events about which the current railroad knows nothing. Phase I assessments are not regulated by the federal government, but may be by the state. The scope of work for the Phase I may include:

- Investigate the rail line history and locate old stations, crossings, spurs and rail yards. The Valuation Plans and historical aerial photographs for the properties abutting the rail line can provide much of this information;
- Investigate site use, identify commercial and industrial stretches and conduct historical research of adjacent properties. The Valuation Plans and Sanborn Insurance maps can provide much of the information for the snapshot in time when they were developed. Local historical societies may have information on leading local industrialists and their businesses;
- Review the existing federal and state lists of known or suspected disposal sites to see if any are located along the right-of-way;
- Inquire with neighbors, fire department personnel or the local historical society for further information on train crashes, accidents and other incidents that may have released chemicals;
- Conduct a thorough, visual inspection of the right-of-way, looking for:
  - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, pipes, or buried debris;
  - Signs of illegal dumping of waste from businesses or industry (not simply household trash);
  - Stressed vegetation or "dead zones";
  - Areas of soil run-off, both away from the right-of-way and toward the right-of-way;
  - Signs of wind erosion sufficient to create a dust inhalation exposure, and;
  - Signs of public use of the existing right-of-way (condoned or trespassing), such as dirt-bike trails, play forts, beverage cans and fire pits.
- Prepare a list of locations that warrant further investigation including sampling techniques, assessment costs and if possible at this stage an estimate of potential clean-up costs.

If the Phase I study identifies problem areas, a Phase II assessment may be required. The Phase II assessment can be avoided if the Phase I does not find an area of significant contamination and the corridor owner assumes responsibility for clean-up costs should problem areas need attention. A Phase II assessment involves more thorough testing of water, air and soil samples, as well as a more thorough investigation of the site. If contamination is found, a Phase III assessment will review clean-up alternatives, clean-up costs and recommend a remediation plan for clean-up.

While the techniques for identifying environmental contamination have become increasingly sophisticated, the cost and responsibility for cleanup and restoration are less clear. Federal law targets past and present owners, operators, transporters and generators of hazardous substances. Assigning responsibility and collecting money for clean-up is complicated by the history of contamination and the likelihood that the original contaminators may no longer be traceable, or if they still exist, do not have the finan-

cial capacity to pay for clean-up. Although the railroad has certain responsibilities as the property owner, do not be surprised if the railroad's representative wants to include cleanup costs as a negotiating point.

Overall, an environmental assessment can cost anywhere from a few thousand dollars to more then $20,000 if extensive soil and water samples are taken over a broad area. The assessment and its results can quickly become a critical issue in negotiations to acquire the property. Before taking title to the property, make sure the purchase contract clearly states who will pay for any environmental problems that have been discovered. Seek warranties and representations from the railroad indicating there is no known contamination, or if that is not the case, disclosing the actual situation and plans for remediation.

REMEDIATION ALTERNATIVES

Once it is determined that remediation is needed, the environmental consultant should prepare an estimate of the approximate costs of alternatives to address the identified contaminants. This cost estimate may be used in negotiations to reduce acquisition costs. If the trail developer owns the land or will be accepting it for a nominal charge, they will want to include the clean-up plan in any construction contract for the project.

Railroad Ties

Generally, salvaging of track and ties prior to construction can be profitable, depending on the market. However, if high levels of contamination are found, this may not be the case. An environmental consultant can help identify licensed facilities that will accept old railroad ties for disposal. In order to avoid liability for illegal disposal, do not reuse the ties on existing properties or allow the public to take them away. On-site burial may be possible if your project includes a large area such as a parking lot. The Massachusetts Department of Conservation and Recreation disposed of ties and contaminated soil under a parking lot built while creating a park on a former municipal dump along the Neoponset River near Boston. Ballast can be used to serve as a sub-base for the new trail.

Trail Construction

Communities can take several actions to address residual and industrial contamination on rail corridors. Taking care of remediation during trail construction can be the most effective means to address contamination. The following is a list of the most common methods for addressing residual contamination on a rail corridor. Combining these methods can be an effective way to address residual contamination and site-specific contamination associated with industry. The Massachusetts Department of Environmental Protection has developed Best Management Practices that promote capping in areas with residual contamination.

The most common methods for addressing residual contamination on a rail corridor include:

- Cut and Fill – Soil containing high contamination is removed, replaced by clean soil to fill the corridor. Regrading of the site may require fill to be placed in certain areas. See if the design engineer and construction company can use contaminated soil where fill is needed, or for another use such as roadway subgrade, or disposed of in an appropriate manner as outlined by the state's environmental laws. If your corridor is wide enough, you may be able to create vegetated berms on the edges of the trail to contain the contaminated soil. Contaminated soils should never be relocated to areas with high human contact, such as playgrounds, schools or residential yards. (See Case Study 3: Doyle Street Greenway.)

- Capping the Surface – Hard surfaces, such as asphalt and cement, may be used to "cap" or cover and isolate contaminated soil along the corridor. Likewise the use of crushed stone with appropriate depth may also be used. Your consultant or state agency should be able to provide you with guidance on these issues. (See Case Study 2: Betsie Valley Trail.)

- Exclusions – In cases where contamination is, or is perceived to be, higher due to due diligence research, a trail developer may choose to exclude a portion of the corridor from purchase and use a separate route alternative to avoid human contact with the contaminated site. This may also be employed as a temporary alternative until a contaminated site may be remediated. (See Case Study 1: Manhan Rail Trail.)

- Signage and Fencing – Signage and fencing are used to keep trail users on the trail and protect them from specific contaminated sites. (See Case Study 4: Trail of the Coeur d'Alenes.)

- Phytoremediation – The process of cleaning contaminated soil and water with plants. Phytoremediation is best used for contamination in the top layers of soil, where the roots of the plants reach. It may be employed in combination with other techniques.

RECOVERING CLEAN-UP COSTS FROM THE POLLUTER

If the organization involved in trail development and remediation did not cause the pollution, recovering the costs to clean-up the contamination may be an option if the polluter can be identified. Involve polluters as soon as possible so they can be involved and possibly fund investigations and clean-up planning. Document that the plan follows clean-up laws to ensure your organization can seek cost recovery. In order to do so any soil samples collected and tested must have a documented "chain-of-custody" and records must have been adequately kept on how samples were collected and handled.

Pursuing polluters can be cost prohibitive and time consuming. If the railroad is the major polluter the best way to handle these costs is during the negotiations of the land transfer. An agency or local environmental attorney can help negotiate conditions regarding environmental clean-up as part of the land transfer.

MANAGEMENT AND MAINTENANCE

Managing risks associated with a contaminated corridor does not stop after construction ends. If contaminated soil is removed, then the problem is eliminated. However if the area with elevated contamination was simply capped with a hard surface it will be important for the trail manager to stay on top of maintenance to ensure the trail user is sufficiently protected. Regular maintenance, as well as reconstruction of a trail surface at the end of its life – 15 years for asphalt and 10 years for crushed stone) will be important. In addition, if needed, trail signage and fencing should be maintained. (See Case Study 4: Trail of the Coeur d'Alenes.) More information about trail maintenance can be found in Rails-to-Trails Conservancy's "Trails for the Twenty-First Century, Planning, Design, and Management Manual for Multi-Use Trails," by Charles Flink, Kristina Olka and Robert Searns.

CASE STUDIES

SUMMARY

The case studies serve as examples of ways communities have addressed contamination. An environmental professional and agency contacts can help you evaluate the best approach to your situation. In an effort to gain a more thorough understanding of the impact of discovering contaminants on a corridor, we have selected four rail-trail projects which did encounter some level of contamination and developed in-depth case studies exploring the mitigation measures taken.

BACKGROUND

The Manhan Rail Trail provides a good example of the barriers that communities must surmount in order to convert an old rail corridor into a multi-use community trail. When complete, this eight-mile trail will run from Easthampton to Northampton, Mass. Four of the five miles of the trail in Easthampton opened in June 2004. The remaining one-mile contaminated section of corridor in Easthampton is currently not open to the public.

Typical of many New England communities, Easthampton, Mass., was a manufacturing city serving the textile, chemical household cleaner and insulation industries. It was also served by a railroad that thrived until the mid-1970s when much of the industrial activity ceased. The Manhan Rail Trail follows the former New Haven Railroad's Canal Division corridor, which paralleled the Farmington canal running from New Haven, Conn. to Northampton, Mass.

By the late 1970s changes in the environmental laws and relocation of businesses to places like North and South Carolina, brought about a shift that made the mill buildings largely dormant. By 1991 the Pioneer Valley Railroad (PVRR) — which had taken over all the trackage in the city — instituted a freight surcharge because of poor track conditions. The surcharge drove the last customer using the railroad, the W.R. Grace & Co.'s Zonolite plant, to close. The railroad filed for abandonment of the approximately five miles of corridor in Easthampton in 1992.

The Friends of the Manhan Rail Trail formed in 1996 to advocate for the trail. The city of Easthampton approved the purchase of the corridor, and by 1999 the PVRR removed the track and the city acquired the corridor.

CONTAMINANTS AND REMEDIATION

The primary concern over contamination along the Manhan Rail Trail was at the site of the former W.R. Grace & Co plant, where raw materials (semi-processed vermiculite ore containing temolite asbestos, a suspected carcinogen) were converted to insulation. The Massachusetts Department of Environmental Protection (MDEP) and the U.S. Environmental Protection Agency (EPA) began testing the soil along the corridor in 2000. W.R. Grace & Co., agreed to conduct further testing, which showed asbestos contamination extending about 700 feet north and 200 feet south of Wemelco Way along the abandoned rail bed. At around this time, W.R. Grace & Co. entered into Chapter 11 bankruptcy because of the number of asbestos-related lawsuits filed against it.

The city of Easthampton hired Tighe & Bond, an environmental engineering company, to assess the degree of contamination and recommend a remediation treatment. Tighe & Bond estimated it would cost approximately $260,000 primarily in disposal costs to clean up the contamination along nearly 1,000 feet (40 feet wide) of the planned bike path route.

The city of Easthampton is still waiting for funding to clean up the site. The proposed method of remediation is to replace one foot (deep) of contaminated material with clean soil and pave the trail. Simply paving the trail was discounted because the railroad ties are still in place and the city is interested in installing a parallel sewer line. The trail will be fenced and signed in order to keep the users on the trail.

FUNDING

Initial testing of the corridor was conducted as part of a larger project to test W.R. Grace sites by the MDEP and the EPA. Tighe & Bond, the environmental engineering company that assessed the degree of contamination and recommended clean-up, donated their time to the project, thus reducing costs to the city.

Identifying funding sources for remediation of the corridor was difficult. In 2003 and 2004 the City of Easthampton submitted grant applications to the EPA's Brownfields Clean Up program but did not receive funding. However, U.S. Representative John Olver (D-Mass.) announced the inclusion of $750,000 in the new transportation bill to remediate the asbestos and construct the rail-trail, which is still pending.

Additionally, in early 2003, the city of Easthampton filed a claim against W.R. Grace & Co. for its failure to clean up asbestos-contaminated soils at the site of its former manufacturing plant on Wemelco Way. The case is still pending.

LESSONS LEARNED

The first hurdle was convincing the responsible parties that the asbestos should be cleaned up, rather than the alternative of not building a trail and thus not needing to clean the contaminated land.

The second major challenge with this project was finding a funding source for the cleanup. Project planners found that the EPA Brownfields Assessment and Cleanup program was a good potential source of funding. Instead, the project is being funded through the next transportation legislation before Congress at the time of this report.

The final lesson learned in this project was that better communication between the state agencies would have been beneficial, especially between the state highway and environmental protection departments.

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BACKGROUND

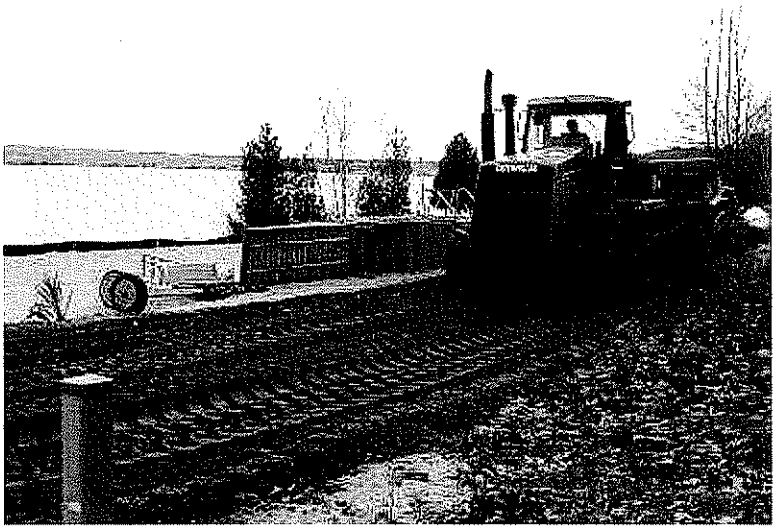
The 22-mile Betsie Valley Trail is located in Benzie County, Mich., along the shores of Lake Michigan between the communities of Thomasville and Frankfort. Rail use began on this line in the 1880's, first to bring wood to Elberta, Mich., to fire metal refining ovens and later to carry passengers between the Thompsonville depot and Frankfort. In the 1930's rail car ferry service began from Elberta, allowing rail cars to be shipped across Lake Michigan. In 1980 the Michigan Department of Transportation (MDOT) purchased the bankrupt Ann Arbor Railroad company. In 1982 the last rail car was transported by ferry and in 1985 the train made its last trip through Benzie County.

Twenty-two miles of the Betsie Valley Trail are open for use and another mile is still under development and slated to be complete by the end of 2004. The Michigan Department of Natural Resources (MDNR) owns the majority of the line and the last two half-mile sections are owned by the Village Alberta and the City of Frankfurt. However, the trail is maintained and operated by Benzie County. Seven miles of the Betsie Valley Trail are surfaced with asphalt, three with crushed limestone (in the Crystal Lake Area), and an additional 12 miles are currently unimproved and are open to snowmobiles.

Concerns over arsenic contamination in the soils of the rail corridor were raised by adjacent property owners opposed to trail development. Beginning in 1988 and ending with a settlement in 1996, adjacent property owners sued MDOT for ownership of the rail corridor along a three-mile stretch of beach front on Crystal Lake. The settlement allowed for adjacent owners to purchase the beach/rail property adjacent to their homes provided they agreed to a lifetime rail, utility and trail easement. The trail location could be relocated provided that 1) it was at the property owner's expense; 2) it would be continuous; 3) have safe curve radius; and 4) have sight distances and meet general safe trail design standards. Once the relocation was approved by the MDNR, a land survey was taken to create the easement language for each property deed. This is being completed now.

CONTAMINANTS AND REMEDIATION

In May 1999 six soil samples were collected from the middle of the railroad corridor, approximately four to six inches below grade. Analysis of the samples showed levels of arsenic ranging from 8.4 parts per million (ppm) to 72 ppm. This is elevated above Michigan Department of Environmental Quality's (MDEQ) standards for residential direct contact. In June 1999 additional samples were taken from the shallow ground water beneath the



railroad bed. Results showed that contaminants were not leaching into the groundwater. Soil sample results showed contaminants decreased rapidly as you moved out from the center of the tracks.

Additional testing was performed in July 2001 and May 2002. This testing revealed arsenic (8.4–72 ppm) and benzopyrene (0–9ppm) (a Poly Aromatic Hydrocarbon or PAH). The conclusion from these tests was that the three miles along Crystal Lake were contaminated, though there is reason to believe that the entire 22-mile corridor in Benzie County is contaminated at a similar level.

Seven miles of the corridor is capped by the trail surface. In the Crystal Lake area, the contaminants were removed and a crushed limestone surface laid. This eliminated direct contact and was cost effective. These sections of trail did not require additional time to complete construction. The contractor was required to follow guidelines on working with contaminated soil, such as ensuring soils did not become airborne during construction.

Along the Crystal Lake segment of the trail, contaminated soil was removed in varying amounts. This was done because of the proximity of the contaminants to homes in this section. Homeowners in this section were insistent that the state clean the contaminants out. Excavation of the contaminated soil began in October 2002 and was completed in June 2003 by MacKenzie Environmental. Construction of the corridor has not been completed.

For removal of contaminated soils in the Crystal Lake segment, the involved agencies were MDEQ, MDNR, Michigan Department of Community Health, MDOT, Crystal Lake Property Rights Association and MacKenzie Environmental.

The surface work in other sections of the trail to cap the contaminates involved MDNR, MDEQ, Betsie Valley Trail Management Council (Benzie County), Johnson Hill Land Ethics (landscape architect), Gourdie Fraser and Assoc., (engineering firm), Elmer's Crane and Dozer, and Kramer Contracting.

FUNDING

The total cost for clean up, engineering and trail surface (crushed stone) for the 3.3-mile section along Crystal Lake was $750,000. MDEQ, MDNR, and MDOT contributed funding to the project.

Construction cost for the capped section of trail did not involve additional expenses because of the contaminants. The cost and process to surface the trail is essentially the same with or without contaminates. Funding consisted of state and federal grants and foundation and local funds were used to match the grants.

LESSONS LEARNED

Due to the court settlement for the Crystal Lake segment, adjacent property owners were allowed to relocate the trail. Many property owners did this by moving the railroad ballast stones off the corridor and onto a new location. This spread the contaminants over a much greater area. This required more testing, additional on-site monitoring of the soil removal process, and more costs. The other sections of the trail created no major challenges.

Because of the potential health impacts adjacent landowners can be particularly concerned about contamination near their homes. Efforts to educate people in the communities with the facts will be time well spent. Most people will read the information and realize the best course of action is to cap the contaminated earth. The public agency is then responsible for developing and presenting a plan to cap the contaminated soil.

CONTACT INFORMATION

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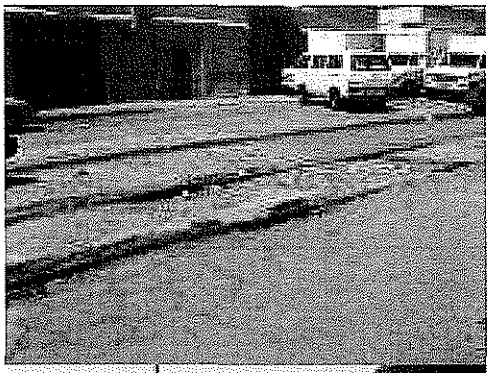
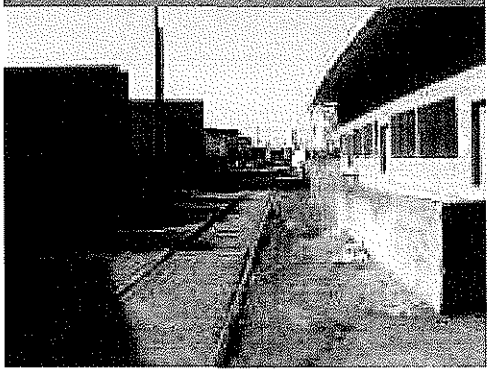
BACKGROUND

The Doyle Street Greenway is located in Emeryville, Calif., a small community of less than 10,000 people across the bay from the San Francisco. The trail project is part of a larger city-wide renaissance to transform itself from an old industrial landscape with many brownfield projects to a livable community with vibrant high tech and commercial industries. The 0.4-mile rail-trail follows a Santa Fe Railroad spur line that once serviced Emeryville, Calif., and Berkeley, Calif. It will be extended by an additional 0.4 miles in order to connect it to other trails.





CONTAMINANTS AND REMEDIATION

Testing of the corridor began before the city of Emeryville purchased the rail corridor from Union Pacific. Both soil and groundwater testing were undertaken to determine the nature and extent of contamination. The soil sample tests showed higher levels of arsenic (up to 689 mg/kg), lead (up to 3,227 mg/kg), and petroleum hydrocarbons (TPH as diesel at concentrations up to 11,300 mg/kg). It was determined that the entire 2,200-foot rail-trail was contaminated.

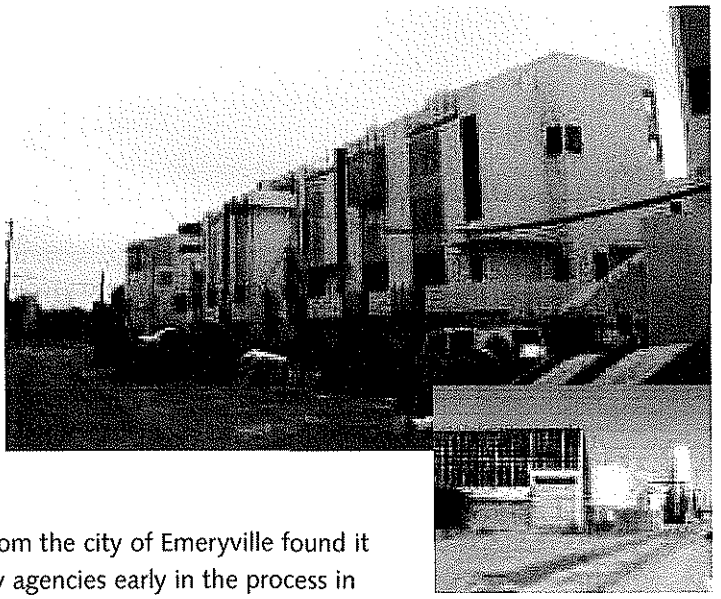
To clean up the site, approximately 2.5 feet across the entire site of contaminated soil was excavated and disposed of, off-site. It was replaced by a layer of clean fill and a combination of hard-surface and greenscape was chosen as the surface material. This method was chosen because it offered the most thorough level of protection of the public's health and minimized long-term maintenance and liability issues.

The remediation process involved the cooperation of the city of Emeryville, the U.S. Environmental Protection Agency's (EPA) Department of Toxic Substances Control, the California Environmental Protection Agency's Regional Water Quality Control Board and Union Pacific Railroad.

FUNDING

The project cost approximately $1 million and was funded in part by EPA's Brownfields Assessment Demonstration Pilot Program as well as by the city of Emeryville, California State Park and Bicycle Bond Funds, Union Pacific Railroad and Pulte Homes, which paid for improvements adjacent to their developments.

LESSONS LEARNED



A major challenge to this project was developing accurate cost estimates for use in negotiations with the railroad. Estimates are difficult to nail down because there are so many different components to such a project that impact the costs, such as acquisition and sampling schedule, and shifting costs of improvements to the private sector through development and design negotiations.

In putting the project together, staff from the city of Emeryville found it useful to engage the various regulatory agencies early in the process in order to avoid surprises during negotiations or after property had been purchased. Much to their advantage, the city of Emeryville can serve as a regulatory agency for less complicated projects, such as this one. The city is very familiar with the redevelopment of railroad spurs because of the large number of them within the city, and therefore is familiar with the special issues surrounding these projects.

Project staff also found it useful to have sufficient funding for the project, allowing them to work through various problems that developed during the course of the project. For example, it is difficult to completely characterize the contaminants in the soil and so having flexibility as the project progressed permitting project managers to react to new information as it became available.

CONTACT INFORMATION

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U.S. EPA Region 9 Brownfields Team
Telephone: 415-744-2237
www.epa.gov/region09/waste/brown/index.html
www.epa.gov/brownfields/

CASE STUDY 4: TRAIL OF THE COEUR D'ALENES, KOOTENAI, SHOSHONE, AND BENEWAY COUNTIES, IDAHO

BACKGROUND

The Trail of the Coeur d'Alenes is a 10-foot-wide, 73-mile-long asphalt trail. It stretches west from the mountain mining town of Mullen, Idaho on the Montana border, along the Coeur d'Alene River in Idaho's Silver Valley to Plummer, Idaho in the prairie lands near the Washington border. As a former Superfund site, this rail-trail presents an extreme case of contamination.

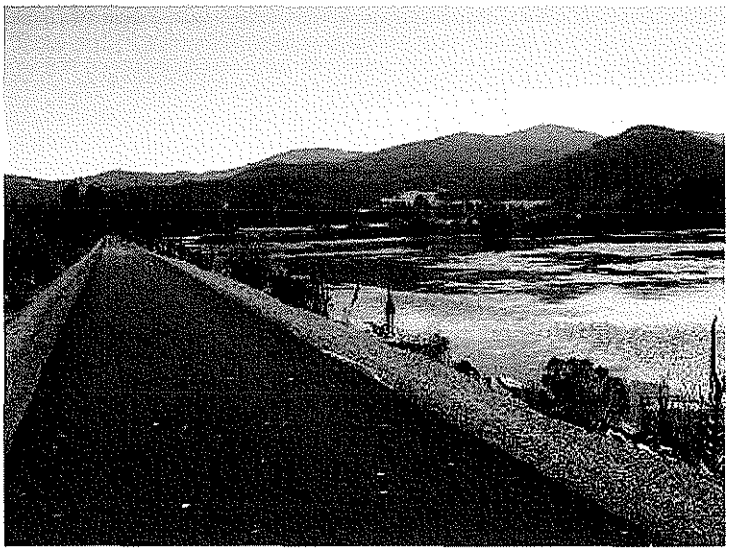
Construction for the rail corridor began in 1886 when silver was discovered and the railroad was used to transport ore and other concentrates. Mine waste was used as fill material in constructing the corridor and further contamination occurred when flooding carried mine waste from non-railroad source points to other parts of the railroad corridor. Union Pacific (UP) proposed abandoning the corridor in the 1990s and the State of Idaho and the Coeur d'Alenes tribe jointly filed for railbanking. In 1996, the Justice Department filed a lawsuit against UP, in which the railroad agreed to pay $30 million to clean up the contaminated corridor. Construction took place between 2001 and 2004.

CONTAMINANTS AND REMEDIATION

A level 1, complete human health risk assessment, was conducted to determine if trail contamination would cause health risks. Hundreds of sample cores at various depths along the entire length of the right-of-way were taken. Contaminants such as lead, arsenic and other heavy metals were found all along the corridor. Contamination levels varied but tests indicated contamination greater than 30,000 part per million in some places.

According to the Environmental Protection Agency (EPA), an engineering evaluation/cost analysis determined that the best option for remediation of the heavy metal contamination was to remove and dispose of some contaminated material, lay vegetative barriers and cap the corridor with asphalt. Contaminated soil was removed and replaced by noncontaminated materials on the section of the corridor near Chatcolet Lake on the Coeur d'Alene Tribe Reservation. A total of 175,000 cubic yards of contaminated materials were removed and remediated, approximately 200,000 cubic yards of barrier material were utilized, and 65 miles of 10-foot-wide asphalt capped the surface.

Ties were removed, decontaminated and salvaged, and tie dump areas from the railroad operations were cleaned up. Lastly, vegetative, asphalt and gravel barriers were used to control trail user exposure to lead.



Trail signage and outreach materials are in use to educate and protect the trail user. A brochure can be found at each trail head recommending removing dirt from clothes, toys, pets, shoes and equipment before leaving the area.

The brochure also warns not to let children play near shore lines or off the trail, and for trail users to carry water for drinking and washing.

The agencies involved in the mitigation process included: Idaho Department of Parks and Recreation, Coeur d' Alenes Tribe, Department of Justice, EPA, Idaho Department of Environmental Quality, U.S. Fish and Wildlife Service, Panhandle Health, Army Corp of Engineers, Union Pacific Railroad, counties and cities, Idaho Attorney General's Office and the Idaho Dept of Transportation.

FUNDING

The entire trail, except for one short section of trail between Mullan and Kellogg which was paved with a $1 million Transportation Enhancements grant, was funded and built by UP under a concent decree that UP entered into with the federal government, the State of Idaho and the Coeur d'Alene Tribe. UP's estimated costs are $30 to $40 million dollars.

UP is still responsible for long-term flood damage to the trail, soil and asphalt barriers and bridges. They keep track of these costs so in the future the government and UP can negotiate a trust fund to cover these long-term costs.

LESSONS LEARNED

Trail advocates, including government agencies, faced a long process with many barriers to build a multi-use trail through a superfund site. At the time there were no similar examples to refer to, which would have made the process easier. There were many opponents to the project and it was difficult to coordinate the many agencies and entities involved in negotiating the deal with Union Pacific.

CONTACT INFORMATION

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www.idahoparks.org/pdf/TrailCDAweb.pdf

FUNDING AND OTHER RESOURCES

This section provides additional resources for federal and state assistance and funding sources.

FEDERAL AND STATE RESOURCES

ENVIRONMENTAL PROTECTION AGENCY (EPA)

The EPA maintains an extensive Web site on Superfund information. Pertinent information includes the section on "Laws, Policies & Guidelines" and the section on "Human Health & Ecological Risk." The "Exposure to contaminants" heading under "Human Health & Ecological Risk" is extremely useful.

www.epa.gov/superfund/index.htm

The EPA also maintains information on brownfields. www.epa.gov/brownfields/ and www.epa.gov/brownfields/liab.htm

SAMPLE STATE PROGRAMS:

COMMONWEALTH OF MASSACHUSETTS, DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF WASTE SITE CLEANUP.

The bureau has developed detailed "Best Management Practices for Rail Trail Conversion." www.mass.gov/dep/bwsc/files/railtrail.doc

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION: BROWNFIELD INFORMATION

The Web site offers information about brownfields in New York with links to the Brownfield Cleanup Program, the Environmental Restoration Program and State Superfund Program.

www.dec.state.ny.us/website/der/bfield/

TEXAS BROWNFIELDS REDEVELOPMENT INITIATIVE

In close partnership with EPA and other federal, state and local redevelopment agencies, and stakeholders, Texas is facilitating clean-up, transferability, and revitalization of brownfields. The Web site provides in-depth information about federal tax incentives and property tax incentives.

www.tnrcc.state.tx.us/permitting/remed/vcp/brownfields.html

WISCONSIN DEPARTMENT OF NATURAL RESOURCES (DNR): BROWNFIELD INFORMATION

The DNR's Web site provides a wide range of information on financial and liability tools in order to assist local governments, businesses, lenders and others to clean up and redevelop brownfields in Wisconsin.

dnr.wi.gov/org/aw/rr/rbrownfields/

WASHINGTON STATE DEPARTMENT OF ECOLOGY: TOXICS CLEANUP PROGRAM

This is a good example of what states are doing to promote environmental remedial actions. The Web site provides specific information regarding statewide policies on toxic substances.

www.ecy.wa.gov/programs/tcp/cleanup.html

FUNDING SOURCES

ENVIRONMENTAL PROTECTION AGENCY (EPA)

BROWNFIELDS ASSESSMENT GRANTS

These grants fund activities to inventory, characterize, assess and conduct planning and community involvement related to brownfield sites. The performance period is two years. Different levels of funding are available for assessment related to various contaminants, with a total application cap of $700,000. For more information see www.epa.gov/brownfields/pilot.htm.

REVOLVING LOAN FUND GRANTS (RLF)

These grants provide funding for grant recipients to capitalize a revolving loan fund and provide subgrants to carry out cleanup activities at brownfield sites. Revolving loan funds generally are used to provide no- or low-interest loans for brownfields cleanup. Grants are available up to $1 million and require a 20 percent match by the applicant. Performance period for these grants is five years. For more information see www.epa.gov/brownfields/pilot.htm.

CLEAN-UP GRANTS

These grants fund actual clean-up activities at brownfields sites. Funds are available up to $200,000 per site, with a limit of five sites per applicant. It requires a 20 percent match by applicant, and the applicant must own property that will be cleaned. A minimum of a Phase I site assessment must be completed prior to a proposal submission. The performance period for these grants is two years. For more information see www.epa.gov/brownfields/pilot.htm.

HEALTHY URBAN COMMUNITIES GRANT PROGRAM (NEW ENGLAND ONLY)

The 2003 grants program integrated nine New England programs dealing with toxics, schools, urban environment and more. Projects funded targeted communities at risk, sensitive populations (i.e. elderly and children), assessed and understood environmental and human health risks, increased collaboration through community-based projects, built institutional and community capacity to understand and solve environmental and health problems, and achieved measurable benefits. Green and open space projects have been funded, but no grants were awarded in 2003 for testing or remediation along rail corridors being converted to rail-trails. The grants program may change for 2004.

Check the Web site for details at www.epa.gov/region01/eco/uep/grants.html.

U.S. DEPARTMENT OF TRANSPORTATION

TRANSPORTATION ENHANCEMENTS (TE)

Environmental testing and remediation along a rail corridor may be eligible for TE funds if the project qualifies under the TE category of "Conversion of Abandoned Railway Corridors to Trails." However not every state utilizes TE money for these purposes and the project sponsor should check with the state TE coordinator first. Visit www.enhancements.org for more information about TE and state contact information.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG)

CDBG grants may be used for a wide variety of projects that improve communities. Assessment and clean up of rail corridors that are being converted into multi-use community trails may qualify under these funds. U.S. Housing and Urban Development administers these grants for designated entitlement communities. Each state administers the funds for nonentitlement communities. For more information about these funds see www.hud.gov/offices/cpd/communitydevelopment/programs/index.cfm.

MASSACHUSETTS STATE AND LOCAL FUNDING SOURCES

COMMUNITY PRESERVATION ACT FUNDS (CPA)

CPA allows towns and cities to approve a referendum allowing them to levy a community-wide property tax surcharge of up to three percent for the purpose of creating a local Community Preservation Fund and qualifying for state matching funds. Funds raised through the CPA may be used for acquisition, creation, preservation, rehabilitation and restoration of open space. Testing and remediation would qualify for funding under this program. For more information, contact the Trust for Public Land at www.tpl.org.

MASSACHUSETTS BROWNFIELDS REDEVELOPMENT FUNDS

These grants fund testing and remediation on brownfield sites, but are currently restricted to redevelopment for economic development (housing, business, etc.). Though cleaning open space does improve communities, thus increasing the property values and inspiring local investment and business, these activities do not currently qualify for this funding. However this funding could potentially be used for testing and remediation of former railroad yards for redevelopment.

APPENDIX A: SURVEY FORM TO TRAIL MANAGERS — ATTEMPT 1 AND ATTEMPT 2

Name of trail:

Open for use or still under development, or both:

If open, surface type:

Miles of open trail:

Miles of trail under development:

County(ies) and state:

Please answer the following questions in as much detail as possible:

- A brief history of rail use on the corridor and when it stopped.
- Any other background that may be useful, relevant, or interesting.
- Type of testing done.
- Type of toxin(s) found and levels.
- Length of trail contaminated.
- Method of mitigation and why that method was chosen.
- Who was involved in mitigation process (list all government and private entities).
- Cost of mitigation.
- How long did the mitigation process take.
- Funding sources (various local, state, federal assistance programs, and any private monies used).
- Major challenges to remediation project.
- Suggestions to others to others in same situation / words of advice.
- Having gone through this, what would have made this process easier for you, resources that would have made the project easier (more, bigger, easier access to funding sources, clearer regulations, information).
- Impact of past contamination and remediation on ongoing maintenance (cost and otherwise).
- Contact information (name, organization, address, phone, e-mail, web site).
- Please send photos if you have them (before, during clean up, after).

APPENDIX B: TRAIL MANAGER SURVEY RESPONSES

TRAIL MANAGER SURVEY

CHIEF LADIGA TRAIL, AL
Extent of testing: Phase I.
Test results: Found no contaminants.
Comments: Ties taken up by railroad.

OLD RAIL ROAD BED, AL
Extent of testing: Unknown, railroad went into bankruptcy in late 1880s.
Test results: NA
Comments: NA

TBD, AL
Extent of testing: Trail still under development but not concerned as railroad was used to haul lumber. Inspection will probably happen during engineering yet to come.
Test results: NA
Comments: NA

TBD, AR
Extent of testing: Trail still under development and no testing has been done as of yet.
Test results: NA
Comments: NA

MOHAVE AND MILLTOWN RAILROAD TRAIL, AZ
Extent of testing: Did not survey or test because 1) not aware that it could be a problem because 2) the railroad was in service only a short time and the ties were removed 50 years ago.
Test results: NA
Comments: NA

OHLONE GREENWAY BICYCLE TRAIL, CA
Extent of testing: Not aware of any testing, but all city staff who were involved in project are gone.
Test results: NA
Comments: City recently purchased a siding from the railroad for a park next to the trail. The city did soil testing but no contamination was found.

UNION PACIFIC TRAIL, CA
Extent of testing: Phase II test.
Test results: NA
Comments: NA

UPPER TAMPA TRAIL, FL
Extent of testing: No testing done as part of trail project, but land was acquired five years prior and some testing may have been done then.
Test results: NA
Comments: NA

ARABIA MOUNTAIN TRAIL, GA
Extent of testing: Level 1 test.
Test results: NA
Comments: Corridor abandoned in 1936, not concerned.

NW ATLANTA GREENWAY TRAIL, GA
Extent of testing: No testing.
Test results: NA
Comments: Ties removed by salvage company for resale.

SILVER COMET TRAIL, GA
Extent of testing: No testing.
Test results: NA
Comments: Ties removed by salvage company for resale.

TRAIL OF THE COEUR D'ALENES, ID
Extent of testing: Extensive soil testing every few feet and Comprehensive Environmental Response, Compensation and Liability Act. The entire 72-mile trail was built on a contaminated area.
Test results: Heavy metal contamination found along entire corridor. Soil was removed and corridor was capped. Process cost $20 million to $30 million. Union Pacific paid all expenses. Took four to six years.
Comments: NA

TUNNEL HILL STATE TRAIL, IL
Extent of testing: One area tested for fuel contamination.
Test results: Contamination found. Earth removed and monitoring well installed using funds from Leaking Underground Storage Tank program. Cost was approximately $87,000.
Comments: NA

HASKELL RAIL TRAIL, KS
Extent of testing: Visual inspection did not prompt concern.
Test results: NA
Comments: Ties removed by salvage company.

PATUXENT BRANCH TRAIL, MD
Extent of testing: No testing was done. Train ceased operation in 1928 and had served a granite quarry.
Test results: NA
Comments: NA

THREE NOTCH TRAIL, MD
Extent of testing: NA
Test results: NA
Comments: Twenty-eight-mile trail appears to be informally open. Respondent indicated that no contamination issues are expected as they move forward with development but no reason given as to why not except that the railroad took up the ties when they abandoned the line.

FIND NAME, ME
Extent of testing: No testing.
Test results: There was some concern, but no indication of contaminants have been found.
Comments: Railroad stopped operation in 1952. Ties were removed at that time. Sounds as though trail is not open yet (perhaps that is why it has no name).

FRED MEIJER HEARTLAND TRAIL, MI
Extent of testing: Checked county records for corridor use. Visual inspection conducted during acquisition stage.
Test results: NA
Comments: NA

SKEGEMOG SWAMP PATHWAY, MI
Extent of testing: No testing, were not concerned.
Test results: NA
Comments: NA

CENTRAL LAKES TRAIL, MN
Extent of testing: Did not test. Trailside vegetation indicates that contamination is not a problem.
Test results: NA
Comments: NA

LAKE WOBEGONE TRAIL, MN
Extent of testing: Did a field survey and contacted the Minnesota Pollution Control Agency for a listing of any known contamination on the corridor.
Test results: No contamination found.
Comments: NA

FRISCO HIGHLINE TRAIL, MO
Extent of testing: Phase 1, concerned about spills from derailments.
Test results: Investigation found two underground fuel tanks which were removed. Results were reported to board (this trail is under private management). Remediation cost was $15,000 and was split by Burlington, Northern, Santa Fe and Ozark Greenways. Delayed project 11 months.
Comments: NA

GRANT'S TRAIL, MO
Extent of testing: Phase 1.
Test results: Asbestos tiles from old building or from dumping were found. Results reported to railroad and they had them removed. No delay in trail project, no increase in cost of liability insurance.
Comments: NA

LONGLEAF TRACE TRAIL, MS
Extent of testing: Visual inspection and local knowledge.
Test results: No remediation required.
Comments: Ties removed by railroad prior to transfer of corridor.

SOMERS TRAIL, MT
Extent of testing: Some sort of testing, apparently.
Test results: Mostly creosote. Environmental Protection Agency cleaned up.
Comments: NA

AMERICAN TOBACCO TRAIL, NC
Extent of testing: No testing, not an issue.
Test results: NA
Comments: Ties removed by railroad.

HOMESTEAD, NE
Extent of testing: Phase 1.
Test results: Results: no indication of contamination. No delay of project.
Comments: Ties removed prior to acquisition.

MOPAC EAST, NE
Extent of testing: Visual inspection.
Test results: NA
Comments: Ties salvaged prior to National Resources District taking ownership.

OAK CREEK TRAIL, NE
Extent of testing: Visual inspection and checked spill records.
Test results: NA
Comments: Ties salvaged before National Resources District took ownership. National Resources District feels trail users have little to no exposure to any contaminants that may be there.

PAULINSKILL VALLEY TRAIL, NJ
Extent of testing: New Jersey Green Acres surveys all property before acquisition.
Test results: No contamination was found.
Comments: NA

SUSSEX BRANCH TRAIL, NJ
Extent of testing: New Jersey Green Acres surveys all property for hazardous waste prior to acquisition.
Test results: No contamination was found.
Comments: NA

ASSABET RIVER RAIL TRAIL, NY
Extent of testing: Level 1.
Test results: Old oil drums had been dumped, but not necessarily by railroad.
Comments: Put $200,000 in development fund to cover cost of any needed remediation. Felt that with asphalt surface, a capping would protect against any potential contamination. Did not do any soil testing.

CAYUGA-SENECA CANALWAY TRAIL, NY
Extent of testing: Not started State Environmental Quality Review Act yet.
Test results: NA
Comments: NA

CLARKE RAIL TRAIL, NY
Extent of testing: Phase 1 at time of acquisition.
Test results: No major problems found.
Comments: Corridor had been abandoned for decades and tracks and ties were removed.

GENESEE VALLEY GREENWAY TRAIL, NY
Extent of testing: Literature search.
Test results: Not concerned because railroad abandoned operations 25 years ago.
Comments: Ties gone when Department of Environmental Conservation bought corridor from a utility.

GROVELAND SECONDARY TRAIL, NY
Extent of testing: Don't know.
Test results: NA
Comments: NA

LAKE PLACID TO SARANAC LAKE RECREATION PATHWAY, NY
Extent of testing: Trail still under development, design stage, no testing as of yet.
Test results: NA
Comments: NA

REMSEN TO LAKE PLACID TRAVEL CORRIDOR, NY
Extent of testing: Soil and water samples. Creosote was considered non-mobile and bound to soil immediately adjacent to ties and therefore not in contact with trail user.
Test results: No herbicide residue found. No delays.
Comments: NA

ADENA RECREATION TRAIL, OH
Extent of testing: No need to investigate; Ohio Environmental Protection Agency tracks toxic spills and none were found in corridor.
Test results: NA
Comments: NA

BLACKHAND TRAIL, OH
Extent of testing: Not known. Trail opened in 1980 and records concerning acquisition and development are no longer available.
Test results: NA
Comments: NA

HUFFMAN PRAIRIE OVERLOOK TRAIL, OH
Extent of testing: Visual examination.
Test results: Little, if any, contamination, remediation not required.
Comments: This is a rail-with-trail and trail is a good distance from active rail line so no contamination was expected.

LOWER SCIOTO TRAIL, OH
Extent of testing: No environmental issues.
Test results: NA
Comments: Rails and ties removed long before they took possession, perhaps 35 years ago.

SPRINGFIELD BRANCH TRAIL, OH
Extent of testing: Trail just getting to planning stage. An environmental assessment will be conducted by the design consultant and will be reviewed by Ohio Department of Transportation.
Test results: NA
Comments: Railroad removed ties before abandoning corridor.

WRIGHT BROTHERS HUFFMAN PRAIRIE BIKEWAY (KAUFFMAN AVENUE BIKEWAY), OH
Extent of testing: Visual inspection and soil samples.
Test results: Finding of no significant impact.
Comments: Investigation took about three months. This is a rail-with-trail and the trail is 20 to 30 yards from active line.

SPRINGWATER ON THE WILLAMETTE, OR
Extent of testing: Phase 1 conducted before purchase.
Test results: Result: No cause for concern, capping would provide any needed protection.
Comments: NA

ALLEGHENY RIVER TRAIL, PA
Extent of testing: Site issued Categorical Exclusion by Pennsylvania Department of Transportation.
Test results: No contamination found.
Comments: Railroad history provided no reason to be concern.

CLARION-LITTLE TOBY RAIL TRAIL, PA
Extent of testing: Not aware of testing, issue not raised.
Test results: NA
Comments: NA

ERNST TRAIL, PA
Extent of testing: Did not test. Issues were discussed but were not a concern. No obvious problems.
Test results: NA
Comments: Railroad abandoned about 30 years ago.

GREATER HAZLETON RAILS TO TRAILS, PA
Extent of testing: Trail not open yet. Phase 1 test. Were concerned because area is a superfund site.
Test results: No major toxics found. Capping, berming, phytoremediation, soil recycling, soil disposal all used on broader site. It cost $15 million to clean up entire site but trail is only very small portion and not actually in the superfund area.
Comments: NA

MONTOUR TRAIL, PA
Extent of testing: Soil testing.
Test results: No sign of contamination found.
Comments: Most ties were gone when they took possession of corridor. Those that were left were put into landfills, some were recycled, a few were burned until they learned that they should not do that.

SANDY CREEK TRAIL, PA
Extent of testing: Site was issued a categorical exclusion by Pennsylvania Department of Transportation because there was no reason to believe that contaminants were present in any significant amount.
Test results: NA
Comments: Railroad hauled coal from 1906 until 1980's. No evidence of dumping or contamination other than occasional coal car accident.

HISTORIC UNION PACIFIC RAIL TRAIL STATE PARK, UT
Extent of testing: Tested air, soil and water for the first 3.5 miles out of Park City of the 28-mile trail.
Test results: Specific findings considered privileged, but generally found traces of heavy metals from mining and processing of ore.
Comments: Remediation effort was capping of trail. Delayed project 1.5 to two years. Findings did not impact liability insurance.

W&OD TRAIL, VA
Extent of testing: Soil testing for arsenic. Photo shows spraying.
Test results: No trace of arsenic found.
Comments: NA

D&H RAIL TRAIL, VT
Extent of testing: No testing. Plant growth on corridor was robust.
Test results: NA
Comments: Issue was of no concern to developing agency until eight years after trail was built when a citizen asked about the issue of contamination. Vermont Agency of Transportation was no concerned, no investigation.

TBD, WA
Extent of testing: Corridor in city ownership for at least 11 years. Respondent unsure of history, as far as she knows, no testing was conducted.
Test results: NA
Comments: NA

400 STATE TRAIL, WI
Extent of testing: Phase 1.
Test results: NA
Comments: Ties sold for salvage.

BADGER STATE TRAIL, WI
Extent of testing: No testing; no sign of contamination.
Test results: NA
Comments: Ties removed by contractor and resold.

ELROY-SPARTA TRAIL, WI
Extent of testing: Phase 1
Test results: NA
Comments: Ties sold for salvage.

LA CROSSE RIVER STATE TRAIL, WI
Extent of testing: Phase 1.
Test results: NA
Comments: Some ties were sold, some buried, some left on site.

SOUTHWEST BIKE PATH, WI
Extent of testing: Phase 1 and Phase 2.
Test results: Found arsenic and chromium above regulatory limits in all 10 borings, plus lead in one boring. Results reported to Wisconsin Department of Natural Resources and Wisconsin Department of Transportation. No material was removed from site, rather all soil would be covered with either asphalt or topsoil and vegetation. This solution added little, if any, extra cost. Fees were covered by a Transportation Enhancements grant that was awarded to build the trail. This process of testing and remediation did not result in any project delay because these findings were foreseen and thus the time to deal with them were included in the original project schedule.
Comments: Ties were disposed of at licensed landfill.

SUGAR RIVER STATE PARK TRAIL, WI
Extent of testing: No testing, trail developed in 1973.
Test results: NA
Comments: Ties were piled and rotted.

TBD, WI
Extent of testing: No contamination encountered.
Test results: NA
Comments: NA

MEDICINE BOW TRAIL, WY
Extent of testing: Environmental assessment ongoing.
Test results: NA
Comments: NA

APPENDIX C: CASE STUDY SURVEY FORM

Name of trail:

Open for use or still under development, or both:

If open, surface type:

Miles of open trail:

Miles of trail under development:

County(ies) and state:

Please answer the following questions in as much detail as possible:

- A brief history of rail use on the corridor and when it stopped.
- Any other background that may be useful, relevant, or interesting.
- Type of testing done.
- Type of toxin(s) found and levels.
- Length of trail contaminated.
- Method of mitigation and why that method was chosen.
- Who was involved in mitigation process (list all government and private entities).
- Cost of mitigation.
- How long did the mitigation process take.
- Funding sources (various local, state, federal assistance programs, and any private monies used).
- Major challenges to remediation project.
- Suggestions to others to others in same situation/words of advice.
- Having gone through this, what would have made this process easier for you, resources that would have made the project easier (more, bigger, easier access to funding sources, clearer regulations, information).
- Impact of past contamination and remediation on ongoing maintenance (cost and otherwise).
- Contact information (name, organization, address, phone, e-mail, web site).
- Please send photos if you have them (before, during clean up, after).

APPENDIX D

LEXIS SEARCH CRITERIA AND EXCLUSIONS

Access to certain freelance articles and other features within this publication (i.e. photographs, classifieds, etc...) may not be available. U.S. newspapers must be listed in the top 50 circulation in Editor & Publisher Year Book. Newspapers published outside the United States must be in English language and listed as a national newspaper in Benn's World Media Directory or one of the top 5 percent in circulation for the country.

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Business Monitor News (file: BMINWS)

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Annals of Plastic Surgery; ANPS
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DM News; DMNEWS
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Facility Index System; FINDS
FIFRA & TSCA Tracking System; FTTS
Hospitals and Health Networks; HOSP
IDD Merger and Acquisition Reports — Archival; IDDMA
IDD Mergers and Acquisition Database — Canada — Archival; IDDCAN
IDD Mergers and Acquisition Database — European Reports — Archival; IDDEUR
IDD Mergers and Acquisition Database — US Reports — Archival; IDDUS
IDD Mergers and Acquisitions Database — UK Reports — Archival; IDDUK
Institutional Investor Publications; IIALL
Leaking Underground Storage Tanks (LUST) Site Records; LUST
National Pollutant Discharge Elimination System Facility Information; NPDESF
National Priority List Descriptions of Hazardous Waste Sites; NPLIST
National Priority List of Hazardous Waste Sites; NPLDSC
No Further Remedial Action Planned; NFRAP
Potentially Responsible Parties (PRP) Superfund Enforcement Tracking System; PRP
RCRA Corrective Action Record; CORACT
Resource Conservation & Recovery Information System; RCRIS
Solid Waste Site Records; SWS
State Priority Lists; SPL
Surgery, Gynecology and Obstetrics; SGO
Toxic Chemical Release Inventory; TRIS
Underground/Aboveground Storage Tank Site Records; USTAST
World Financial Markets; WLDFIN

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