

# Visualizing and Managing Field Inspection Activity in Pasadena

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## **Abstract:**

The City of Pasadena, California has rolled out a customized ArcIMS application (iMAP) and linked it to its parcel information tracking system (Tidemark). Using real- and near real-time Tidemark data, the City provides Code Compliance inspectors and management with multiple maps of code violation issues and potential trouble spots, viewed at the parcel, neighborhood, or compliance territory level. Via iMAP, this information is made available to all City staff with access to the enterprise network. Layers include land use, vacant lots, vacant buildings, violations, violation severity, and residential density. The paper and presentation will describe information needs identified; data points and processes developed to meet those needs; how the GIS-Tidemark integration was implemented; and how Code Compliance has adjusted its resource deployment based on more informed decision-making.

## **I. Introduction:**

The City of Pasadena, California, is probably best known for its New Year's Day festivities, the Tournament of Roses Parade and Rose Bowl Game. The City is located in the County of Los Angeles, at the foot of the San Gabriel Mountains, and at the western edge of the San Gabriel Valley. Within its borders, Pasadena has a population of over 136,000, approximately 23 square miles, and nearly 33,000 parcels. Pasadena is as proud of its rich cultural heritage and many historic properties as it is of its many modern residential amenities, vibrant commercial areas, and world-renowned institutions of higher education.

In the year 2000 the City began its investment in GIS, developed primarily by a departmental partnership between Planning and Development, Public Works, Water and Power, and Information Technology. The City has an enterprise GIS web site, which is available to all City employees with intranet access, served up using ArcIMS. There are approximately 25 ArcGIS users in various departments throughout the City. At this time, though, the current GIS and land base is primarily driven by parcel-related data.

When the City of Pasadena began developing its GIS system, much of its tabular land base data was already stored in an Oracle database, which was being updated continuously through Accela's "Tidemark" permitting and parcel maintenance system. The City did not want to run the risk of having two separate databases to be updated independently. Pasadena's preferred

# Visualizing and Managing Field Inspection Activity in Pasadena

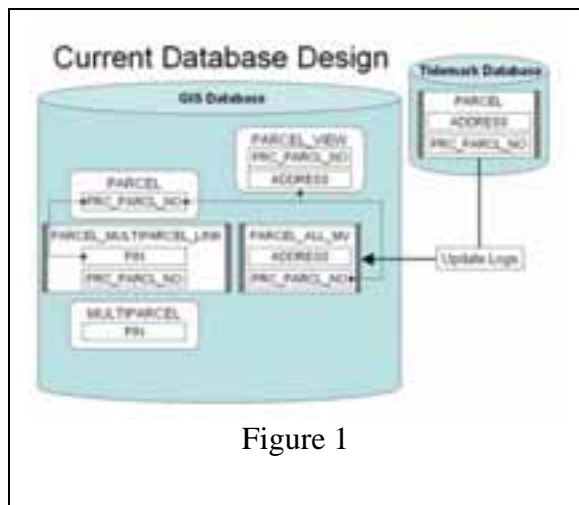


Figure 1

scenario was for the GIS to read the data in Tidemark, which was already replete with a wealth of attribute data about parcels.

The City contracted with Psomas to develop its GIS program, including iMAP, the enterprise GIS web portal. ArcSDE database, and a set of policies and procedures for updating. Psomas developed a protocol, which the City has since refined, to refresh a geodatabase table residing in ArcSDE. This table contains the GIS parcel attribute data from the Tidemark database, through the use of an Oracle materialized view as illustrated in Figure 1.

In Pasadena's current system, parcel attribute data are stored and updated in the Tidemark (Oracle) database, where the primary key is the APN field. On the GIS side, spatial parcel data is stored in an Oracle/ArcSDE database, where the primary key is the PIN field. A link table is used to negotiate many-to-one relationships by joining spatial PIN values to tabular APN values. The joined spatial/tabular data is presented to users through ArcSDE spatial views.

Each night a script sends update logs from the Tidemark database to the GIS database, which updates the parcel materialized view tables, including address and APNs. Other, more dynamic Tidemark data, such as permit status or inspections, are accessed real-time from the GIS using the PIN-APN link. Once the parcel polygons are identified and rendered in GIS, parcel attribute data is also accessed from the Tidemark database – e.g. owner information, permit information, zoning information, etc.

## II. Code Enforcement Activities:

Pasadena's Code Compliance group works proactively to ensure preserve and enhance the quality of life in the City. Staff not only investigates code compliance complaints such as abandoned vehicles, over-grown yards, and unsafe buildings, but takes a proactive approach to ensuring that neighborhoods and residential units are safe and meet the City's standards. For instance, every multi-family residential building of three or more units is inspected every four years to ensure that it is safe and inhabitable. Single family dwellings, duplexes, and triplexes are inspected prior to close of escrow to ensure that all items meet code. Additionally, Code Compliance Officers routinely survey their assigned neighborhoods to identify and correct code violations before they become problems or nuisances in the neighborhood.

Code Compliance management asked if the City's iMAP application could be used to help focus resources toward potential trouble spots within the City. A project team was assembled, consisting of the City's Code Compliance Management; City's GIS Coordinator, and GIS Analyst; and Planning and Development Department's (P&D) Technology Projects Manager, and Tidemark Database Administrator. The project team met several times to identify useful

## **Visualizing and Managing Field Inspection Activity in Pasadena**

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data fields, and to determine how those might be displayed geographically in iMAP. Over the course of conversations, it became evident that since so many new layers were needed, and since the information was so unique to Code Compliance, a new map service was in order.

### **III. Building Code Compliance Layers and Map Service:**

The following is a list of iMAP layers that the development team decided was relevant to the deployment of Code Compliance staff resources. Several of the layers already existed on the City’s enterprise ArcSDE server. Others were created specifically for the Code Compliance map service. The table below shows the mix of layers identified by the development team; whether those layers already existed on the City’s ArcSDE; and the purpose of including the layer: An annotated description of these data layers can be found in the table in Section VII, along with their data source and a thumbnail of how they appear in the iMAP application.

<b>Layer</b>	<b>Existing/New</b>	<b>Purpose</b>
<b>City Boundary</b>	Existing	Line - Helps staff determine whether a parcel is inside or outside the City’s jurisdiction
<b>Schools</b>	Existing	Point - Some code compliance issues deal with proximity to school property
<b>Council District Line</b>	Existing	Line - Helps staff know which Council member or field deputy may need to be involved
<b>Vacant Building</b>	New	Parcels with a vacant building are hot-spots for code violations and code compliance activities
<b>Vacant Lot</b>	New	Parcels as vacant lots are hot-spots for code violations and code compliance activities
<b>Multi-Unit Quad</b>	New	Parcel with a multi-family building that comes under the City’s Quadrennial inspection program
<b>National Register (property)</b>	Existing	Parcel listed on the National Register of Historic Places. A hot-spot for code violations.
<b>Landmark</b>	Existing	Parcel listed on the City’s list of Historic Places. A hot spot for code violations.
<b>Greene and Greene Property</b>	Existing	Parcel with a structure built by these architects of historical significance. A hot-spot for code violations.
<b>Landmark District</b>	Existing	Parcel within a group of parcels that comprises a City “Landmark” Neighborhood. A hot-spot for code violations.
<b>National Register Districts (shaded)</b>	Existing	Parcel within a group of parcels that comprises a Nationally recognized “Landmark” Neighborhood. A hot spot for code violations.

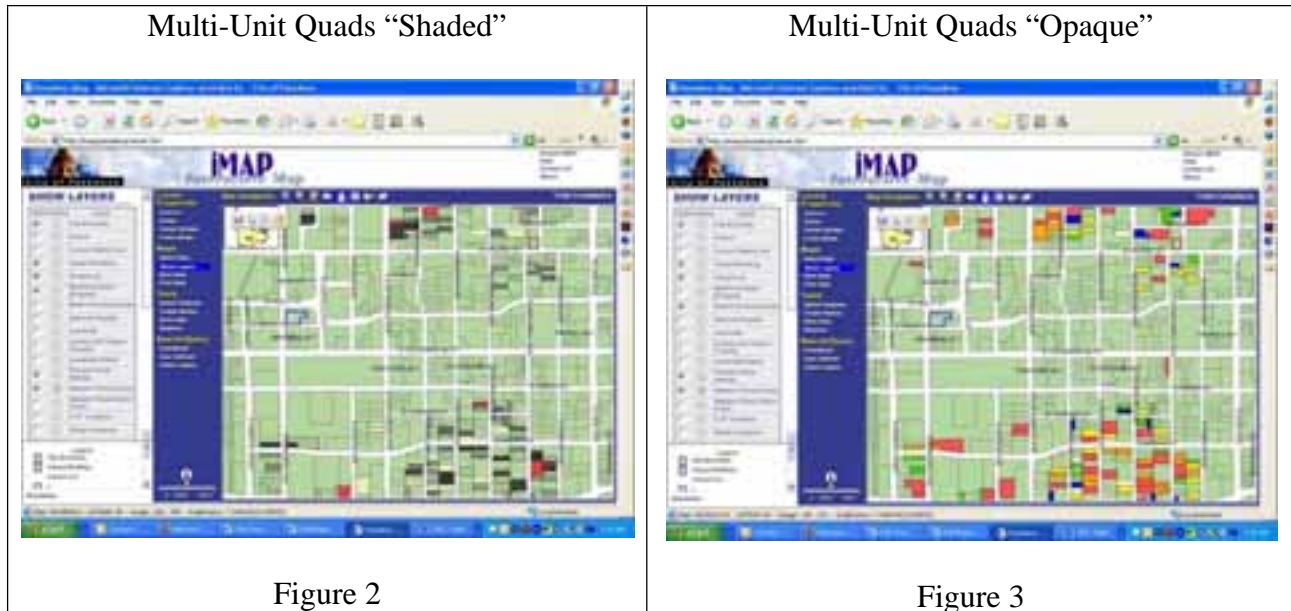
## Visualizing and Managing Field Inspection Activity in Pasadena

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<b>Layer</b>	<b>Existing/New</b>	<b>Purpose</b>
<b>Primary Parcel Address</b>	Existing	Parcel view that displays the primary parcel address at appropriate zoom level. Useful for tying parcel number to street address
<b>Assessor Parcel</b>	Existing	Shows parcel boundaries and provides ownership information for Code Enforcement activities.
<b>CTP Violations</b>	New	Parcels that have active and open Complaint Tracking Program (CTP) cases, also known as Code Compliance Citations. Color indicates the number of violations.
<b>Street Centerline</b>	Existing	With the iMAP measure tool, helps staff determine distance from street center line for certain enforcement actions.
<b>Street Name</b>	Existing	Shows street names for staff reference
<b>Proactive Neighborhood Surveyed</b>	New	Based on census tracts, shows those neighborhoods which have been recently surveyed for Code Compliance violations.
<b>Code Compliance Areas</b>	New	Based on Census tracts data, shows Code Compliance staff territories.
<b>Violation Severity</b>	New	Parcel shows whether a quadrennially inspected building has major, minor, or no code violations, based on Tidemark data.
<b>Land Use</b>	Existing	Parcel that shows current land use, based on Assessor information found in Tidemark. Useful for some Code Enforcement actions.
<b>Building Footprint</b>	Existing	Polygon that represents the footprint of the structure(s) on a parcel. (From 1999 aerial photo)
<b>Multi Parcel</b>	Existing	Polygon that represents the footprint of the structure(s) on a pseudo parcel several tax parcels (e.g. condominiums)
<b>Aerial Photo 2005</b>	Existing	Provides aerial view of what was on the ground when the photo was taken. Useful to document unauthorized construction and additions.
<b>Aerial Photo 2003</b>	Existing	Provides aerial view of what was on the ground when the photo was shot. Useful to document unauthorized construction and additions.
<b>Aerial Photo 1999</b>	Existing	Provides aerial view of what was on the ground when the photo was shot. Useful to document unauthorized construction and additions.

## Visualizing and Managing Field Inspection Activity in Pasadena

The development team determined that Code Compliance staff would likely want to look at several different layers simultaneously. Therefore, the development team needed to pay special attention to color choices, opacity of the layers, and order of the layers, so that one polygon layer did not obscure the next. In several instances a layer is repeated using either clear or hatched symbolization. For instance, for display purposes, staff may want to see “multi-unit quads” shown in opaque colors. However, to see “multi-unit quads” with “Quad Violation Severity”, we created a different layer accessing the same data but using hatching on a clear background. Likewise, “Parcel Clear” allows violations on a parcel to be distinguished, while still allowing parcel ownership information to be accessed.



The development team went through several iterations of order and color scheme to arrive at the version finally available to staff today.

#### IV. Data for Code Compliance Layers:

The Code Compliance map service is a combination of enterprise-wide data maintained by the GIS office, Public Works, and Planning and Development, of which the Code Compliance Group section is a part. The following describes which groups maintain which data layers.

##### ***GIS Office:***

In addition to maintaining the iMAP application, the GIS office also maintains and updates the aerial photographs, or orthophotos. The City is participating in the Los Angeles County Imagery Acquisition Consortium (LIRAC). Through LIRAC, the orthophotos will continue to be updated every two years. The GIS office also maintains the shape data for parcels, and building footprints.

##### ***Public Works Department:***

The City’s Public Works Department maintains both the shape and attribute data related to the following layer in the Code Compliance Map view, most of which is static

## Visualizing and Managing Field Inspection Activity in Pasadena

- City Boundary
- Council District Boundary
- Street Centerline
- Street Name

### ***Planning and Development Department:***

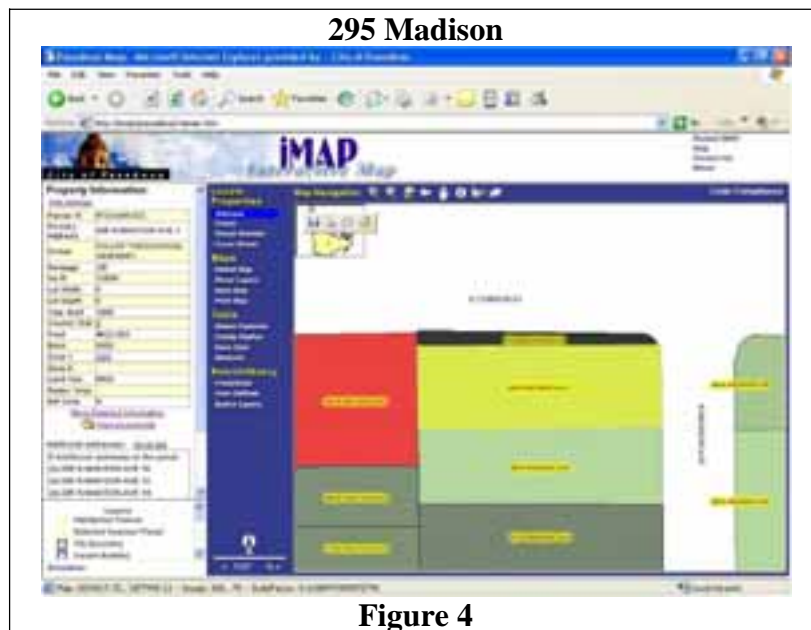
While the GIS office maintains the shape data, the Planning and Development Department (P&D) Department maintains virtually all of the attribute data for parcels and building footprints within the Tidemark database. Case-related attribute data is refreshed in the materialized views twice each day. This would include:

- Quad Violation Severity
- CTP Violations

Parcel attribute information is updated by several different P&D staff members including staff responsible for issuing building permits, updating address and parcel changes, historic preservation staff, zoning staff, and code compliance, etc.

- Vacant Parcels
- Vacant Buildings
- Landmark properties
- National Register properties
- Greene and Green properties
- Land Use
- Multi-Unit Quads (Residential Density)

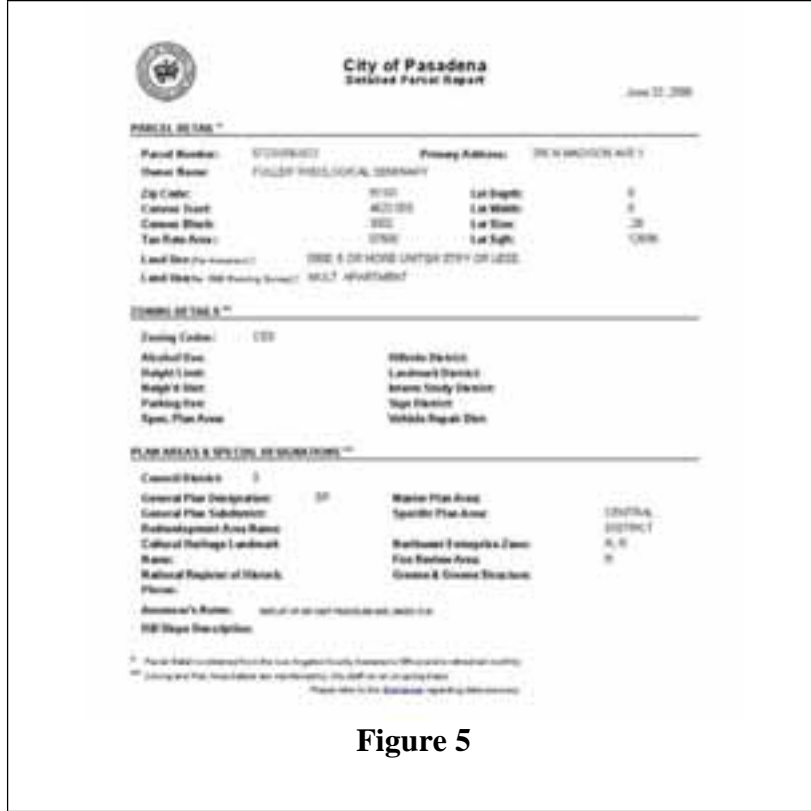
## **V. Resource Allocation Benefits to Code Compliance Map Service**



From the iMAP application, staff can identify a parcel or parcel address (Figure 4), and generate a "Parcel Report" (Figure 5). This report provides Code Compliance staff with valuable information about the property ownership, zoning, specific plan area, etc. From iMAP, staff can also see what documents and permits, including site photos, have been attached to the parcel or case and saved in the Tidemark application (Figure 6). Then staff can view those documents through the iMAP application (Figure 7).



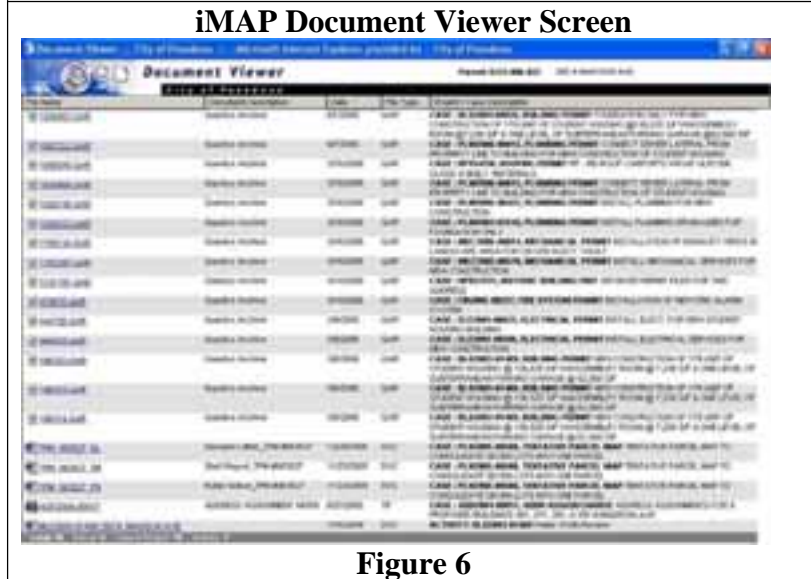
# Visualizing and Managing Field Inspection Activity in Pasadena



**Figure 5**

This significantly reduces staff research time and allows for more time to spend in the field.

Management can use the application to view neighborhoods with notable violation activity in conjunction with other area attributes such as concentrations of multi-family dwellings; vacant land or structures; graffiti activity (under development); landmark designations; etc. Analytical GIS tools can also be used to determine potential statistical correlations between such factors. From there management can make informed decisions to deploy resources more strategically.



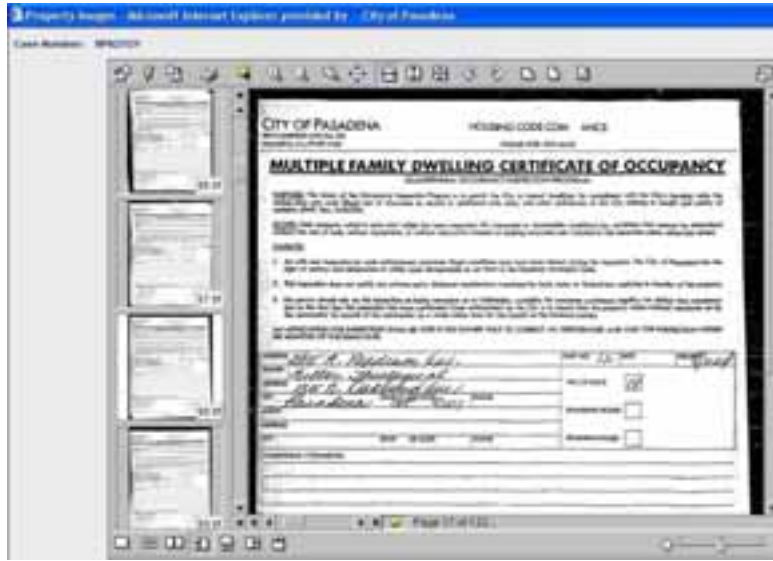
**Figure 6**

Each year, since the original iMAP deployment in 2000, the City has added additional map services, data views, and functionality to the application. When the Code Compliance Map Service was launched in August 2005, iMAP was already heavily integrated with Tidemark parcel data. The City of Pasadena has **NOT** undertaken a rigorous cost-benefit analysis of the Code Compliance map service.

## Visualizing and Managing Field Inspection Activity in Pasadena

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### View Document in iMAP



**Figure 7**

The City is confident, however, that over the past year it has recouped its initial investment in staff resources, through productivity improvements. Approximately 20 staff days of effort were spent developing, configuring, testing, and implementing the Code Compliance map service. With 16 Code Compliance officers using the application, if each saves a modest two hours of staff research time per month, the City recouped its initial investment in the first six months. The City expects that iMAP and the Code Compliance map service will continue to pay big productivity dividends.

### VI. Acknowledgements:





The authors would like to acknowledge the contributions of the following without whom the project could never have been completed, nor could this paper have been written.

- Jon Pollard, Manager, Code Compliance, City of Pasadena Planning and Development Department
- Michael King, Manager, Code Compliance, City of Pasadena Planning and Development Department
- Lisa Stinstrom, Supervisor, Information and Technology Services, City of Pasadena Planning and Development Department
- Michael Neely, Tidemark Database Administrator, Information and Technology Services, City of Pasadena Planning and Development Department
- Ani Balikian, GIS Analyst, City of Pasadena Information Technology Division







## Visualizing and Managing Field Inspection Activity in Pasadena





### VII. Table of Code Compliance iMAP Layer Descriptions:

<i>Layer</i>	<i>Source</i>	<i>As Viewed</i>
<b>Vacant Lot</b> <ul style="list-style-type: none"> <li>A parcel of vacant land.</li> </ul>	Tidemark Parcel Screen: <i>Code Vacant Lot = Y</i>	
<b>Vacant Building</b> <ul style="list-style-type: none"> <li>A parcel on which one or more buildings is vacant.</li> </ul>	Tidemark Parcel → Address Screen: <i>Vacant = Y</i>	
<b>Multi-Unit Quad (Shaded)</b> <ul style="list-style-type: none"> <li>A parcel with a multi-family dwelling unit.</li> <li>Shaded view allows you to see other parcel information through this layer.</li> </ul>	Tidemark Parcel Screen: <i>Assr Units</i>	
<b>Multi-Unit Quad (Shaded)</b> <ul style="list-style-type: none"> <li>A parcel with a multi-family dwelling unit.</li> <li>Colored views may be better for display but do not allow other parcel information to be seen on the screen.</li> </ul>	Tidemark Parcel Screen: <i>Assr Units</i>	

## Visualizing and Managing Field Inspection Activity in Pasadena





<i>Layer</i>	<i>Source</i>	<i>As Viewed</i>
<p><b>Landmark District (new)</b></p> <ul style="list-style-type: none"> <li>• City of Pasadena Landmark Districts</li> <li>• Identifies the specific District e.g. Bungalow Heaven, Washington Square, etc.</li> </ul>	<p>Tidemark Parcel Screen: <b><i>Zoning Overlays Landmark pick-list.</i></b></p>	
<p><b>National Register District</b></p> <p>OR</p> <ul style="list-style-type: none"> <li>• An area of the City</li> <li>• A parcel within the city which has been designated by the National Register of Historic Properties</li> </ul>	<p>Tidemark Parcel Screen: <b><i>Zoning Overlays Landmark pick-list.</i></b></p>	
<p><b>Cultural Heritage Landmark</b></p> <ul style="list-style-type: none"> <li>• A building on this parcel is listed as a “Cultural Heritage Landmark.”</li> <li>• (The term will soon be changed to simply “Landmark,” per Design and Historic Preservation.</li> </ul>	<p>Tidemark Parcel Screen: <b><i>Cultural Heritage Landmark Building</i></b> field.</p>	
<p><b>Greene and Greene Property</b></p> <ul style="list-style-type: none"> <li>• A parcel of land with a building Designed by Greene and Green.</li> </ul>	<p>Tidemark Parcel Screen: <b><i>Greene and Greene Structure</i></b> field is populated.</p>	

## Visualizing and Managing Field Inspection Activity in Pasadena



<i>Layer</i>	<i>Source</i>	<i>As Viewed</i>
<p><b>Landmark District</b></p> <ul style="list-style-type: none"> <li>Identifies parcels belonging to any of the City's Landmark Districts.</li> <li>Does not distinguish Among the Districts.</li> <li>Hatching allows other parcel information to be viewed.</li> </ul>	<p>Tidemark Parcel Screen: <b>Zoning Overlays Landmark pick-list</b>, if any value is populated.</p>	
<p><b>Primary Parcel Address</b></p> <ul style="list-style-type: none"> <li>Displays the primary address of a parcel.</li> <li>Only displays when "zoomed" in to a fairly close resolution.</li> </ul>	<p>Tidemark Parcel → Address Screen: <b>Primary = Y</b></p>	
<p><b>Assessor Parcel (Clear)</b></p> <ul style="list-style-type: none"> <li>Shows only the parcel outline.</li> <li>Allows other parcel layers to be viewed at the same time.</li> </ul>	<p>Attribute information comes from the Tidemark Parcel Screen: Geometry is based on legal description and Assessor Data.</p>	
<p><b>Proactive Neighborhood Surveyed</b></p> <ul style="list-style-type: none"> <li>Census Tracts which have been surveyed by officers show "clear."</li> <li>Census Tracts which have not been surveyed show gray.</li> </ul>	<p>List of Census tracts surveyed and not surveyed provided by Jon Pollard in April, 2005.</p>	



## Visualizing and Managing Field Inspection Activity in Pasadena

<i>Layer</i>	<i>Source</i>	<i>As Viewed</i>
<p><b>Code Compliance Areas (Line)</b></p> <ul style="list-style-type: none"> <li>• Only the boarder lines of the Areas.</li> <li>• Allows for parcel information to be seen in conjunction with the boarders</li> </ul>	<p>List of Code Compliance Areas and the Census Tracts each covers, provided by Jon Pollard in April, 2005.</p>	
<p><b>Code Compliance Areas (Shaded)</b></p> <ul style="list-style-type: none"> <li>• With the boarder lines of the Areas visible.</li> <li>• Allows for parcel information to be seen in conjunction with the boarders</li> </ul>	<p>List of Code Compliance Areas and the Census Tracts each covers, provided by Jon Pollard in April, 2005.</p>	
<p><b>Code Compliance Areas</b></p> <ul style="list-style-type: none"> <li>• Without the boarder lines of the Areas visible.</li> <li>• Conceals some parcel information when displayed with other layers.</li> </ul>	<p>List of Code Compliance Areas and the Census Tracts each covers, provided by Jon Pollard in April, 2005.</p>	
<p><b>Violation Severity</b></p> <ul style="list-style-type: none"> <li>• Green = no violation</li> <li>• Yellow = minor violation</li> <li>• Red = major violation</li> </ul>	<p>Tidemark CCI Case screen: <b><i>Violation Severity = No active violation; minor violation; or major violation.</i></b></p>	

## Visualizing and Managing Field Inspection Activity in Pasadena

<i>Layer</i>	<i>Source</i>	<i>As Viewed</i>
<p><b>CTP Violations</b></p> <ul style="list-style-type: none"> <li>• Green = no violation</li> <li>• Yellow = 1-2 violations</li> <li>• Red = 3 or more violations</li> <li>• <b>Note:</b> Reads “Violations” not “Cases.”</li> </ul>	<p>Tidemark CTP Case Screen → Violations Sub-Screen: <b><i>Each violation type is counted per case.</i></b> (E.g. 1 – Trash, Junk &amp; Debris; 2 – Inoperative Vehicle; 3) Parking on landscape)</p>	
<p><b>Land Use:</b></p> <ul style="list-style-type: none"> <li>• Current land use</li> <li>• 8 general categories</li> <li>• As reported by the Los Angeles County Assessor’s Office.</li> </ul>	<p>Tidemark Parcel Screen: <b><i>Land Use per Assr.</i></b></p>	

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