



# SITE DEVELOPMENT **PRIMER**

**NO ONE LIKES SURPRISES!**



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The importance of laying the ground work for success has never been more important than in today's development market, whether retail, commercial, residential or institutional. Infrastructure and site development are the "invisible" components of these multimillion dollar investments. And the early phases of planning can contribute greatly to the ultimate success of the venture.

Site development is key to create a well-functioning site for the long term and to the perception of quality of the institution, company or organization occupying the site. Grading transitions; ease of access whether vehicular, transit or pedestrian; landscape and hardscape aesthetics are all elements of site development that contribute to the first impression.

Less visible, but equally as important, are the steps that occur before design even begins: feasibility studies, site selection, acquisition of permits and adherence to ordinances, utility verification and more. When executed properly, these elements work together towards a quality facility, providing a head start to successful operation.

## **But when things go wrong?**

When Dunaway Associates asked developers, facility planners, CEO's, and architects what was the biggest stumbling block to a successful project, their answer was one consistent, yet simple word:

## **SURPRISES**

Surprises that include unanticipated fees and ordinances; municipal utilities or franchise utilities not where they were supposed to be; and other unanticipated issues. It was through these conversations that this booklet was conceived. By understanding, anticipating and mitigation surprises in these early stages, the project team can establish a good foundation for future success of the project.

# Contents

***A Primer for Better Site Development*** is divided into two parts.

***Part One: Top Surprises in Site Development*** identifies the leading “what can go wrong” scenarios faced when expanding or building new facilities.

***Part Two: Top Considerations for Building Better Sites*** summarizes Dunaway Associates’ 50 + years of practice into eleven salient points.

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## PART ONE

# Top Surprises in Site Development

Surprises—unexpected challenges that can impact anything from grading and drainage to traffic and parking issues—can add hundreds of thousands of dollars to construction cost. Delays can add weeks, months, even years (in the case of some permitting issues) to the completion schedule. Anticipating these surprises and avoiding their consequences can impact the bottom line.

Dunaway offers an **integrated project team** approach that allows for true collaborative input to help uncover what could go wrong. Blending Building Information Modeling (BIM) and 3D Civil modeling software, Dunaway is leading the way in offering visualization applications to the early site development phase at a time when key decisions are made that impact the long-term success of the project.

These visualization techniques allow the entire project team—engineers, architects, and construction contractor—to view the project in ways not previously possible. A clear picture of the integration of the land, infrastructure, and building emerges, giving advanced disclosure to design team, owner’s representatives, contractor and subcontractors. This collaborative process allows enhanced synergy that helps eliminate surprises that add can add cost and delays.

Dunaway’s 50 + years of practice has resulted in a unique ability to anticipate challenges, ask the right questions, tap into local knowledge and decision-makers, and apply engineering, planning, environmental, and landscape architecture expertise to get projects off to the right start. Experience, coupled with the firm’s **integrated project team** approach, results in a facility which affirms the owner’s intention and legacy.



SURPRISE #

1

## Stormwater Detention

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### ***Surprise:***

The master plan's space allocation for stormwater detention does not meet site requirements. The problem: allocated space may not align properly with existing municipal infrastructure—or size (surface area of pond) does not accommodate required volume—or perhaps basin location conflicts with optimum drainage elevation allowed by topography.

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### ***Solution:***

Use creative application of a variety of options for detention in ways that will not compromise the site plan but will still accommodate stormwater management needs.

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### ***Discussion:***

Often there are multiple options for stormwater detention in addition to a typical on-site pond. Don't fall victim to the idea that all detention must be in one spot. Often the solution lays in multiple detention facilities. For example: **One**, consider a redesign of the parking lot topography to "build in" detention low spots while maintaining parking capacity. **Two**, explore the possibility of detention reservoirs below ground, underneath the parking lot or garage. Or **three**, incorporate swales (bio swales or vegetative swales) to manage stormwater detention needs while getting the benefit of a sustainable approach. Another alternative would be to work with the city or local jurisdictional authority to implement downstream upgrades to accept increased flow. Creative solutions can help maximize site layout while avoiding compromise to stormwater drainage needs.



SURPRISE #

## 2 Accessibility Requirements

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### ***Surprise:***

Site programming failed to realize the domino effect of accessibility improvements on a rehabilitation, renovation or expansion of an existing facility. What began as one or two simple accommodations has become a facility-wide accessibility upgrade.

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### ***Solution:***

Enlist a Registered Accessibility Specialist early in project programming. Accommodate unexpected accessibility construction improvements through cost-effective trade-offs in your original plan.

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### ***Discussion:***

Americans with Disabilities Act (ADA) guidelines have not changed...once any accessibility upgrade to a facility occurs in the rehabilitated or expanded portion of the facility, it may trigger the requirement to upgrade the entire facility, a cost that is often overlooked in project budgeting. The best you can do at this point is to find ways to accommodate requirements in as cost-effective manner as possible. Sometimes that means changing the entryway location to meet distance restrictions from handicapped parking to main doorway. Or another solution could include rerouting walkways along a topography that more easily stays within maximum grade/slope limitations. Even after a project is well underway, bringing in a Registered Accessibility Specialist can help discover least-cost solutions to difficult challenges. However, bringing in this specialist early-on in project programming is the best way to avert lost time and budget overruns in the long term.



SURPRISE #

3

Landscape  
Architecture

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### ***Surprise:***

A goal to maximize floor space of the facility has left minimal space for exterior landscape opportunities, yet decision-makers want the outdoor environment to contribute to a positive indoor experience.

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### ***Solution:***

Skilled application of landscape architecture solutions can turn even limited space into an integral part of a relaxing environment while contributing to the positive visitor experience.

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### ***Discussion:***

Studies have shown that viewing natural scenes such as gardens fosters stress recovery by evoking positive feelings, reducing negative emotions, and blocking or reducing stressful thoughts. This research has demonstrated the restorative benefits of gardens, and many organizations are eager to integrate their rigorously planned internal spaces with the external environment. Space is limited, creative solutions can maximize potential. Creative approaches may include: **One**, maximize the view of gardens from the inside of the facility to create the illusion of more space, opening up a two-way vista of the peaceful environment. **Two**, focus on scale—don't overwhelm limited space with large-scale shapes, whether the shape is a planting, fountain or seating accommodation. And **three**, steal small venues from other locations—for example, a 5 x 5 foot area can become a mini garden. Even interior spaces can be transformed into a garden-like setting. A professional landscape architect can blend goals of functionality, maintainability, environmental soundness, and cost effectiveness to create a visually pleasing landscape. Getting the landscape architect on board early is a good solution, but in the event of a "surprise" of limited space, this professional can develop creative solutions that maximize land use and budget.



SURPRISE #

4

## Entitlements

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### ***Surprise:***

Attempts to proceed with a planned street closing are met with heated opposition. The expectation of “smooth sailing” during the property acquisition phase is derailed.

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### ***Solution:***

Start early, include city staff in planning. Identify all parties and groups of influence and create dialog. Invest in listening, understanding opposition, and steering excitement about your project.

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### ***Discussion:***

What was expected to be an exciting addition to a community has turned into a political hot potato. While the project owner/developer sees the capital investment as a key to improved quality of life due to better access to shopping, doctor’s offices, or places to work, opposing viewpoints paint a different picture. Home and business owners fear construction impacts such as noise, dust, mud, blocked access and traffic congestion. Additional concerns include closed streets, light pollution, potential drainage and flooding problems due to paved surfaces.

Strong opinions can slow a project down through city approval. City councils are sometimes reluctant to appear to be favoring “big business” over the little guy. Failure to generate positive relationships can cause delays in project approval, rejections of needed proposals, result in fines or additional scrutiny, and create adversarial positions that can impact the “good will” the new facility was counting on. Begin early to identify homeowners associations, business coalitions, advocacy groups, political figures, and even vocal individuals. A good communication plan with input from engineers and contractors closest to the early stages of project development can serve to mitigate this hurdle.



SURPRISE #

5

## Municipal Infrastructure

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### ***Surprise:***

The city requires that the developer or owner upgrade the municipal infrastructure to offset facility impacts, yet the expense is not included in the budget and time not included in the schedule. Another issue: city as-builts are not accurate, complicating tie-ins.

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### ***Solution:***

Research what you are getting into before you start by performing a site investigation. Choose your site carefully. Develop a partnering relationship with city staff and regulators. Negotiate skillfully (and knowledgeably) with jurisdictional authorities to resolve the “who pays” question. Create a win/win. Request copies of infrastructure as-builts early on.

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### ***Discussion:***

More and more, the owner/developer is called on to bear the cost of infrastructure development and expansion. Often, when plans are presented for permitting, it is the first time city staff has the opportunity to understand the new or expanded facility’s impact on infrastructure. Permits can be withheld causing projects to stall as the question of “who pays for improvements” ensues. Another surprise is when the city gives the “all clear” based on their as-builts and late in the game, your contractor discovers infrastructure is undersized or in an unknown location. The solution is three fold.

**First**, realistically quantify water needs, sewer volume, and storm water quantity. Engineering experience may illustrate standard formulas for translating occupant load into infrastructure impact may vary with location or mix of uses.

**Two**, the optimal time for understanding infrastructure obligations is before facility expansion budgets and schedule are set. Even better is to know before fundraising begins. For example, converting a retail or residential use into a facility can add thousands of dollars in infrastructure cost. Sometimes, selecting an alternative site averts the problem altogether.

**And three**, if more growth is on the horizon, economy of scale may dictate “building in” future infrastructure capacity. Benefits include using today’s construction dollars in lieu of tomorrow’s higher construction cost (and higher dollar value); securing accurate as-builts to enhance accuracy in future tie ins; and constructing in today’s regulatory environment in lieu of a potentially more restrictive environment in the future.



SURPRISE #

6

## Sustainable Site Design

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### ***Surprise:***

The decision makers involved in the new or expanded facility desire sustainable site certification, but the window of opportunity to implement sustainable elements is closing because the project is too far advanced.

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### ***Solution:***

Make choices early on regarding sustainable objectives. Weigh the life cycle cost of the sustainable element versus the up front construction cost. Consider the “intrinsic” value of sustainable practices such as good stewardship.

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### ***Discussion:***

Achieving sustainable certification for a project is based on the number of “points” accrued by incorporating a variety of sustainability features or practices. In attempting to receive accreditation, the project manager seeks to balance the cost to implement the sustainable parameter with the degree of benefit derived from the parameter.

Site design is perhaps one of the greatest opportunities for sustainable practices. Topography, vegetation and tree canopy are elements that can affect sustainability over the long term that can be enhanced with sustainable practices. Elements such as paving and drainage can have tremendous impact on the physical environment. Mitigation measures such as permeable surface materials and on-site stormwater detention can make a significance difference.

With most projects, the location is selected well in advance of the decision to attempt to achieve accreditation. Decision points have been passed, leaving the design team few options in seeking site-related sustainable point opportunities, regardless of the natural features of the site.

The key to maximizing the cost benefit ratio is to fully understand the “pay off” in life cycle benefit. Sustainable categories relating to energy efficiency, building materials, and water usage are among the options. From design through construction, when all members of the design team (engineers, architects, interior designers, and contractors) work together to identify synergies and trade-offs, the maximum usage of best practices can be achieved.



SURPRISE #

## 7 Impact & Inspection Fees

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### ***Surprise:***

The owner/developer of the facility is faced with the financial impact of unanticipated fees that may include Inspection Fees, Impact Fees, Improvement District Fees, and others. Getting permission to proceed takes longer than anticipated. Time and money issues mean big headaches for everyone involved.

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### ***Solution:***

You can more accurately identify fees with a thorough fact-finding site investigation. Conduct this assessment early in project planning. Know what questions to ask.

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### ***Discussion:***

Simply knowing there will be fees is the first step in mitigating their impact. First, understand what kinds of fees are required for your project and the likely cost. Types of fees you may encounter may include: water/wastewater, transportation, inspection, plan review and others, depending on the jurisdiction in which the project is located. While fees are rarely waived, they may be negotiated to be more aligned with the realities of the site. Knowing enough about the usage of the site to scale the fee accurately is your first defense.

Sometimes, fees can be “right sized” with an adjustment in equipment. In the case of water impact fees, the fee scale is based on both volume of water and size of meter. A potential way to reduce this fee is to coordinate with the mechanical engineer on the project to decide what size meter to use that will not adversely impact flow into the building. Many times the meter size can be smaller than the line size (pipe diameter) into the building, thereby reducing the meter size which determines your impact fee. To illustrate, the difference between a three-inch and a four-inch meter can increase impact fees by tens of thousands of dollars.



SURPRISE #

8

Franchise  
Utilities

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### ***Surprise:***

Existing franchise utilities do not support new capacity requirements calling for upgrades and expansion. Existing utilities are located within the proposed building footprint. Utility locations overlap, making a shared corridor necessary.

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### ***Solution:***

Determine franchise utility capacity as a factor in site selection. Obtain accurate cost projection for the owner's portion of the utility upgrade or relocation. Contact franchise utility owners as part of the site investigation report. Negotiate "who pays."

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### ***Discussion:***

Franchise utilities may include electric, gas, telephone, cable, or other services that have been granted the right to use public or private right-of-way for delivery of services. Access is typically provided via conduit, pipeline, or some type of transmission facility. Virtually every construction project will impact utilities in some manner. A dilemma may occur when the building footprint overlaps existing utility pathways; calls for increased capacity resulting in significant cost; or the anticipated location of utilities prove inaccurate. Due to the cost of adding electrical transmission facilities, relocating telephone switch gear, or moving gas lines, it can never be too early to verify location of franchise utilities and capacity.

Challenges faced may include difficulties with installation, such as problems with rock outcroppings, environmentally sensitive areas, water, large trees, inaccessibility, etc. Not enough space in the designated right-of-way is another common problem. And sometimes the installation proposed by the utility provider may adversely affect the design or construction of the project.

A key solution is to conduct open discussions with your local franchise utility provider early on, even during site selection stages. If you have long-range growth projections that include phased expansions, partner with your franchise utility so that they too can prepare for your growth. Open discussions can identify conflicts early on and solve them at their least expensive stage.



SURPRISE #

9

Environmental

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***Surprise:***

Unanticipated environmental permits are required, causing delays and increased cost. Seemingly routine permits take a different turn. The required environmental investigation uncovers issues that threaten to derail the project or call for changes in the site plan.

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***Solution:***

Be upfront with regulators regarding the oversight. Allow a qualified environmental professional to represent you and create appropriate open communications with regulators and jurisdictional authorities. Make sure the interpretation of the regulation is accurate and that it applies to your parcel and/or facility.

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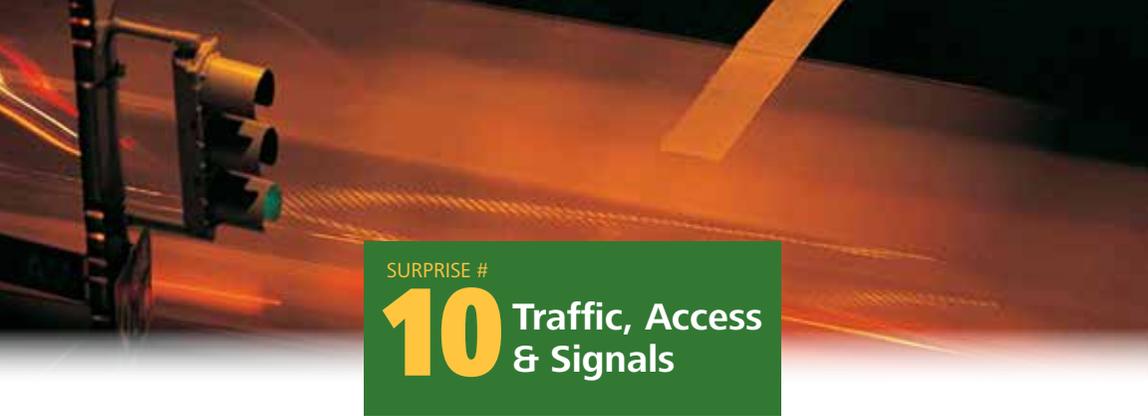
***Discussion:***

Most surprises related to environmental issues could have been avoided if a proper due diligence assessment had been conducted early during project planning stages. And, occasionally, due diligence **was** conducted, but findings were out of date.

Whether a facility project is on a site categorized as greenfield (formerly agricultural), brownfield (formerly industrial) or infill (wedged between existing land uses) can dictate the types of environmentally-related issues most likely to be discovered.

Today, environmental issues and permits are a fact of life. Yet with skilled assistance, there may be room for interpretation and application. The best policy is to be open, cordial and conciliatory in dealing with regulators issuing mandates. Then determine exactly what is needed to comply. In addition, the construction phase of any project causes potential “good neighbor” issues. Best Management Practices (BMPs) are required to mitigate the impact of erosion, dust, noise and light pollution.

Surprises relating to environmental issues can be minimized by engaging the environmental professional as soon as the decision to build or expand is made. Including the professional as a liaison between authorities and owner can create a win/win atmosphere...always a good strategy in negotiations. And don't forget to conduct due diligence early on, keeping environmental issues “top of mind” from site selection to site planning to construction.



SURPRISE #

# 10 Traffic, Access & Signals

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## ***Surprise:***

The capacity of an existing street is inadequate to accommodate anticipated increases in traffic. New traffic signals may be required based on increased volume. A street must be closed to accommodate the new campus footprint creating additional volume on remaining streets and limits fire department access.

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## ***Solution:***

Look at ways to increase capacity of access lanes which could include acquiring and/or dedicating additional right-of-way, restriping pavement to create turn lanes, and adding signals to better manage traffic flow. Recalibrating signals may be an easy fix for congestion issues.

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## ***Discussion:***

It can be easy to overlook the impact a new or expanded facility can have on traffic and circulation. Often the impact is not felt until the facility is in full use and patient volume climbs.

When congestion issues are related to signal timing and not volume of traffic, recalibrating the signals can sometimes solve the problem. Traffic engineers can produce coordinated timing plans for intersections using modeling software. Also, if right-of-way can accommodate an additional lane, inserting a turn lane can divert traffic from the main street.

Perhaps the most complex situation is when a street must be closed due to conflicts with the facility footprint. In cases in which street closure is inevitable, neighborhood acceptance is critical. A strong neighborhood information and education campaign can help make peace with angry residents and business owners.

Installation of new signals or relocation of signals can have a significant impact on traffic congestion. Negotiate signal location with city and fire departments so that they clearly understand your needs. Start as soon as possible to determine options. The best time for a skilled traffic/transportation engineer to study, project and manage circulation and traffic issues is early during the planning stages.



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### ***Surprise:***

Dirt is already being moved and your project team discovers there is not enough space on site to accommodate displaced parking during the construction phase. Also, the projected facility growth will outpace the space allocations for parking. What can you do now?

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### ***Solution:***

Enlist the engineering, construction and security team members to work together to stage the temporary parking needed to accommodate employees and patients during construction. This may require coordination with offsite parking resources. For long-term needs, reassess the relationship between number of spaces, usages, and timing (such as shift changes) to be sure available space is maximized.

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### ***Discussion:***

Inevitably, construction activity disrupts parking which is typically replaced using temporary offsite facilities coupled with transportation service to and from the lot. The first challenge is finding "off site" parking sufficient to meet your needs. Next, negotiate the space usage parameters (time of day, number of slots, etc). And third, make sure that employees and staff know where to find that space. Physicians require even more convenience that a special valet service might satisfy. And don't forget additional security!

Traffic engineers can develop a parking demand matrix calibrated to the various uses, time of day and day of week to characterize the ebb and flow of parking usage. Designing maximum flexibility into the traffic circulation, parking management and functional parking design will facilitate growth.

## PART TWO

# Top Considerations in Building Better Sites



### 1. Site Selection

Urban location or greenfield?? Some institutions are moving facilities away from dense, hard-to-access urban sites to large campuses in growing suburban areas. Others are taking advantage of infill areas to capitalize on the critical mass of the existing facility. Each represents advantages and disadvantages. Know the complexity of both conditions.

### 2. Municipal Infrastructure

Facilities typically have high water usage. In planning an expansion or a new facility, infrastructure must be sufficient to support the site. Factors impacting sizing of infrastructure include the design volume of stormwater runoff, groundwater recharge capacity, permeable surface percentages, and efficiency of irrigation. Be sure calculations are accurate.

### 3. Traffic, Parking, Access to Transportation

Nothing spoils the user's experience more quickly than traffic congestion or parking issues. And as transit and multi-modal options become available, ease of access contributes greatly to ridership. Never expect the traffic, parking and transportation to remain "status quo" when facilities expand or relocate. A quick assessment can point out potential conflicts and identify options for solutions.

### 4. Wayfinding

Directional signage can be a reassuring aid or a source of frustration. Sometimes known as "wayfinding," these graphic elements can increase or decrease stress levels and well being. Wayfinding not only includes signage, but pathways in consistent materials and color and other indicators.

### 5. Use Organizational & Visualization Techniques to Enhance Solutions

Meshing elements of Geographic Information Systems (GIS) , Building Information Modeling (BIM) and design visualization can enhance decision-making and save construction cost. A great way to uncover potential conflicts is to use GIS to view and record municipal infrastructure, franchise utilities, topographic considerations, adjacent land uses, and relationship to other company-owned facilities. Use of BIM takes some of this same information and meshes it with site and building engineering. This design visualization technique provides a way to "see" the facility before it is built, and can be a great way to analyze multiple scenarios prior to final commitments.

## **6. Security**

Security issues include lighting, controlled access, visibility of security, surveillance system and more. A well-designed site increases safety and security by providing controlled access and ample lighting. Creating inviting spaces leads to more people using the area which often correlates with less crime.

## **7. Social and Cultural Value**

Good site design creates a “sense of place” integral to social and community structure and values. For example, the number and configuration of meeting spaces created via seating, shaded walkways and small-scale venues for outdoor events can enhance public acceptance and incorporation of the facility into the neighborhood rhythm.

## **8. Sustainability**

Sustainable practices relate to both the design/construction process of new/expanded facilities as well as the life cycle of the facility. Life cycle cost assessment is about the total cost of ownership, not just the initial cost. Decisions regarding levels of commitment to sustainability should be made as early in the planning process as possible.

## **9. Good Relationships with Agencies**

Even before design begins, both the consultant team and leadership should become well-versed in regulations and requirements from local jurisdictional authorities and agencies such as the Department of Health and Safety and EPA. Get familiar with Accessibility Standards, Americans with Disabilities Act and other requirements. A forthright “spirit of intent” to embrace requirements can go a long way in building relationships.

## **10. Building in Flexibility**

Impacts of new technology, treatment methodologies and changes in population impact the project. It pays to carefully think through the layout of your site and strategically locate “soft uses” like parking, green space, and even non-critical support facilities in areas that could be reconfigured to provide “growing room” for the critical, non-movable facilities. Knowing the growth or expansion possibilities of the future allows the site developer to build in conditions that make the future transition easier.

# About Dunaway Associates

Established in 1956, Dunaway Associates is a professional services company with a solid, results-oriented history. With a staff of over 120, the firm provides civil engineering, land development, planning, landscape architecture, environmental, traffic, hydraulics/hydrology, and surveying services. Dunaway's reputation as an accomplished, dependable site development engineer has been earned through a variety of projects, including commercial, retail, residential, institutional and municipal.

## **MISSION STATEMENT**

Our mission is to foster a culture that attracts the finest employees and clients through our commitment to our core values and excellence in the delivery of our services.

## **CORE VALUES**

Integrity  
Honesty  
Respect  
Responsiveness  
Attitude of Service  
Sense of Urgency  
Technical Competency

## **Studies & Entitlements**

- Feasibility Studies
- Due Diligence
- Entitlement Procedures
- Public Hearing Representation

## **Infrastructure Engineering**

- Water & Wastewater Planning
- Water Transmission & Distribution
- Wastewater Collection
- Stormwater Collection
- Site Development, Grading, Drainage
- Site Permitting
- Erosion Control
- Utility Coordination
- BIM Integration with Civil 3D

## **Water Resources**

- Hydrologic / Hydraulic Modeling
- Watershed Master Planning
- Drainage Criteria Development
- Detention Analysis
- Drainage Ordinance Review & Development
- Channel Condition Assessments
- Channel Restoration / Bioengineering
- Erosion Protection
- Floodplain Determinations & Permitting
- FEMA Map Revisions

## **Traffic Engineering**

- Traffic Impact Analysis (TIAs)
- Traffic Signals, Warrants, Design & Operations
- Traffic Control & Signing
- Intersection & Roundabout Design
- Site Development, Feasibility & Access
- Transportation Management Plans
- Wayfinding & Directional Signage
- Illumination

## **Parking Engineering**

- Functional Design
- Demand Management
- Feasibility Studies

## **Planning + Landscape Architecture**

- Urban Planning & Design
- Parks & Recreational Facilities
- Site Design for Sustainability
- Irrigation & Water Management
- Water Feature Design & Enhancement
- Landscape Ordinance Development
- Site Lighting Design
- Urban Forestry Permitting

## **Environmental**

- Permitting & Compliance
- Site Assessments
- Stream & Wetlands Assessment
- Grant Assistance
- Wetlands / Protected Species
- Stormwater Pollution Prevention

## **Survey Services**

- Right-of-Way Surveying
- Survey for Design
- Topographic & Boundary Surveying
- Construction Staking / Layout
- Geodetic Control
- GIS & Data Integration





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