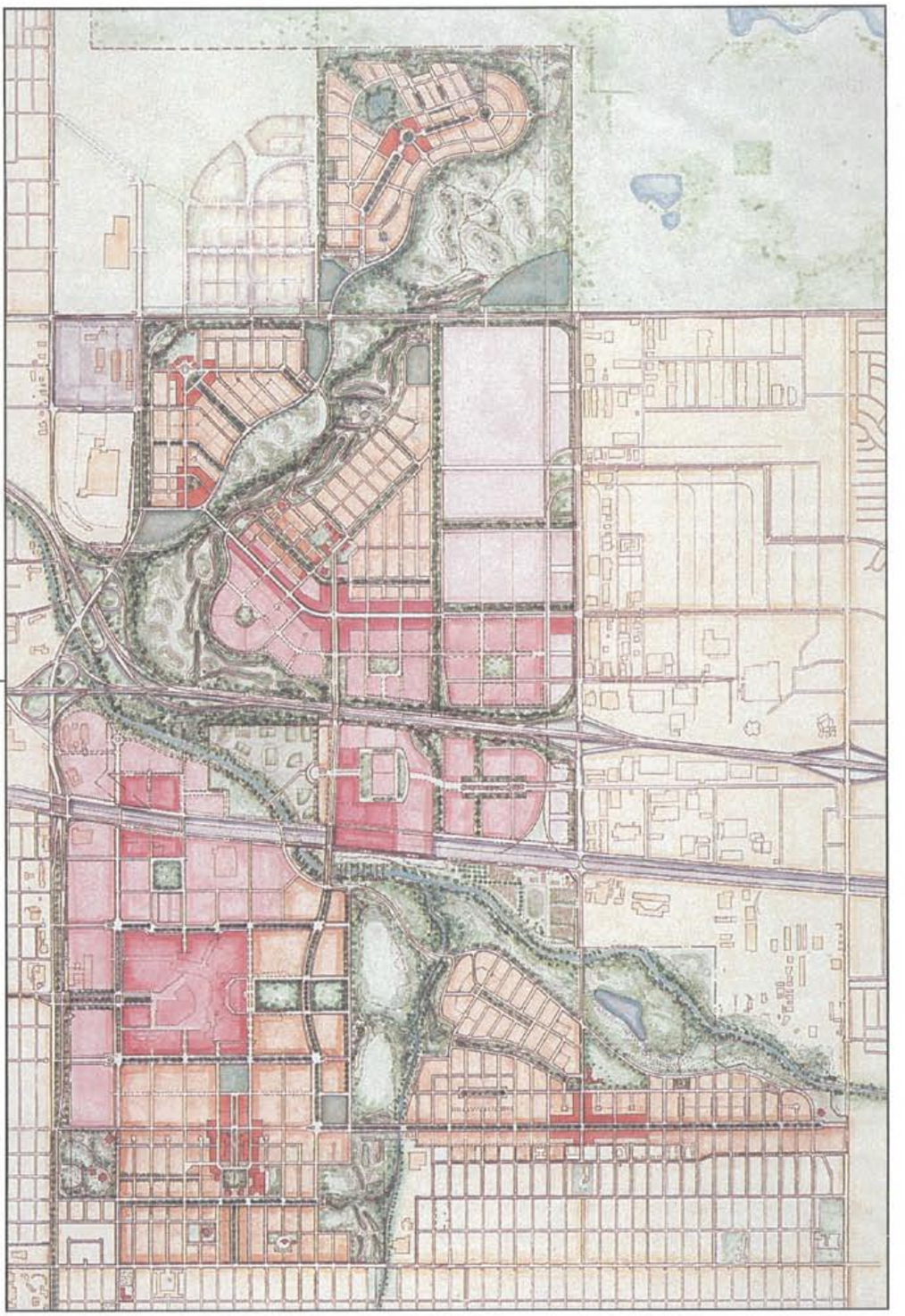
V. Development Plan

V. DEVELOPMENT PLAN



The Stapleton Development Plan defines a new development model for Denver for the next century. The redevelopment of the Stapleton site is based upon the principle of sustainability. In addition, the physical plan is based on four important concepts: one, the successful integration of urban development, transportation, natural systems and wildlife habitat; two, a balanced mix of uses and densities to provide efficient, accessible, diverse neighborhoods and communities; three, a desire to incorporate, build and improve upon what is best about Denver's neighborhoods, parks, and natural settings; and four, response to the environment, context and character of the site and the communities that surround it.

A. VISION

The Development Plan created for Stapleton is a direct response to the contexts and principles described in the previous sections. Stapleton will be a unique mixed-use community capable of supporting more than 30,000 jobs and 25,000 residents. More than one third of the property will be managed for parks, recreation and open space purposes. Developed portions of the site will provide an integrated mix of employment, housing, recreation and access to public transportation.

Stapleton's reuse will support the health of surrounding neighborhoods and provide strong ties to the adjacent Rocky Mountain Arsenal National Wildlife Area and Lowry educational campus. Development and operation of the Stapleton community will provide a model for the region of serving the economic and social needs of people without degrading the natural environment. The process of restoration and redevelopment of the Stapleton site will establish Denver and Colorado as world leaders in addressing the economic, social and environmental challenges of the next century.

The Plan reinforces Stapleton's role as a regional employment center, but through the creation of compact, accessible communities that integrate uses and create strong ties between the Stapleton site and the surrounding community.

Key Features of the Vision

The Development Plan assigns approximately 65 percent of the site to urban development and 35 percent to a mix of open space uses. Development is organized in eight distinct districts. The districts each contain an identifiable center and emphasize the integration of employment and housing and walkable scale. The Plan reinforces Stapleton's role as a regional employment center, but through the creation of compact, accessible communities that integrate uses and create strong ties between the Stapleton site and the surrounding community. The open space system serves a major role in unifying the eight districts, making effective regional connections and restoring the ecological health of natural systems on and off the site.

Any Development Plan for a site of this significant scale must provide a degree of flexibility. The Development Plan identifies the general scale, character, density and mix of uses desired in each district. Specific land uses, parcel configurations and the relationship between employment, housing and other uses will vary as development proceeds. What are most important to establish now are the basic character of the site's mixed use districts and the basic community infrastructure, open space, civic sites and other elements of the public realm which will guide the long-term development of the site.

The Stapleton Development Plan describes a community that is different in important respects from many large scale suburban or urban infill projects. Key features of the Development Plan include:

Linking the physical plan with people through the integration of economic and social objectives with development

The challenge is not simply to fill available land or build buildings, it is to create successful communities for people. Most fundamental to the Stapleton Development Plan is the integration of economic and social objectives with physical development. Creation of a new job base at Stapleton provides an important opportunity to increase and diversify employment opportunities available in the City and County. Job creation

DEVELOPMENT AND OPERATION OF THE STAPLETON COMMUNITY WILL PROVIDE A MODEL FOR THE REGION OF SERVING THE ECONOMIC AND SOCIAL NEEDS OF PEOPLE WITHOUT DEGRADING THE NATURAL ENVIRONMENT.

"IT IS MERELY POSSIBLE TO SET THE STAGE FOR COMMUNITY. THE EXTENT AND THE WAYS IN WHICH COMMUNITY IS REALIZED DEPENDS ON A RANGE OF OTHER, NON-PHYSICAL FACTORS."

WILLEM VAN VLIET, COLLEGE OF ARCHITECTURE AND PLANNING, UNIVERSITY OF COLORADO

must be accompanied by a commitment to education, skill development and entrepreneurial opportunity for disadvantaged and minority populations in our community.

An employment base of 30,000 - 35,000 jobs can be readily accommodated over time on the site. The Havana Street corridor and areas north and south of I-70 provide significant opportunities for creating a manufacturing, assembly and distribution base on the site. These areas offer rail service and easy interstate access. Section 10 on the far north and the interior area above the I-70 corridor provide significant office and research and development opportunities. The area surrounding the existing terminal will become a regional destination offering a mix of exhibition, entertainment, retail, office and other uses. Each neighborhood center on the site will also provide opportunities for employment. In total, the Development Plan allocates roughly 1,200 acres, or 54% of the developable land, to employment use.

The Plan also emphasizes establishing the site as a national center for the development of environmental technologies, products and services; creating an environmental technology incubator to support start up firms; creating training and skill development programs designed to provide area residents with the work skills needed by employers operating on the Stapleton site; and developing programs that encourage the participation of youth and entrepreneurs, particularly from minority communities.

Development of successful neighborhoods will require direct involvement in the nature and quality of educational and other services, enhancement of public safety and promotion of opportunities for resident participation in all forms of governance and service delivery. The physical form of the community can do a great deal to support these objectives and foster a strong sense of community. Attention to the human aspects of development, however, will be essential for Stapleton to achieve its stated objectives.

Building true urban neighborhoods that have character, identity and meet the needs of people

Denver has a strong tradition of urban neighborhoods as the foundation of the community. The Development Plan reflects a strong commitment to the continuation of this tradition. Foremost, the Plan seeks neighborhoods that can encourage and support diversity in age, income and ethnicity. These neighborhoods must be inclusive and accessible. Their physical form will emphasize defined centers for services and civic uses, walkable scale, access to nearby employment, diverse transportation options and strong connections to parks and nature. These are many of the same qualities that have allowed some of Denver's strongest neighborhoods to thrive over many decades of economic, social and technological change.

PUBLIC ART

Within the City and County of Denver, one percent of all public works projects must be invested in public art. Public art is an important part of Denver's character, cultural expression and history. It creates memorable impressions in the minds of residents and visitors alike. The current Public Art Program creates opportunities for all people to experience art in a broad range of public spaces. Stapleton will build upon the existing program by identifying additional funding sources and creating a Public Art Master Plan to provide guidelines and a vision for public art projects throughout the implementation of the Development Plan. A Public Art Master Plan will provide the opportunity for public art commissions within the site to respond to the goals of the Development Plan, to provide a relationship between individual projects, and provide a model for private development on the site to incorporate public art.

Stapleton's mixed use neighborhoods can accommodate an ultimate population of approximately 10,000 households. The average density of residential areas for the entire site is roughly 12 units per acre, sufficient to support reasonable public transportation service. Higher densities are provided for in close proximity to neighborhood centers, transit stops and major public amenities. Each neighborhood on site is organized around a center and provides a variety of mobility options beyond the automobile including walking, bus, bicycling, rail transit (along the Smith Road corridor) and the use of telecommunications to substitute for the need for travel. School facilities will be located in neighborhood centers, will be multi-use community facilities and will play a central role in the life of the surrounding neighborhood. Stapleton neighborhoods will provide a range of housing types and densities that support diversity.

Integrating nature and wildlife with the urban environment on a permanent basis

The open space system planned for Stapleton is rich and diverse. The system includes a wide range of opportunities, from urban parks, trails and recreation facilities, to extensive natural areas that support significant wildlife and allow the restoration of native plant and animal communities that have been displaced or eliminated. This focus represents a return to Denver's natural heritage as a city established on the prairie. In its scale and diversity, the Stapleton system is unlike anything undertaken by this community since the City and County's basic urban and mountain park systems were established roughly a century ago.

Shattil and Rozinski

The Stapleton open space system includes more than 1,600 acres of parks, trails, recreation facilities and natural areas. The principle trail corridors are along Sand Creek, Westerly Creek and the newly created open space corridor connecting Sand Creek with the Rocky Mountain Arsenal National Wildlife Area. The system includes a championship golf course above I-70 and a nine-hole learning course along Westerly Creek. A major ballfield and outdoor recreation

complex is located between Sand Creek and I-70 west of Yosemite Parkway. An urban agriculture center and equestrian facility are accommodated on the north side of Sand Creek just west of Havana Street. A major urban park is provided at the confluence of Sand and Westerly Creeks, as well as a number of smaller scale parks and public spaces. Parkways and landscaped drainageways connect neighborhoods to each other and to the major components of the open space system. Significant areas of prairie and riparian corridor restoration, particularly in the northern half of the site, will dramatically increase the wildlife habitat provided by the site. A 365-acre Prairie Park in the far northern portion of the site, primarily above 56th Avenue, will be the centerpiece of these restoration efforts.

The open space system is completely integrated with the urban community that will develop around it.

Perhaps equally important, the open space system is completely integrated with the urban community that will develop around it. The system is functional. It addresses stormwater management, water quality improvement, irrigation and other development requirements. It is also a defining element of the communities that will emerge at Stapleton. All portions of the site and all types of land use have strong connections to the system. Denver is a city whose early identity was largely framed by parks and parkways. The transformation of Stapleton's identity from airport to mixed use community will be even more directly dependent on the development and care of its open space and natural resources.

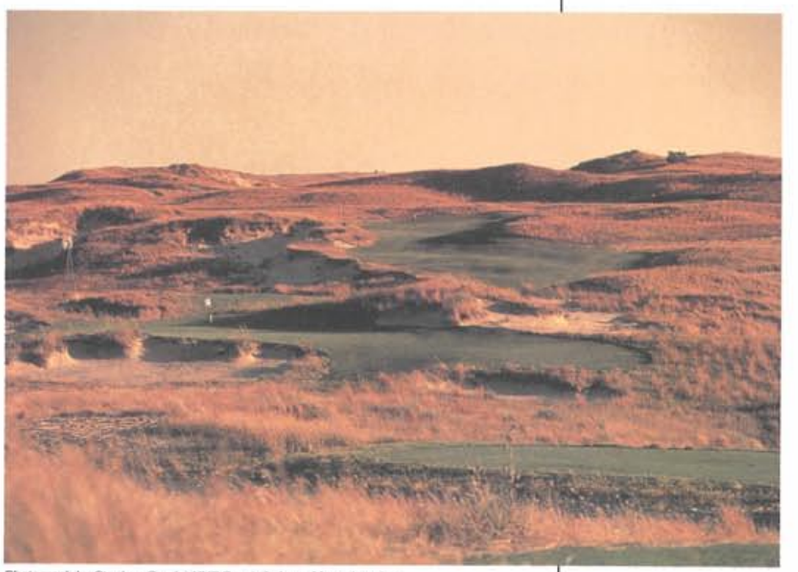
Implementing a more sustainable pattern of development that supports economic and community needs, but consumes fewer natural resources and creates fewer impacts on the natural environment

The Development Plan is rooted in the presumption that economic, social and natural systems must be sustainable over time. Our region is beautiful and fragile, and in search of better methods to accommodate our needs without degrading the natural health and beauty of our home. The Stapleton Development Plan stresses efficiency in the use of resources and the reduction of environmental impacts.

This sustainable philosophy is reflected in many different aspects of the program. Land use planning and community design stress compact, mixed use communities that are walkable and transit-oriented. These characteristics can reduce automobile dependence and emissions and increase the efficiency of service delivery. Approaches to community infrastructure stress water reuse, energy and water conservation, renewable sources of energy supply and innovative stormwater management approaches to maximize opportunities for on-site irrigation and water quality improvement. The solid waste management strategy seeks to achieve a zero net contribution from the site to local landfills, in part through the creation of a "resource recovery village" on site to promote waste minimization, recycling and reuse. Transportation technologies emphasize bus and rail transit, bicycling, walking and alternative fuels for vehicles. The Development Plan also emphasizes the need to support demonstrations of technologies and practices on site that support the project's basic sustainable development objectives.

Basic choices about land use patterns and community infrastructure can have enormous implications for the long-term resource needs and impacts of the Stapleton community. The Development Plan identifies important choices that can result in infrastructure and operating practices that are efficient, affordable and more environmentally benign. In addition, the Plan calls for approaches that provide the ultimate users of the site with more options, more information and more incentive to manage resources wisely. Stapleton is intended to be a place of innovation in these areas, and a center for the development of environmentally-oriented technologies, services and businesses.

The Development Plan identifies important choices that can result in infrastructure and operating practices that are efficient, affordable and more environmentally benign.



Photograph by Stephen Szurlej NYT Sports/Leisure Magazines Inc.
Copyright © 1995.

B. Highlights

Stapleton has the potential to integrate economic, social and environmental objectives in a fashion unique within the region. The result will be an extraordinary set of communities that combine strong Denver traditions with new forms of innovation. Defining features will include:

1. Link With Nature: Stapleton will demonstrate the most successful integration of urban activity with wildlife and the natural environment in Colorado. Stapleton will serve as a catalyst for restoration and trail development in the Sand Creek and Westerly Creek corridors. Stapleton will provide approximately 1,680 acres of open space, much of it restored native grasslands, stream corridors and animal habitat. The Arsenal wildlife program will be extended onto the Stapleton property and connected to the Sand Creek waterway. Stapleton and Lowry together will increase the recreational and open space opportunities provided by the Denver park system by 50 percent. The Rocky Mountain Arsenal National Wildlife Area will become the premier urban wildlife refuge in the country.

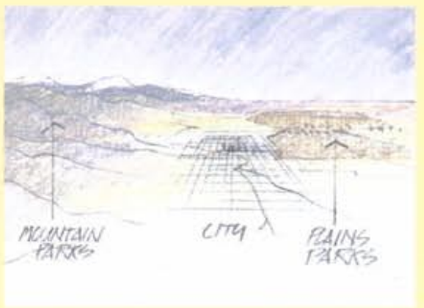
2. Urban Villages: Development at Stapleton will occur in a series of urban centers or villages. Each will provide a mix of employment and housing, as well as walking access to public transportation and recreation. These communities will be efficient, people-oriented and accessible. They will support a diversity of income, age and ethnic groups and address the demand for locally accessible, quality public education.

3. Mobility: Stapleton must provide an unparalleled set of mobility options to employees, residents and visitors. These options must de-emphasize the car and allow for dramatic reduction in the ownership and usage of personal automobiles on the site. Walkable neighborhoods, housing/employment links, an attractive bikeway system and a variety of forms of transit and paratransit will be used to expand mobility options.

4. Best Technologies and Practices: Stapleton will be developed with a commitment to use the best technologies and practices available in creating and managing the urban environment. Systems will be efficient, environmentally benign and economical.

5. "Green" Business Environment: Stapleton will be a regional employment center and offer a new environment for businesses seeking to reduce consumption of natural resources and become more competitive in a global marketplace. Stapleton will offer an environment that encourages demonstrations and supports innovation. Stapleton will also be a center for environmental business and a leader in advancing the development of environmentally-oriented products and services.

6. Community Linkage: The economic opportunities created at Stapleton must be tied directly to individuals with the greatest economic needs. Job creation and investment at Stapleton must be linked to training, skill development and entrepreneurship opportunities. The outmigration of middle income families must be reversed. Stapleton will be a tool for investing in people and strengthening the communities around the site, and protecting and enhancing the social and economic well being of children and their families.



7. Governance, Service Delivery and Participation: Stapleton provides the opportunity to explore new forms of governance, service delivery and citizen participation that empower people. These features can expand opportunity, increase the level of community commitment and enhance the overall health of the community. Stapleton will encourage innovation and demonstrate new approaches to the use of regulatory structures, market mechanisms and community-based initiatives.

"THE WORLD WE HAVE CREATED TODAY AS A RESULT OF OUR THINKING THUS FAR HAS PROBLEMS WHICH CANNOT BE SOLVED BY THINKING THE WAY WE THOUGHT WHEN WE CREATED THEM."

ALBERT EINSTEIN

C. STRUCTURING ELEMENTS

1 INTRODUCTION

"IF YOU DON'T KNOW HOW THINGS ARE INTERCONNECTED, THEN A SOLUTION CAN CAUSE MORE PROBLEMS THAN IT SOLVES. ON THE OTHER HAND, IF YOU UNDERSTAND THE HIDDEN CONNECTIONS BETWEEN ENERGY, WATER, AGRICULTURE, TRANSPORTATION, SECURITY, AND ECONOMIC AND SOCIAL DEVELOPMENT, YOU CAN OFTEN DEVISE A SOLUTION TO ONE PROBLEM (SUCH AS ENERGY) THAT WILL CREATE SOLUTIONS TO MANY MORE PROBLEMS AT NO EXTRA COST."

AMORY LOVINS,
ROCKY MOUNTAIN
INSTITUTE

The Development Plan presented here was not derived in the abstract and imposed on the site. The Development Plan has grown out of a careful analysis that has considered the site's local and regional context, a wide variety of community objectives and a set of specific intentions regarding the purpose and form of this new community that are summarized in the Guiding Principles presented in Section IV of this plan.

What follows here are descriptions of the essential structuring elements of the Development Plan - open space and parks, transportation, services and land use and urban design. The layering and integration of these elements is what defines the form and character of this "new" place. The approach taken places strong emphasis on the following:

• The community that emerges at Stapleton must respond to its immediate neighborhood and regional context. Stapleton is not an island, but a part of the community fabric that must be reconnected. It's future use will be heavily influenced by existing patterns of land use and by larger natural, transportation and infrastructure systems that cross and converge on the site.

• The pattern of urban development on the property will be significantly shaped by restoration of natural systems and the creation of a new permanent open space system. Development and healthy natural areas can be integrated on a permanent basis.

• The provision of transportation and utility services to the new Stapleton community is an integral component of community development. Decisions regarding these systems are fundamental to the form and life of this new community.

• A conscious attempt has been made to apply the principles developed to the creation of viable urban neighborhoods. The structure of these neighborhoods emphasizes districts with definable centers; mixing of uses to support diversity, efficiency and mobility objectives; walkable scale, transit orientation, and a defined hierarchy of streets; prominent roles and locations for public spaces and civic uses; and an extension of some of the best traditions of Denver neighborhoods, parks and public spaces.

The overall success of the environments created at Stapleton for work, home, play and other uses will be a function of the ability to thoroughly integrate land uses, man-made and natural systems and the site and its larger community context. The physical structure of the community seeks to combine many old and new approaches, pursue efficiency and livability simultaneously, and create a diverse, urban mixed use community that can attract the support of the marketplace and the loyalty and commitment of its residents and users.

The structuring elements of the development plan; open space and parks, transportation, services, and land use and urban design, will begin to organize development areas on the Stapleton site.

STRUCTURING ELEMENTS

2 OPEN SPACE AND PARKS

The Big Picture

Stapleton's open space system builds on Denver's rich park legacy of traditional community parks and recreation facilities, parkways and greenbelts connecting neighborhoods, natural features defining the city and a visionary string of mountain parks. The Plan also expands our traditional ideas of a park with its High Plains landscape restoration, extensive natural systems, and commitment to water quality, wildlife and habitat development. The Stapleton open space system is a blend of the best of Denver's past and present parks and a new attention to Denver's lost landscapes and critical need for environmental stewardship.

Approximately 35 percent of the Stapleton site will be devoted to some form of open space. This system will address a variety of goals for Denver, including:

1. Contributing to a dramatic change in the physical appearance and identity of the Stapleton site. The investment in open space will not only increase adjacent property values, it will expand market opportunities, create long-term value and provide each new neighborhood with an identifiable center and defined edges.

2. Meeting local and regional demand for open space and recreation opportunities. As important, Stapleton enables Denver to provide major, specialized recreation facilities for the city at large that it cannot provide elsewhere. These facilities include a lighted outdoor sports complex, golf courses, agricultural and equestrian facilities and a large urban park for northeast Denver.

3. Complementing the classic urban park system of the City and County, the mountain park system on the west, with a bold regional system on the east that celebrates the original Denver landscape of High Plains plants, water and animals. The Stapleton system will support the restoration of natural systems on site and establish and maintain extensive wildlife habitat.

4. Providing cost effective and environmentally beneficial approaches to water management on site. The open space system is designed to accommodate all of the site's stormwater management and 100-year flood control requirements. The system also uses natural filtration, constructed wetlands, water reuse and other techniques to improve water quality and minimize the use of scarce water resources for irrigation.

5. Reconnecting Stapleton to the rest of the city and region. Major regional trail connections will be provided between Stapleton and the Platte River and High Line Canal trail systems, Lowry Air Force Base, the Rocky Mountain Arsenal National Wildlife Area and adjacent neighborhoods. These trail linkages, along with extensions of Denver's historic parkways, will greatly encourage pedestrian and bicycle travel.

Approximately 35 percent of the Stapleton site will be devoted to parks, recreation and open space.

Approximately 1,680 acres of the Plan is devoted to some form of park, open space or stormwater management. The breakdown of components of the system is roughly as follows:

- formal parks (neighborhood and large urban). 250-275 acres. This commitment to formal parks is comparable to the ratio of parklands to residents in other portions of Denver.
- special facilities (outdoor sports complex, golf courses, agricultural center). 350-400 acres.
- natural areas, creek and trail corridors and floodplain (Sand Creek, Westerly Creek, Sand Hills Park). 600-650 acres.
- parkways and greenways carrying stormwater. 375-425 acres.

NOTE: Double counting of open space acreage occurs when areas perform multiple functions.

"YOU CAN LOOK AT A PARK PRIMARILY AS A SOCIAL TOOL, PRIMARILY AS AN AESTHETIC ELEMENT, OR PRIMARILY AS A PRACTICAL AND FUNCTIONAL THING."

PAUL GOLDBERGER, NEW YORK TIMES

"TOWN AND COUNTRY MUST BE MARRIED AND OUT OF THIS JOYOUS UNION WILL SPRING A NEW HOPE, A NEW LIFE, A NEW CIVILIZATION."

EBENEZER HOWARD


Shattil and Rozinski

Sustainable Resources

As this list indicates, the open space system planned for Stapleton is diverse and complex. Open space improvements will support restoration and enhancement of habitat in all areas of the Stapleton site. The reintroduction of original High Plains landscapes will incorporate a variety of indigenous types of vegetation and provide a viable scale and healthy environment for wildlife. This restoration will affect the kind of transformation of the whole site that is crucial to building the vision and identity of the new Stapleton. Healthy habitat areas will add value to the site as aesthetic and recreational amenities, with trails, wildlife viewing areas, picnic areas and volunteer restoration opportunities. These habitats will enhance and benefit from the storm water drainage system, and provide a model of reduced irrigation demand in public spaces.

The sustainability of indigenous landscapes depends not only on the restoration and protection of significant natural areas but also on maintaining vital biotic corridors, and on landscape management practices that sustain the natural processes of the larger ecosystem. The goal is to restore and manage the indigenous plant and animal communities of the Western High Plains within a renewed urban fabric. This goal will be realized at many scales throughout Stapleton, from a regional scale establishment of sandhills prairie and restoration of the historic forested stream channels of Sand and Westerly Creeks to the smallest habitat areas in gardens or schoolyards.

Drainage Corridor Illustration: A network of drainage corridors will connect developed neighborhoods to Westerly Creek and other primary drainageways, serving to detain water and clean pollutants from the urban runoff. As stormwater infiltrates along the canal, it will sustain a network of trees and vegetation. A pedestrian path will allow access for periodic maintenance and cleaning.

The components of the open space system must be carefully integrated in order to prevent conflicts. No piece of the system can be one-dimensional. A golf course, for instance, must support broader objectives such as habitat development, water conservation and reuse, trail connections, stormwater management and public access.

Management and Funding

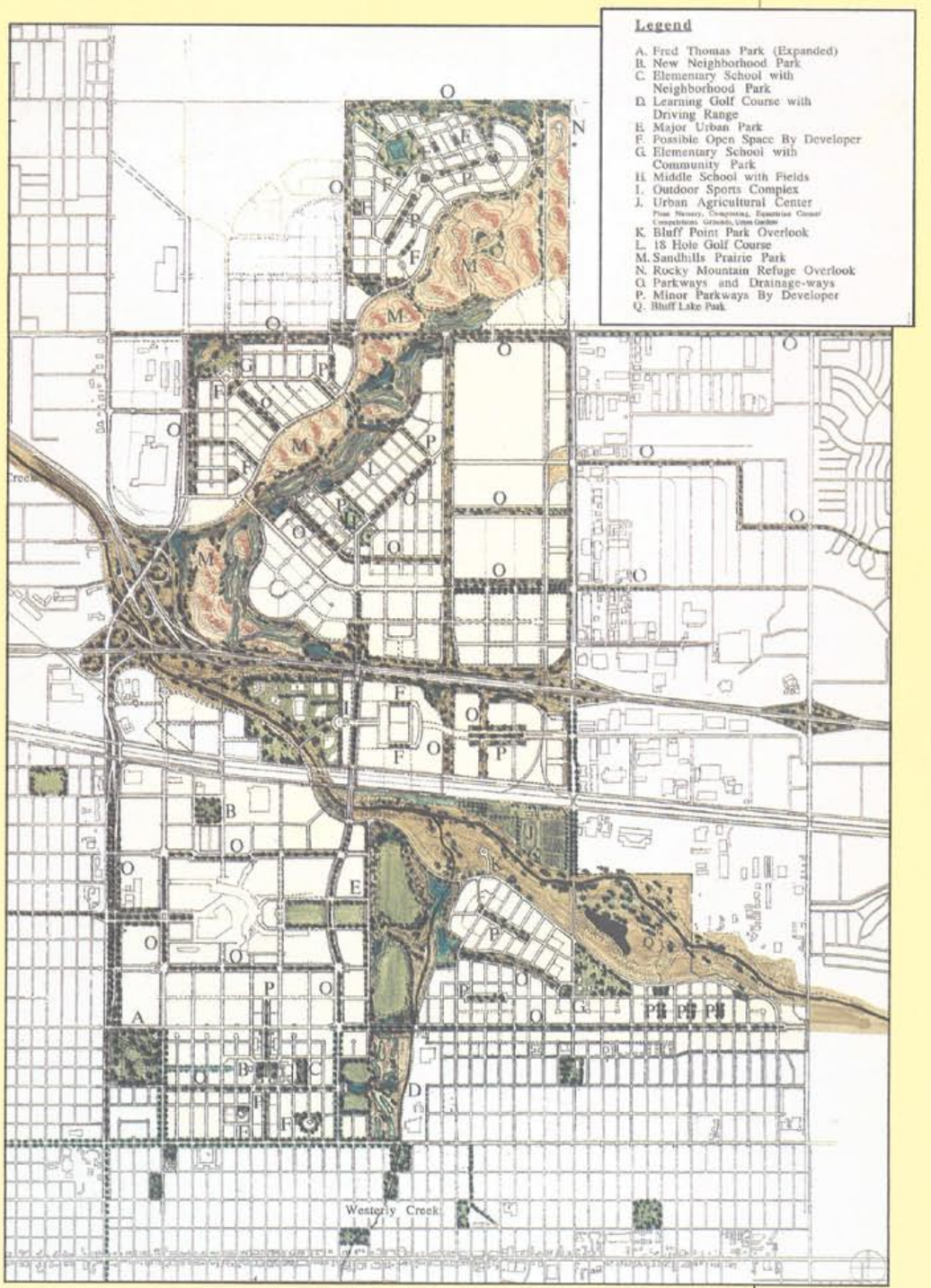
A system of this scale and diversity will require new approaches to development and long-term funding and management. Phasing will also be a critical issue since open space development (and its costs) may precede adjacent residential and commercial development (and their revenues). Open space development costs, like the rest of the infrastructure, will be shared by development fees, city funds, philanthropic and other external sources of funding and other special revenue mechanisms.

Long-term management and maintenance responsibilities will require similar sophistication. Formal parks, from neighborhood to large urban parks, and recreation facilities must be supported either by city revenues generated by development on the site, special district fees or other financial tools. The regional, High Plains system will require a partnership with other interested agencies and jurisdictions. The extensive greenways carrying stormwater, too, must have a solid funding source to finance their maintenance. The development program must take advantage of opportunities to reduce costs and capture value through the development and operation of the open space system. Elements of this system will increase adjacent land values and broaden market opportunity. The integration of flood control, natural irrigation and water quality treatment through filtration can also offset costs that would otherwise be incurred for more expensive infrastructure to satisfy the same requirements. Native plants and natural areas can also reduce overall maintenance requirements.

The parks plan below identifies the major components of the Stapleton open space system. These include:

1. Major Urban Park (marked E on the accompanying map): This park, planned for the southern end of the site, to the east of the terminal area, will be similar to traditional Denver parks, such as Washington, Cheesman and City Parks. It will cover approximately 175 acres, bordered on two edges by Westerly and Sand Creek greenway corridors. The park will accommodate a variety of uses — from playing fields to social gathering areas — serving as an amenity both for new residential and commercial development on the site, and for existing neighborhoods.

2. Sandhills Prairie Park (M on the map): This park will be the defining characteristic for the northern half of the site. It will be approximately a 365-acre restoration of the original landscape type of this area — the Sand Hills Prairie — bringing a sense of the High Plains back into Denver. The park's topography of rolling sand hills, vegetated with tall and short prairie grasses, cottonwoods, willows and other shrubs, will attract a wide variety of birds and small mammals. Among other uses, the park will provide an entryway into the National Wildlife Refuge under development at the Rocky Mountain Arsenal National Wildlife Area to the north. The scale and unique character of the site will require a major restoration effort. It will be managed to protect the restored prairie ecosystem, while providing maximum opportunities for public enjoyment and learning through bicycle/pedestrian trail systems, bird/animal watching, picnicing and scenic drives, restoration demonstration areas and volunteer activities.



The Stapleton Parks Recreation and Open Space Plan will become a nationally recognized model of restoration and integration of a diverse set of urban and natural land uses.

3. Community Parks (A and G on map): The plan calls for the creation or expansion of three community-scale parks of 20-40 acres each. These parks will feature playing fields and, in two cases, be co-located with elementary schools.

4. Neighborhood Parks (B and C on map): There will be several smaller parks (up to 10 acres each) within easy walking distance for families and children. In some cases, these may serve as transition areas between different types of development (e.g. single family homes, commercial areas and multiple family residences), or as important components of a neighborhood center.

5. Parkways (O and P on map): Parkways will provide continuity between traditional Denver neighborhoods and new development at Stapleton. Parkways will be developed along selected major streets as well as small neighborhood streets, where they will serve as local park areas and enhance real estate values. Parkways will also incorporate grass-lined drainage swales and trail systems in many areas.

6. Outdoor Sports Complex (I on map): Adjacent to Sand Creek, a 107-acre outdoor recreational area will be accessible by bike, transit and car to groups both day and night. This area could potentially include a full range of amenities, including lighted basketball courts, ball fields, etc.

7. Golf Courses (D and L on map): The plan calls for two courses to be developed on the Stapleton site: one, a youth training course and driving range at the south end of the site adjacent to Westerly Creek; and the other, an 18-hole championship golf course integrated with the Sand Hills Prairie restoration to the north. Both would seek to minimize environmental impact through water reuse for irrigation, low chemical use, habitat development and integration of natural landscapes.

8. Urban Agricultural Center (J on map): This center is to be located on or adjacent to the site of the current city nursery. Initial plans are to develop a community farm, market and garden area, with an equestrian center and programming for at-risk populations.

9. Trail Systems: Extensive trail systems are planned throughout the Stapleton site for both recreation and commuting (pedestrian, bicycle and possibly equestrian). Trails will be located along Sand and Westerly Creek corridors, and through the central habitat and open space corridor to the northeast, as well as along roads and in parks and drainage corridors. Trail improvements will provide both local and regional access.

10. Bluff Lake Environmental Education Area: The City and County of Denver has already committed over a million dollars to funding for restoration and development of the Bluff Lake area as an urban environmental education facility. Bluff Lake has significant wildlife resources, and is located adjacent to Sand Creek. Partnerships with local, state and federal agencies will support united programming for school children in the fall of 1995.

11. Greenway Corridors: The Sand and Westerly Creek corridors will be important elements of the Stapleton parks and open space system. Both corridors will be the focus of intensive resource inventory and restoration efforts. Once developed, they will provide regional trails and wildlife corridors and will provide natural water quality enhancement features (ponds and wetlands) for surface water drainage. Both efforts will require extensive cooperation between the cities of Denver, Aurora and Commerce City and among local, regional, state and (in some cases) federal agencies. The Sand Creek Corridor also offers the opportunity to connect the existing Platte River and High Line canal trail systems, forming a loop for these linear systems.

Since its origins in the last century, parks and natural features have been the defining elements of Denver's neighborhoods and urban fabric. The Stapleton Development Plan builds on this legacy, but also expands it to include a broader appreciation for natural and man-made landscapes. Denver's tradition of parks and parkways can be extended onto the site and connected to extensive open space areas that transition from formal urban spaces to far more natural areas. The Stapleton system will forge important connections to regional trail systems, adjacent neighborhoods, the Rocky Mountain Arsenal National Wildlife Area and Lowry open space and recreation facilities. This system can also increase understanding of our natural environment, its resources and our role as responsible stewards for future generations.

AND IN TIME THERE'S NO MORE TELLING WHICH IS WHICH BETWEEN THEM, NO SHARP DISTINCTION, NO CLEAR EDGE OF DIFFERENCE WHERE IT CAN BE SAID THAT HERE THE LAND ENDS AND HERE THE MAN BEGINS.

DON BERRY

TRASK

FROM: THE THUNDER TREE
LESSONS FROM AN URBAN WILDLAND

BY ROBERT MICHAEL PYLE

THEY CALL OUR COTTONWOODS A CHEAP TREE. IT IS ALONG THE MISSOURI RIVER, BUT IT HAS NOT BEEN A CHEAP TREE IN DENVER. OUR PEOPLE HAVE PAID LARGE PRICES FOR COTTONWOODS, AND LARGER SUMS FOR WATER TO MAKE THEM GROW...THE COTTONWOOD HAS BEEN A NECESSITY, NAY MORE, IT HAS BEEN A LUXURY AND A LIVING JOY — A LUXURY AND JOY NO PEOPLE CAN EXPERIENCE WHO LIVE IN A TIMBERED COUNTRY, NO MATTER HOW BEAUTIFUL OR GRACEFUL OR EVER RENOWNED THEIR TREES FOR SHADE MAY BE.

W.G.M. STONE, THE COLORADO HANDBOOK, 1893
FROM: THE THUNDER TREE
LESSONS FROM AN URBAN WILDLAND
BY ROBERT MICHAEL PYLE

The Plan for Restoration of Soils, Vegetation and Wildlife Habitat

The Stapleton Development Plan envisions urban and natural environments that strengthen each other for their mutual benefit. Restored site soils, vegetation communities and animal habitat will play an important role in the making of new, healthy Denver communities. These natural system concerns have been incorporated into the Parks, Recreation and Open Space initiative as a key structuring element of the Development Plan.

Aviation use has allowed for degraded topsoil conditions and severe changes to natural site grading. The vegetation of the Stapleton site today has been so modified that, with the exception of a few patches along Sand Creek, virtually all of the historic vegetation has been eliminated. As a result, only degraded remnants of the native prairie and riparian habitats are left and these fail to capture any of the drama, scale or beauty of the original Colorado landscape. These fragments also are neither large enough nor continuous enough to sustain the indigenous plant and animal communities of the region. Redevelopment of the Stapleton site offers the opportunity to restore the patterns and the functions of the larger ecosystem that will be required if these natural values are to be sustained into the future within the Denver metropolitan area.

The proposed open space system integrates a unique mix of natural areas, outdoor sports facilities, drainage corridors, multi-use trails and scenic urban parks and parkways. The plan includes traditional parks and parkways as well as restored native landscapes. The best landscape images of urban and rural Colorado will be brought together to change Stapleton. Familiar landscape types such as golf courses, park drives and residential streets will be retained but subtly modified to reflect the goals of sustainability. The management of these landscapes will foster native plants and animals and also serve as models for reduced irrigation demand as well as innovative and cost effective stormwater control and pollutant reduction. More than any other single feature, the restoration of the landscapes of the High Plains will affect the kind of transformation of the whole site that is crucial to building the vision of the new Stapleton.

A comprehensive restoration and management strategy is included in the Development Plan support documentation. The intent is simply to reintroduce the matrix of mixed prairie vegetation landscapes naturally found on the site. Included are Upland Landscape types such as short grass prairie and sandhills prairie, Riparian Landscape types such as sandbar channels, lake bottoms and lake fringes, and Modified Prairie Landscape types such as woody draws and prairie turf. These landscapes will in turn support a diverse mix of wildlife and provide important habitat connections for regional wildlife resources.

The Stapleton Development Plan envisions urban and natural environments that strengthen each other for their mutual benefit.

Major Habitat Types

Upland Landscape - shortgrass prairie

The shortgrass prairie, characterized by shorter, more drought resistant grasses, occurs where there are heavier, finer-textured clay soils that prevent water from percolating to depth. In the larger open spaces in the southern part of the Stapleton site, shortgrass prairie can be restored adjacent to Sand and Westerly Creeks. It could also be used at the farthest margins of drainage corridors in this portion of the site and along landscape edges where an alternative to turf is desired.

Upland Landscape - sandhills prairie

The sandhills prairie will be the primary prairie landscape of Stapleton, with its centerpiece at the Prairie Park. The terrain consists of gently undulating hills oriented to and created by the prevailing winds. Tallgrass prairie occurs in the High Plains where the more permeable soils allow moisture to percolate deep into the sand. Sand blowouts and sandhill depressions can also be found in the rolling prairie dune environments.

Riparian Landscape - sandbar channels

All the drainageways within the larger open space system of Stapleton are modelled on sandbar channels — free-flowing, wide, flat, main channels, within which minor channels are free to braid and meander. Sinuous lines of cottonwoods grow on higher ground and thick patches of sandbar willows with occasional peachleaf willow grow within the channels.

Riparian Landscape - streamside prairie

In the lower area, along the prairie stream corridors, switchgrass covers the entire ground except where the stream channel is actively eroding. Switchgrass should be established early on so that as the site gets wetter the plants can spread. Prairie cordgrass can be planted across the bottom of the channel as it will grow in standing water. Western wheatgrass has a wide range of tolerance and can be planted when the channel is still relatively dry. Later it will be able to tolerate flooding and grow even in standing water.

Riparian Landscape - lake bottom

Where a basin is constructed for stormwater management, either to improve water quality or to control flooding, the model will be the playa lake. Playa lakes are ephemeral waterbodies that are found throughout the plains region. The playa lakes at Stapleton will be designed to maintain groundwater contact and to build up the "groundwater mound" that will develop beneath the basin. Continuous groundwater contact allows the basin bottom to support a rush meadow that will reduce pollutants and improve water quality.

Riparian Landscape - lake fringes.

Water bodies that fluctuate between wet and dry are found throughout the high plains region. At the upper reaches of the playa basins and along their margins there will be less frequent contact with groundwater and the moisture regimen will fluctuate more dramatically. These fringes are characterized by spike rush and dense stands of prairie cordgrass.

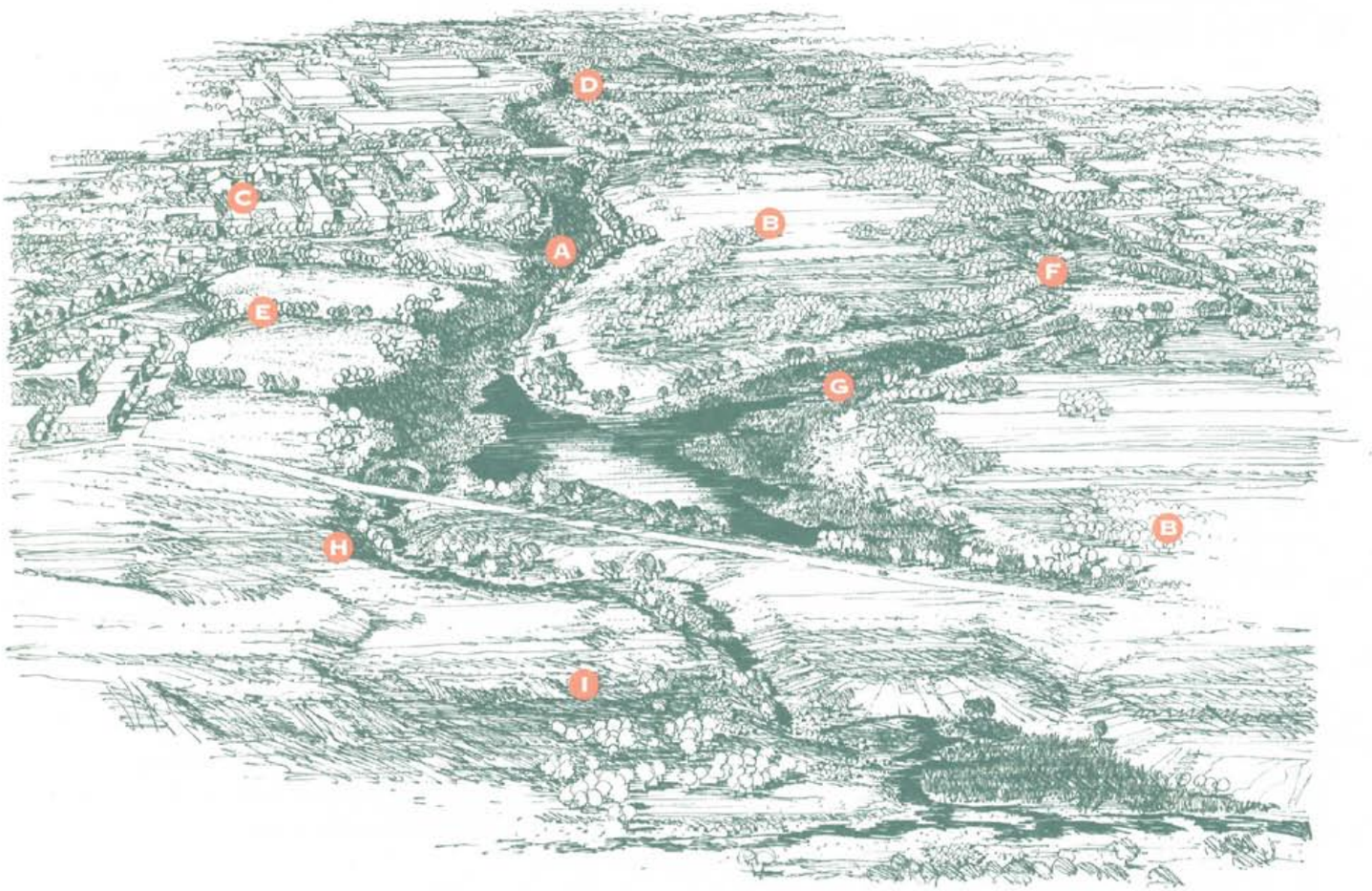
Modified Prairie Landscape - woody draw

The woody draw is an intermediate prairie landscape zone where root systems can access water sources below. Example species are box elder, green ash, serviceberry, American elm, red-osier dogwood, ponderosa pine and burr oak.

Modified Prairie Landscape - prairie turf

Many buffer or transition areas will occur in the restored urban and natural landscapes. Turf areas should be durable, easily maintained and water conserving. Indigenous examples are buffalo grass, blue gramma grass and western wheatgrass.

The Habitat Plan identifies locations for the mixed prairie vegetation landscape types on the Stapleton site. It illustrates the integration of natural areas, transitional parklands and urban development.



WESTERLY CREEK CORRIDOR AND SURROUNDINGS:

A birds-eye view looking south along a 1 1/2 mile length of Westerly Creek between Sand Creek and Montview Boulevard. This segment of the corridor contains the following elements:

A) Excavation and restoration of the natural stream corridor where aircraft runways previously constricted local and regional storm flows;

B) major urban park adjacent to the District II employment neighborhood;

C) District III residential neighborhood;

D) learning golf course adjacent to Westerly Creek and the District I residential neighborhood;

E) tree-lined local drainage corridor connecting adjacent urban neighborhood flows through to Westerly Creek;

F) hierarchy of surface channels and canals convey stormwater from larger urbanized basins to water quality treatment areas;

G) ponds and wetlands where stormwater is temporarily detained allowing for biological uptake and sedimentation of pollutants and nutrients;

H) a series of grade control drop structures stabilize the stream bed, preventing further erosion; and

I) wetlands at the edge of Sand Creek valley provide wildlife habitat and improve Westerly Creek stormwater quality before entering Sand Creek.

STRUCTURING ELEMENTS

3 TRANSPORTATION

The Denver region has one of the highest per capita rates of vehicle ownership in the nation and is grappling with the air quality impacts of a largely automobile-based system. From 1980 to 1991, vehicle miles travelled in the region increased by 35%. As the metropolitan region continues to grow, the number of privately owned vehicles will grow as well. As suburbs continue their outward expansion, commute distances will lengthen and vehicle miles traveled will grow. Resulting impacts to air quality and roadway congestion are likely to worsen.

The Stapleton Development Plan offers an alternative approach to development and mobility that seeks to reduce vehicle miles traveled and resulting air quality impacts through land use design, multiple modes of transit, and transportation demand management strategies. Diverse transportation options will be a long-term key to Stapleton's success as a place of employment, housing and recreation.

Existing Conditions

As an island surrounded by development, the Stapleton site is reasonably well served by streets leading up to its perimeter. As an operating airport, however, Stapleton has created a significant barrier to east/west and north/south continuity in the area's roadway system. I-70 is the only roadway corridor crossing the site, providing two regional access points, the Quebec Street and Havana Street interchanges. Primary east/west streets leading to the perimeter of the site are 56th Avenue, Smith Road, Martin Luther King Boulevard and Montview Boulevard. Primary north/south streets leading to the perimeter include Quebec Street and Havana Street. A number of neighborhood streets also intersect with the site's perimeter on the west, south and northeast.

In addition to the I-70 roadway corridor, the Union Pacific rail main line also crosses the site. This line travels through downtown and is a primary corridor in the national system. Surrounding neighborhoods are currently provided with reasonably efficient bus service, a network of on-street bike trails and pedestrian sidewalks. Existing bus service for the Stapleton site serves only the terminal location. No regional trails of any sort cross the Stapleton property.

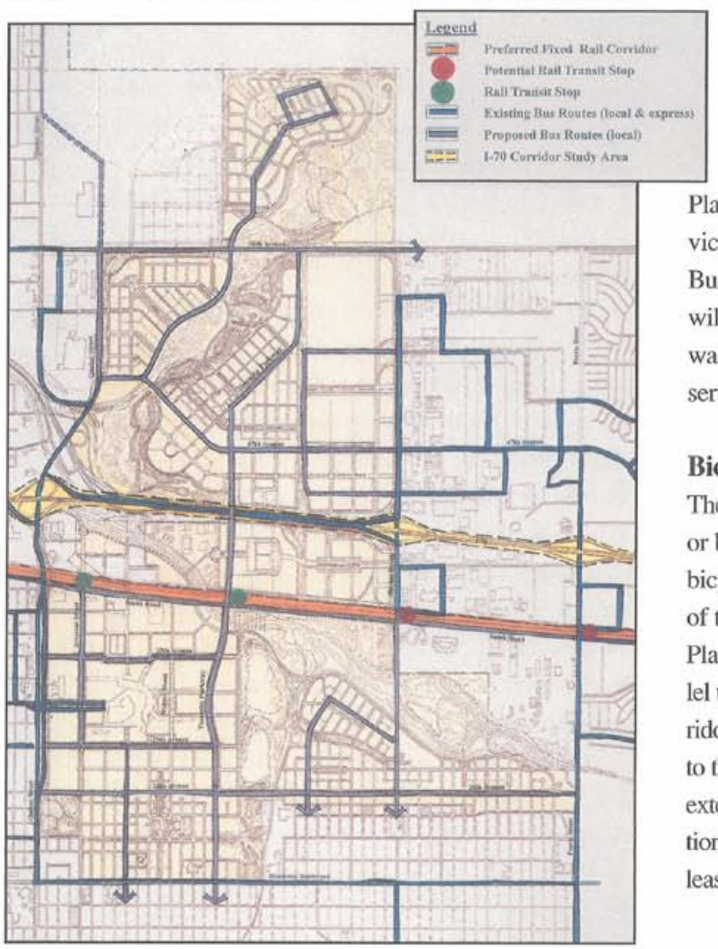
Land Use Design

Fundamental to the Development Plan are compact, transit-oriented, mixed use neighborhoods. Walkable scale, mixed use neighborhoods encourage walking and transit use by generating many relatively short trips. These trips are spread out through the day creating a steady demand for transit as opposed to the peak morning and evening rush hours. Also fundamental are greater densities around access points for public transportation. Greater densities will maximize the number of people who either live or work within walking distance of public transportation, increasing the likelihood of its use. In each district of the site, minimum densities necessary to support transit are incorporated into the Plan and all employment areas are located within walking or biking distance of housing.

Travel Modes

Rail Transit

The existing Union Pacific rail corridor crossing the site south of I-70 along Smith Road is currently the proposed alignment for rail transit in the east corridor as defined by the Regional Transportation District (RTD). The Development Plan supports this specific location, and recommends locating two intermodal facilities along the corridor at its intersection with Syracuse Street and Yosemite Parkway. These facilities will link rail transit, bus transit, bikeways, pedestrian networks and automobiles within one single facility. These locations can also serve regional connections to downtown, DIA, the Rocky Mountain Arsenal National Wildlife Area and the Lowry campus. The east corridor will be studied over the next 18 months by the Denver Regional Council of Governments (DRCOG), Colorado Department of Transportation (CDOT) and RTD to determine which transportation improvements will serve the corridor most efficiently. This effort must be coordinated with Stapleton's redevelopment. The goal will be to maximize the potential for future rail investment and complimentary adjacent development to generate significant transit ridership and reduced automobile reliance in this portion of the Smith Road corridor.



TRANSIT PLAN: All portions of the site will be within five minutes walking distance (1/4 mile or less) of public transportation. Fixed rail service in the I-70/Smith Rd. corridor is currently under study. The Development Plan proposes rail stations along Smith Road at Syracuse Street and Yosemite Parkway.

Bus Service

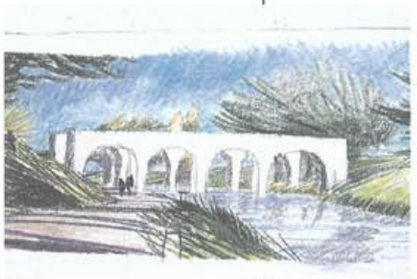
Introduction of bus service to the site will require logical extensions of existing routes. The Stapleton Development Plan provides necessary through street connections for bus service to operate through the site and into surrounding locations. Bus stops will be located throughout the site in locations that will ensure all residents and workers are within a five minute walk of a stop. All district and neighborhood centers will be served by this route structure.

Bicycles

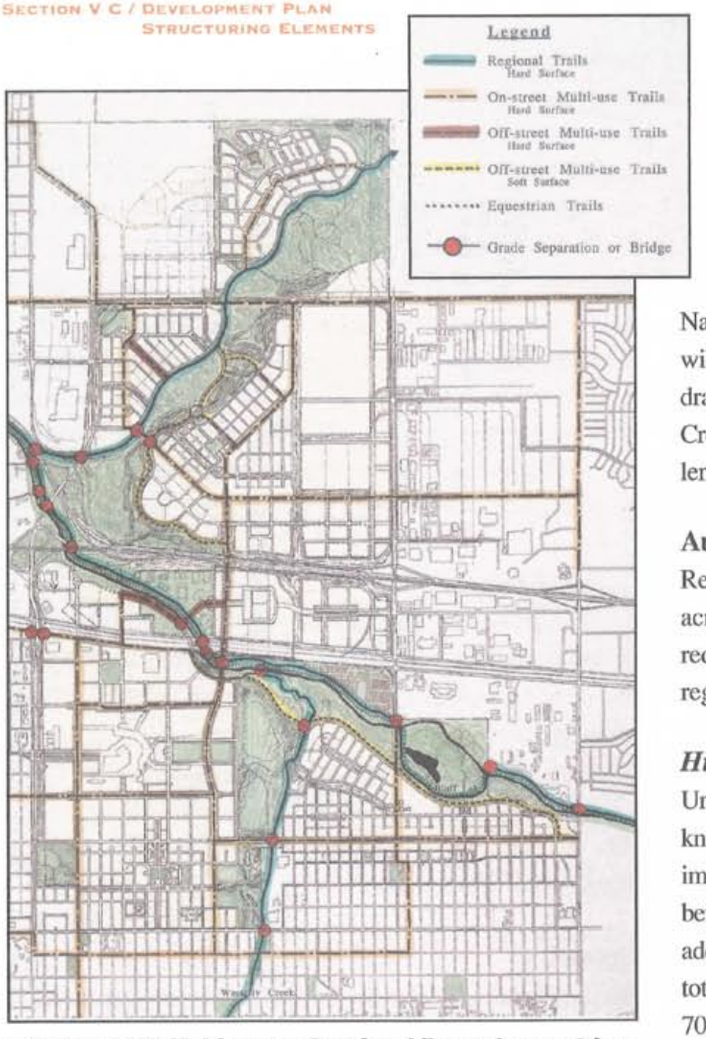
The Development Plan is designed to encourage greater usage or bicycles for recreation and commuting. A comprehensive bicycle network has been developed for the site as an extension of the route structure defined in the Denver Bicycle Master Plan. This network features off-street regional bikeways parallel to Sand Creek, Westerly Creek and the major open space corridor in the northern half of the property connecting Sand Creek to the Rocky Mountain Arsenal National Wildlife Area. An extensive collection of signed on-street bike routes serves all portions of the site. For on-street bike routes, the curb lane will be at least 15 feet wide to accommodate both vehicles and bicycles.

A REGIONAL RAPID TRANSIT SYSTEM IS NECESSARY TO SERVE CITY RESIDENTS AS WELL AS SUBURBAN COMMUTERS TO THE CENTRAL BUSINESS DISTRICT (CBD) AND OTHER ACTIVITY CENTERS. INCREASES IN RIDE SHARING, VEHICLE OCCUPANCY, BICYCLING AND WALKING ARE ALSO VIEWED AS VITALLY IMPORTANT GOALS

CITY AND COUNTY OF DENVER COMPREHENSIVE PLAN, 1988



SAND CREEK TRAIL: The existing runway tunnel structure could be opened up with the arched wall elements remaining for historical interest.



TRAILS PLAN: Multi-use pedestrian, bike and equestrian trails will connect the site's mixed use districts and link the site with the region.

Pedestrian Walkways and Trails

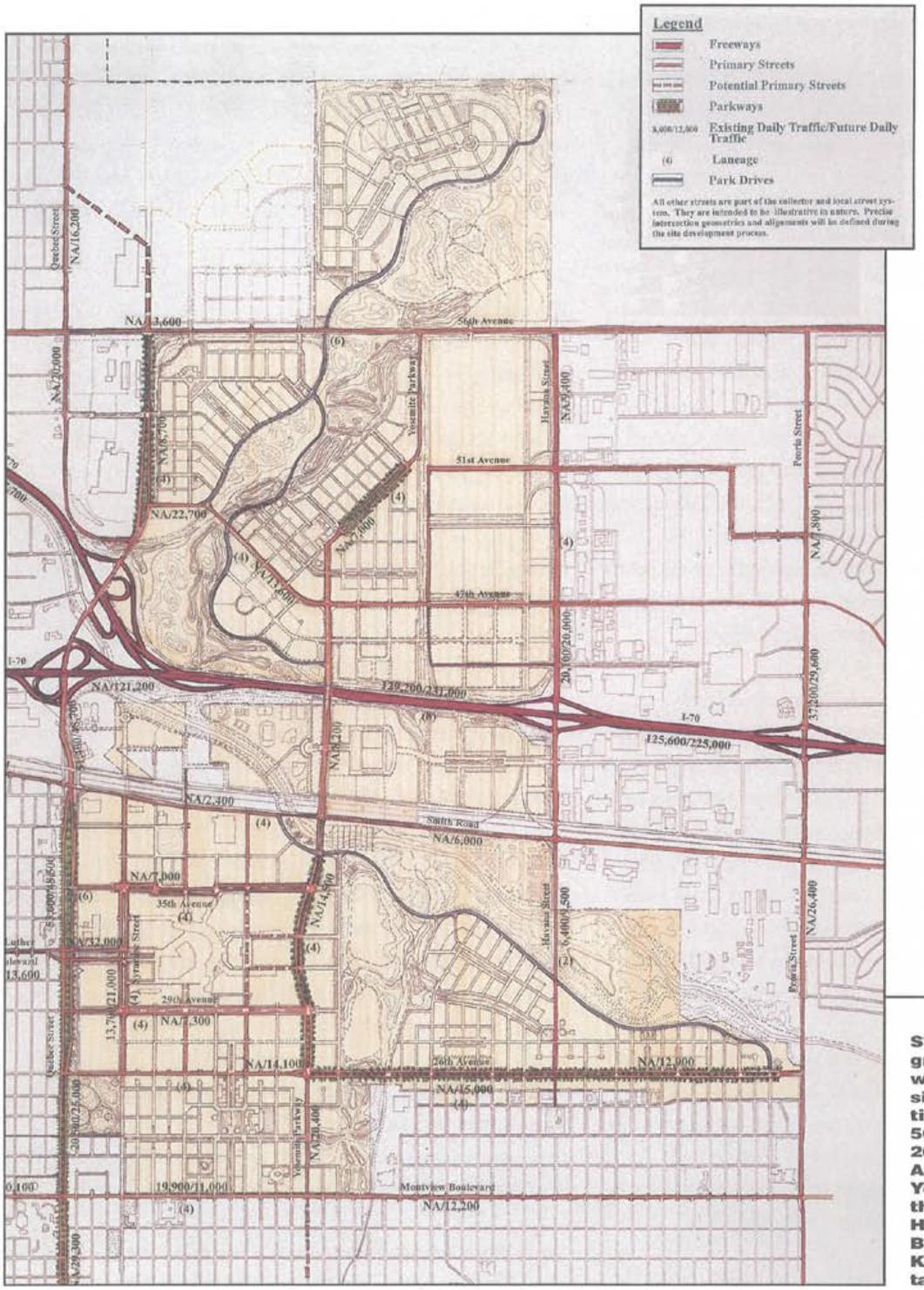
Sidewalks will be provided adjacent to all streets. Special pedestrian amenities will be provided in the area between Quebec Street and Yosemite Parkway, and Smith Road and 29th Avenue to help mitigate the pedestrian impacts of wider streets and intersections. The Development Plan also includes a number of parkways with significant landscaping that will encourage pedestrian use and designates multiple use trail linkages to connect the site into the regional trails system. Trails lie within mapped street or open space areas. Regional trails include the Sand Creek Trail connecting the Platte River Greenway east through Stapleton into Aurora to the High Line Canal, the Westerly Creek Trail from the Sand Creek Trail ultimately to the High Line Canal through Lowry, and a new trail from Sand Creek northeast along the Sandhills Prairie Park to the Rocky Mountain Arsenal National Wildlife Area. Fingers from these backbone trails will penetrate development areas via the surface water drainage system, parks and parkways. The multi-use Sand Creek Trail will also have an equestrian component for its full length on Stapleton.

Automobiles

Recognizing that I-70 is currently the only major roadway across the site, a number of roadway improvements will be required to reconnect the site with neighborhood and regional systems.

Highways

Until the I-70 corridor study is complete, it is impossible to know how the site will be impacted by future potential improvements. Accordingly, a 300 to 350-foot envelope is being reserved for these as yet unspecified improvements with additional buffering and drainage along the perimeter. The total corridor width for all of these combined purposes equals 700 feet. All travel demand modeling for the site assumed eight through lanes for I-70. If this does not become the case, the size and capacity of each recommended roadway will need to be reevaluated. Irrespective of the results of the study, it is clear, however, that both the I-70/Havana Street interchange and the I-70/I-270/Quebec Street interchange will need to be redesigned to accommodate the ultimate access needs of the site through these key points. More specific design recommendations will be made as part of the I-70 corridor study.



The Stapleton Development Plan provides necessary through street connections for bus service to operate through the site and into surrounding locations.

STREET PLAN: The basic grid of Northeast Denver will be extended onto the site. Important connections will occur along 56th Ave., Smith Road, 26th Ave., 49th / 47th Aves., Syracuse St., and Yosemite Parkway within the site. Quebec St. Havana St., Montview Blvd. and Martin Luther King Blvd. provide important perimeter connections.

Streets

Primary recommended street improvements are broken down between north/south and east/west improvements. Final street improvement design will require coordination with existing plans of jurisdictions surrounding the site.

The primary north/south streets include Quebec Street, Syracuse Street, Yosemite Parkway, Havana Street and Peoria Street.

Quebec Street: Currently Quebec Street is a two-lane facility south of 23rd Avenue, a four-lane facility between 23rd Avenue and 29th Avenue, and a six lane facility between 29th Avenue and I-70. In order to accommodate projected 2015 regional traffic volumes of 20,000 to 29,000 vehicles per day, it is necessary to widen Quebec to four lanes between 29th Avenue and Colfax Avenue. Widening is consistent with the Lowry Redevelopment Plan and would not be required until the southwestern portion of the site is substantially developed. Right-of-way will need to be acquired to construct this facility.

North of I-70, the Plan proposes a realignment of Quebec eastward to provide improved access to I-270, a high capacity connection to I-70 and an appropriate entrance into Districts VI and VII. A connection back to the existing Quebec Street alignment north of I-270 occurs at 56th Avenue. It must be noted that the alignment represented is conceptual. Determination of a final engineered alignment will be the result of a future study involving Commerce City, the CDOT and the City and County of Denver. Final construction will not be necessary until the northwest portion of the site is actively under development.

Syracuse Street: Syracuse Street is a two-lane neighborhood street serving the East Montclair neighborhood. It will be extended north into the site to serve neighborhoods planned in District I and will be terminated near Fred Thomas Park. North of 26th Avenue, it will be continued as a four-lane facility to serve District II and will not extend north of I-70.

Yosemite Parkway: Yosemite Parkway provides direct continuity from 56th Avenue to Montview Boulevard through the "heart" of the development. It will bridge over both the railroad corridor and I-70 using existing roadway bridge structures that will remain in place. Yosemite Parkway will also provide access to the businesses along Colfax Avenue and to the Lowry campus to the south.

Havana Street: Havana Street provides continuity from 56th Avenue to 26th Avenue, where it will terminate. The segment between 56th Avenue and I-70 is currently a four lane facility. Havana Street between I-70 and 26th Avenue is initially proposed as a two lane facility, but right-of-way should be preserved for a future four-lane section to accommodate future development.

Peoria Street: No changes to Peoria Street are proposed, although several streets serving the Stapleton site will now connect to it. They include 26th Avenue, Smith Road, 47th Avenue and 56th Avenue.

The primary east/west streets include 56th Avenue, 47th Avenue, Smith Road, 35th Avenue, Martin Luther King Boulevard, 29th Avenue, 26th Avenue, 23rd Avenue and Montview Boulevard.

56th Avenue: Fifty-sixth Avenue right-of-way will be capable of ultimately accommodating a parkway of up to six-lanes with a landscaped median, setbacks and limited access. Within 90 days of the closure of Stapleton, construction on two lanes of 56th Avenue will commence. Construction will utilize materials recycled from the Stapleton airfield.

47th Avenue: Forty-seventh Avenue, transitioning to 49th Avenue, will provide continuity through the north half of the development from Quebec Street to Havana and Peoria Streets. This will be a four-lane facility with minimal truck traffic.

Smith Road: Smith Road currently penetrates the site from the east and west but is not continuous. It will be connected and reconstructed as a four-lane facility with an intersection with

Yosemite Parkway. The Smith Road corridor will provide a major east/west connection and will accommodate rail transit, bicycles and pedestrians as well as automobiles.

35th Avenue, Martin Luther King Boulevard and 29th Avenue: Thirty-fifth Avenue, Martin Luther King Boulevard and 29th Avenue are intended to serve the proposed high density terminal area in District II. The existing MLK Boulevard/Quebec Street intersection will be preserved to provide a high capacity "front door" to the terminal area development sites. Both 35th and 29th Avenues will be "disconnected" west of Quebec Street to discourage travel through the residential Park Hill neighborhood to the west. The emergence of a major regional traffic generator at the terminal may necessitate modifications to these configurations and other connections different or in addition to those the Plan currently recommends. In addition, more detailed intersection design in this area may result in further modification to the street system.

26th Avenue: Twenty-sixth Avenue provides continuity through the south half of the site from Quebec Street to Peoria Street. It will be discontinued west of Quebec Street to discourage travel through neighborhoods to the west. It will be a standard four-lane street west of Yosemite Parkway, and a four-lane residential parkway east of Yosemite Parkway.

23rd Avenue: Currently, 23rd Avenue carries more traffic through Park Hill than Montview Boulevard and 26th Avenue combined. It will be extended into the site until it intersects Yosemite Parkway.

Montview Boulevard: No changes to Montview Boulevard are proposed, other than a large, landscaped setback on the north side along the Stapleton property.

Scenic Parkways: Two scenic parkways will be located along the major open space and drainage corridors. One will follow the south bank of Sand Creek across the site. The other will travel along the Sandhills Prairie Park open space network in the north half of the site. Final locations for these parkways will be developed with detailed design and engineering of the open space system.

Transportation Demand Management Strategies

Transportation demand management (TDM) strategies are intended to maximize the people-moving capability of the transportation system by increasing the number of persons in a vehicle, or by influencing the time of, or need to, travel. To accomplish these types of changes in travel behavior, a combination of incentives and disincentives are typically used. Examples of TDM strategies for the Stapleton area include:

Residential Neighborhoods

- Neighborhood transit subsidy (Eco-Pass) program
- Tele-work, teleconference centers in neighborhoods
- Tele-service centers (banking, city services, library access, etc.)
- Latest communication technologies (home shopping, etc.)
- Daycare, health and public services and schools in neighborhood centers

Commercial/Retail/Office Development

- Establishing maximum parking ratios
- Charging for parking
- Reduced-price, preferential location parking for carpool/van pool users
- Subsidies for transit and taxis for retail customers
- Employer-based Eco-Pass program
- Compressed work weeks and other alternative work schedules such as staggered shifts
- Support retail and restaurant facilities within walking distance of workplaces
- Shared fleet of low-emission vehicles for midday travel
- Shuttles to/from DIA or to/from transit station
- Bicycle parking, lockers and showers
- Health clubs in office developments
- Guaranteed Ride Home programs
- Rideshare matching
- Providing ready access and encouraging use of alternative fuels
- Financial incentives for ridesharing, bicycling or walking

Multi Use Streets

Extensive Bikeways

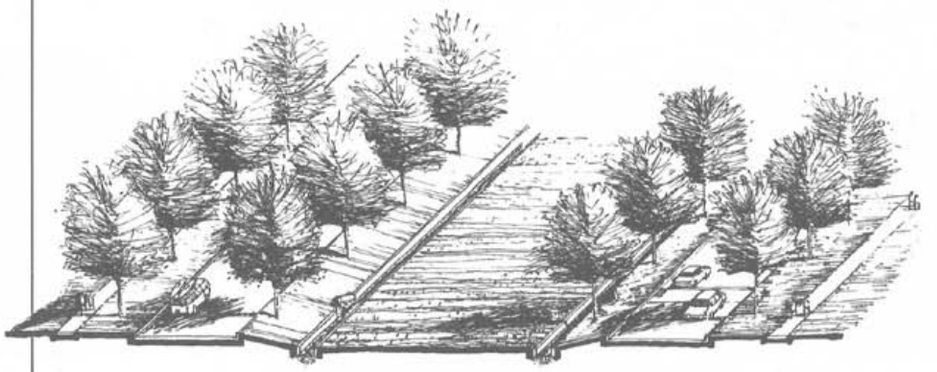
5 Minute walk to bus

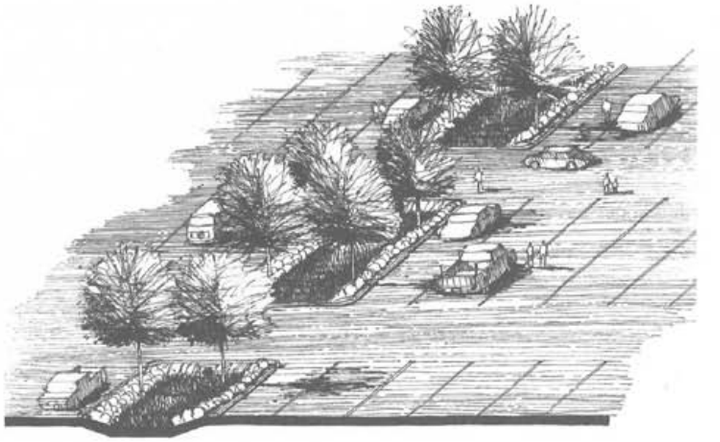
Rail Transit

Intelligent Vehicle Highway System

- In-home transit information
- Travel advisories (changeable message signs, highway advisory radio, personal communication devices, smart kiosks; etc.)
- Incident detection and response information

Successful implementation of some or all of these strategies will require early establishment of a Transportation Management Organization (TMO). The TMO would be responsible for incorporating and implementing strategies in new development rather than trying to retrofit them in established areas of development which may be resistant to change.





PARKING AND PARKWAY ILLUSTRATIONS: On site parking areas and some parkways, such as extended 35th or 29th Avenues, are examples of multiple use right-of-way design. A coordinated approach will integrate public safety, transportation, landscape, drainage and water quality functions. Maintenance concerns are incorporated as well.

Above right for example, parking lot runoff is directed to a series of connected shallow landscaped basins in order to detain stormwater, remove urban pollutants and irrigate drought tolerant and riparian plantings. The shallow basins connect to either on-site or regional detention areas via drainage corridors.

Above left for example, small rain showers are collected within the parkways in cleanable canals at the bottom edge of a broad median channel that directly infiltrates stormwater, irrigating adjacent street trees. Larger storms are conveyed to the regional stream network by the grass-lined median channel which also acts as a linear park. Along the sides, right-of-way is also reserved for pedestrians and bicyclists.

STRUCTURING ELEMENTS

4 SERVICES

Overview

For much of its history, the Stapleton site was open land or in agricultural use. Urbanization of the property began in earnest in the late 1920s with the construction of Denver's first municipal airport. Since that time, the site has been extensively modified. Many physical improvements and an extensive system of infrastructure have been added over the last 65 years to support the growing demands of aviation activity.

Upon the airport's closure in 1995, a new set of requirements and service demands will begin to emerge. Improvements and infrastructure originally created to serve aviation must be adapted and/or replaced with larger and different infrastructure systems designed to serve non-aviation use. In its present form, Stapleton is only partially prepared to support extensive reuse. Its existing infrastructure is concentrated in the southwestern portion of the site. It lacks internal systems sufficient to accommodate substantial employment, housing and other activities on site. Natural systems of topography, vegetation and drainage have also been destroyed or significantly altered. In addition, the interior of the site is disconnected from much of the local and regional systems of transportation, open space and service delivery.

Fundamental to the task of redevelopment is the ability to design and construct new systems to support new mixed-use communities and public use of the site. Existing infrastructure and improvements will be adapted, reused or recycled whenever possible. Significant new infrastucture investment in energy, water, wastewater, stormwater, solid waste, telecommunications, transportation and open space systems will be required. These investments must be made in a fashion that is cost-effective and supports the larger sustainable development objectives of the redevelopment program.

Stapleton infrastructure must provide cost-effective, low maintenance and environmentally sustainable approaches to urban service delivery. It must integrate urban and natural systems. It must respond to the limitations of traditional infrastructure provision where systems are often built and operated in isolation from one another and from consideration of broader environmental and social costs. For example, stormwater has traditionally been conveyed directly from streets to underground storm drains to rivers as quickly as possible. This approach eliminates opportunities for on-site irrigation and increases water quality impacts. When solid waste is indiscriminately landfilled, opportunities to reclaim its value as a resource through reuse, recycling and composting are also lost. Energy production is often associated with reduced air quality and global warming impacts, fossil fuel mining and geopolitical strife, but new developments of Stapleton's magnitude are often designed with insufficient attention to energy conservation.

Stapleton infrastructure must provide cost-effective, low maintenance and environmentally sustainable approaches to urban service delivery.

Stapleton provides an opportunity to integrate utility systems in a way that recognizes resource values in both inflows (water, energy, consumer goods from raw materials) and outflows (wastewater, stormwater, garbage), and captures these values through conservation and reuse wherever possible. Stormwater runoff channeled through grass-lined swales provides irrigation for green spaces and is filtered through vegetation, improving downstream water quality in river systems. Solid waste, presorted and processed, produces raw materials for local end-use

"ECONOMIC GROWTH HAS ITS IMPERATIVES; IT WILL OCCUR. THE KEY QUESTION IS: WITH WHAT TECHNOLOGIES?"

JAMES GUSTAVE SPETH
UNITED NATIONS
DEVELOPMENT PROGRAM

industry production activity or compost for soil amendment. Energy conservation through both demand and supply-side management reduces consumption and internalizes costs. Proposed systems will thus be both more resource-efficient and cost-effective, and will minimize environmental impacts.

The new systems developed for Stapleton must facilitate efficient use of natural resources, provide diverse mobility options, support compact communities, promote restoration of natural systems (habitat, plant communities, water quality, etc.) and take advantage of technological advancement and opportunities for demonstration projects.

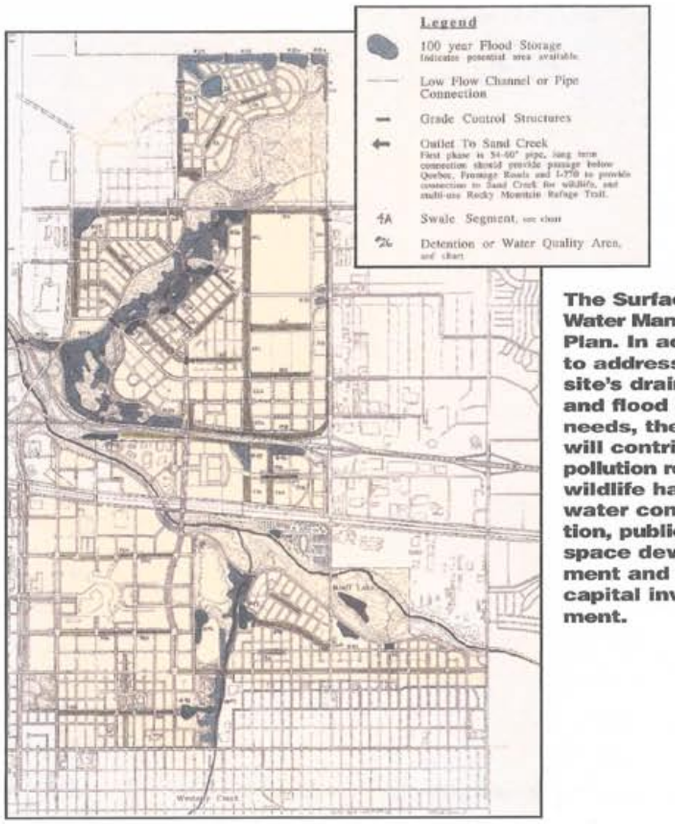
Meeting Future Service Demands

Fundamental to redevelopment is the delivery and pricing of a wide variety of urban infrastructure services to the people living, working and recreating on the Stapleton site. Existing improvements will be adapted, reused and recycled whenever possible, but significant new investment in infrastructure will be necessary.

With environmental responsibility as a principle focus of the development program, implementation must go further than simply identifying the delivery of utilities to the site. New community infrastructure services must be sustainable over time. The goals have been to define cost-effective approaches to service delivery that make a project truly sustainable, to integrate systemic solutions when possible, and to produce efficient, durable and manageable solutions. In addition, it will be important to price these services in a manner that accurately reflects their cost – including economic, social and environmental costs. Accurate pricing will provide incentives for achievement of a sustainable urban form. Four areas are highlighted in order to demonstrate an integrated systems approach. They are storm-water management, energy management, water and wastewater management and solid waste management.

Storm Water Management and Flood Control

Currently, Stapleton has a very limited set of stormwater management improvements. The portion of the site below I-70 has some piped collection facilities that direct stormwater flows to Sand Creek and Westerly Creek. The balance of the flows are surface flows carried by the topography to these same waterways. North of I-70, the site has little in the way of stormwater management facilities. The soil is extremely sandy and porous, and most of the rainwater is absorbed directly into the ground. This infiltration is possible because so large a proportion of the northern half of the site is open land with no impervious surface.



The Surface Water Management Plan. In addition to addressing the site's drainage and flood control needs, the plan will contribute to pollution reduction, wildlife habitat, water conservation, public open space development and reduced capital investment.

Non-aviation use of the site will dramatically increase the amount of connected impervious surface in many areas of the property, and particularly north of I-70. Much higher concentrations and volumes of water will need to be accommodated. The existing grade will tend to direct surface flows to the northwest towards Commerce City and the Rocky Mountain Arsenal National Wildlife Area. Commerce City's stormwater system is not designed or intended to manage these flows, and the Arsenal can accept only historic flows due to its unique circumstances (containing and treating groundwater flows as part of the overall cleanup program).

The project team has worked with the Urban Drainage and Flood Control District, Denver Wastewater and other agencies to develop a comprehensive flood control and stormwater management system for Stapleton. This system will:

- avoid piped collection systems and rely primarily instead on storage and management of water on site through a series of swales, small channels, storage facilities, and a new riparian corridor north of I-70, with an outfall at Sand Creek near Quebec Street;

- handle the vast majority of the site's stormwater management needs in the public realm to ensure ongoing maintenance, assist natural irrigation of public spaces, and provide greater site development flexibility;

- serve multiple purposes, including:
  - irrigation of natural areas;
  - establishment of vegetation for wildlife habitat;
  - 100-year flood detention;
  - extensive use of natural filtration to control nonpoint source pollution and improve water quality.
  - provision of a more cost-effective solution than traditional piped systems.
  - creation of water amenities; streams, ponds and wetlands

The Surface Water Management Plan illustrates the essential elements of this system. This approach allows for state-of-the-art management of stormwater. Regional detention is maximized, water is essentially harvested from private property to irrigate and improve public spaces, and overall capital investment in the site is reduced.

Energy Management

During the last 10 years, energy efficiency in American industry (home building, automobile manufacturing, etc.) has improved significantly in response to market demand. The social costs of energy consumption include environmental damage and geopolitical conflict over fossil fuel sources; the risks of nuclear power; air pollution, potential climate change and the consumption of forest, desert, river and ocean habitats. These relationships are increasingly apparent to consumers, who have developed a greater interest in conservation, and in products that have reduced impacts on the environment. In addition, buyers of real estate increasingly consider long-term energy costs as a factor in purchase decisions.

During the last 10 years, energy efficiency in American industry has improved significantly in response to market demand.

The goal of the Development Plan is to use innovative building and community design, technology and market mechanisms to decrease the overall energy demand at Stapleton, and to incorporate "clean" energy sources wherever possible.

As part of the Stapleton Development Plan, an analysis identified potential energy requirements for the site and scenarios for meeting those requirements. Once again, the goal was to explore the most effective options likely to be available over time to meet energy requirements while promoting efficient use of resources and reduced impacts on the natural environment.

Three different demand scenarios were examined, each presuming different levels of conservation and demand-side management. These scenarios illustrated the potential at buildout to achieve savings of 50, 60 and 70 percent over current standard practices, relying on presently available technology. The analysis emphasizes the critical role of demand-side strategies as the most cost-effective and most readily available components of an overall energy strategy for the site. Demand-side management includes all forms of design, construction and operating practices that reduce energy consumption. Demand-side efficiency will be directly affected by land use patterns, building orientation, density, landscaping, solar access, wind protection and other factors.

Supply-side options were also evaluated. Given the 30-40 year anticipated buildout of the site, a number of renewable sources can play a role in meeting the site's supply requirements. The analysis specifically examined wind electric conversion systems, solar thermal applications, distributed and concentrating photovoltaics and fuel cells. The cost competitiveness and opportunities to incorporate these approaches may vary, but Stapleton does provide an ideal setting for demonstrations of these and other renewable technologies, even in the short term.

The report also examined the potential role of village-scale district energy systems and opportunities for commercial/industrial energy cascading among different energy users on the Stapleton site. District energy systems may be a viable alternative to distributed (individual) heating, cooling, and hot water systems. These systems could meet the thermal and electric demand requirements of a properly balanced mix of users minimizing the peak demand of the electric utility. Opportunities for cascading on the site should also exist, given the potential close proximity of industrial, commercial and residential users.

THE MAJOR RECOMMENDATIONS WITH RESPECT TO ENERGY MANAGEMENT INCLUDE:

- *Maximize conservation through demand-side strategies.*
- *Establish energy performance standards for buildings rather than prescribe levels of component performance.*
- *Ensure solar access rights through multi-level solar zoning.*
- *Use life-cycle cost analysis to select demand-side technologies.*
- *Develop appropriate zoning, codes, covenants and incentives to encourage/require energy efficient site and building designs.*
- *Develop village-scale energy systems (cogeneration) based on mixed land-use scenarios that support energy management goals.*
- *Install renewable energy demonstration projects*
- *Use tree planting to reduce heating and cooling loads on site.*
- *Develop energy hook-up, delivery, transmission and end use pricing schedules that encourage conservation*

Water and Wastewater Management

Denver, though located in a semi-arid region, has long enjoyed its status as an irrigated community. Water consumption in the Denver metro area (at an average rate of 151 gallons per person per day) has grown steadily over time, and has skyrocketed in recent years with population growth. This trend has not been without costs to the region. Water use in Denver has implications not only for the long-term viability of our rivers and groundwater, but for the viability of regional agriculture and critical wildlife habitat on the South Platte and other regional rivers.

Current Denver water supplies are adequate to support the full buildout of Stapleton. However, Stapleton represents an opportunity to demonstrate new approaches to water use, reuse and

conservation. Efficient use of the resource, through the use of new technologies and management practices, can provide a model for the west.

Potable water for the Stapleton site is provided by Denver Water. Stapleton has been essentially a private system for all of its history. All of its existing on-site improvements for water distribution were constructed and operated by the airport. Stapleton's system must now be adapted, extended, and integrated with the rest of the public water system.

Wastewater services are currently handled by the Metro Wastewater Reclamation District. In addition to their other service delivery responsibilities, Denver Water and Metro Wastewater are each currently studying options for a northeast metro area reuse water system.

As with all other services, the goals regarding water and wastewater have been to maximize efficient use of the resource, to minimize environmental impacts, and to support the broader objectives of the redevelopment program. Over the course of the redevelopment program, we should be able to move towards an ideal in which:

• use of potable water is greatly reduced from present consumption patterns;

• non-potable water reuse and stormwater flows play an increasingly greater role in meeting irrigation, industrial and other non-human consumption demands;

• reuse water is supplied by wastewater treatment facilities treating flows that currently move through the site or that in the future are generated on site.;

• water management approaches will reduce demand, contribute to water quality improvements in the South Platte River basin and support habitat development and restoration on site.

Achievement of these objectives will require a phased approach. Some options, such as enhanced conservation measures, are available immediately. Others, such as regional reuse programs or significant reuse of wastewater flows generated on site, will need to be anticipated now but will not be possible to implement until later stages of the program.

THE MAJOR RECOMMENDATIONS WITH RESPECT TO WATER AND WASTEWATER MANAGEMENT INCLUDE:

Short Term Policies

• Implement aggressive conservation and demand management programs.

• Install dual distribution systems within public open spaces.

• Use nontributary groundwater to supplement dual distribution system until on-site wastewater flows are sufficient to meet supply needs for irrigation.

• Explore opportunities for a one-million-gallon-per-day reuse program with Aurora's Sand Creek Wastewater Treatment Plant immediately adjacent to the site.

• Explore options for diverting and treating wastewater flows in the 56th Avenue sanitary sewer at a satellite treatment facility on site.

• Pursue wetlands banking opportunities and incorporate best available technologies for water quality management in site restoration, open space and storm drainage improvements.

Mid and Long Term Policies

Continue above efforts, and:

• Explore possible expansion of Sand Creek treatment facilities and increased reuse volumes.

• Pursue opportunities to work with Metro Wastewater to receive additional reuse flows as part of its response to South Platte River water quality issues or its effluent management program.

• Pursue similar reuse opportunities with Denver Water through future phases of its water reclamation project.

• Apply local or sub-regional approaches to wastewater treatment and reuse as opportunities arise.

STAPLETON'S APPROACH TO WATER MANAGEMENT WILL EMPHASIZE CONSERVATION AND MAXIMUM USE OF STORMWATER FLOWS AND WATER REUSE TO ADDRESS IRRIGATION AND INDUSTRIAL NEEDS.

"IMAGINE WASTES BEING CONVERTED INTO HIGH VALUE PACKAGING, WHICH OFFERS A VIABLE SUBSTITUTE FOR SEVERAL PETROLEUM PLASTICS, SUBSEQUENTLY DEGRADES TOTALLY, OR ALTERNATELY, CAN BE RECYCLED BACK TO THE EXACT SAME USE."

MARK MONTGOMERY, PRESIDENT OF ECOCHEM (A JOINT VENTURE OF CON AGRA AND DUPONT FOUNDED IN 1990 TO PRODUCE PACKAGING MATERIALS FROM WASTE PRODUCTS)

It should be noted that the recommendations described on the previous pages with respect to water reuse will require a high degree of intergovernmental cooperation between various service providers. The Metro Wastewater Reclamation District is responsible for treatment of wastewater collected by Denver within Denver's bounderies. Denver's current contractual relationship requires the direction of all flows to the District's treatment system. The Board of Directors of the Metro District, as well as other policy makers, will need to ultimately approve a number of the more innovative concepts described above. All of the relevant service providers have expressed a willingness to pursue the general service objectives identified for the Stapleton site.

Solid Waste Management

The average American generates 4.4 pounds of solid waste per day, resulting in a national total of 208 million tons per year, according to the U.S. Environmental Protection Agency. Even though landfill capacity and disposal costs are not perceived to be a constraint in the Denver region, there are increasing concerns and consequences resulting from our waste disposal practices. Much of what we dispose is reusable, recyclable or compostable. In addition, the entire process of raw material development, use and disposal has economic and environmental consequences.

In planning for the Stapleton site, emphasis has been placed on achieving higher ratios of recovery and reuse of materials. Evaluation of solid waste options for the site began with an evaluation of the volume and composition of waste a community of the size planned for Stapleton would currently generate. Strategies were then evaluated for moving the community as close as possible to a condition of no net waste: i.e. no contribution of waste to local landfills.

At full buildout, the Stapleton community is anticipated to produce 25,000 tons of waste products per year. The strategy developed for the site includes reduction of this volume, as well as opportunities to import material to the site for reuse as part of an overall solid waste management system. The strategy addresses handling and processing of material, remanufacturing opportunities and institutional policies required to support successful implementation of the program. Many components of this plan are considered viable in the current market.

THE MAJOR RECOMMENDATIONS WITH RESPECT TO ENERGY MANAGEMENT INCLUDE:

- Develop a resource village on site to address processing of recyclable material, yard waste, household hazardous waste and construction/demolition debris.
- Identify public or private organizations to manage and/or provide the following services:
  - operation of recyclable materials processing facility;
  - operation of yard-waste composting facility, in combination with a clean source of sludge, to be recycled as part of Stapleton land restoration;
  - handling and transportation of household hazardous wastes:
  - operation of construction/demolition debris processing facility;
  - collection of wet/dry wastes from commercial and residential generators;
  - operation of end-market manufacturing facilities to create reusable products from processed, reusable, recyclable and compostable materials.
- Coordinate with the City and County of Denver and Stapleton development management entity to implement a solid waste rate structure and public education programs necessary to achieve source reduction
- Establish procurement policies that maximize the use of reusable or recycled content products in development, operation and maintenance of the site.

STRUCTURING ELEMENTS

5 LAND USE AND URBAN DESIGN

The land use plan and development program for Stapleton reflect the site's context and the principles adopted to guide redevelopment. The land use plan describes a substantial mixed-use community which could support an ultimate employment base of more than 30,000 jobs and 10,000 households in a unique environment: a series of urban villages that each provide access to employment, housing, public transportation and open space. Districts of the site are organized around identifiable centers that support a variety of services and civic uses. The emphasis is on compact, walkable communities and strong ties between the Stapleton site and the surrounding community.

The land use plan reflects Stapleton's future role as a significant employment center. Stapleton represents an important opportunity to create an employment base — in response to the significant trend towards concentration of employment growth in suburban areas. At the same time, the plan attempts to create integrated communities rather than large, single-use districts. The integration of jobs and housing forms part of an overall strategy to increase access and reduce vehicle miles and regional air quality impacts. This plan also suits the size of the site; absorbing such a large property in the Denver market would be difficult without a broad mix of uses.

The land use plan is intended to be flexible. No one can predict market demand or absorption of land with any accuracy over 30 or 40 years. As a result, the mix of uses and densities must remain somewhat flexible — particularly for portions of the site likely to be developed in later phases of the project. What are most important to establish now are the general character, scale and density of the mixed-use community and its districts, as well as the basic community infrastructure, open space, civic sites and other elements of the public realm. Specific land uses, parcel configurations and relationships among various forms of employment, housing and other uses should be determined more definitely as development and the process of district planning, zoning and platting proceeds. The development program defines the land use allocations, average densities and anticipated employment and population totals projected for buildout of the site. Some of these parameters will vary over time, but the development program provides a feasible baseline, consistent with current and anticipated market conditions.

The development program assigns 65 percent of the site to urban development and 35 percent to a mix of open space uses (stormwater management, parks, golf courses, recreation facilities, trails and natural areas). Approximately 16 percent of the site will be required for parkways, streets and other forms of public rights-of-way. With all forms of open space and public rights-of-way accounted for, approximately 2,285 acres of net developable property remain. Of this acreage, 52 percent is allocated to all forms of employment and commercial uses, 41 percent to residential use and 7 percent to institutional/cultural use. The figures on the following page describe the preliminary Land Budget for the site.

The land use plan reflects Stapleton's future role as a significant employment center.

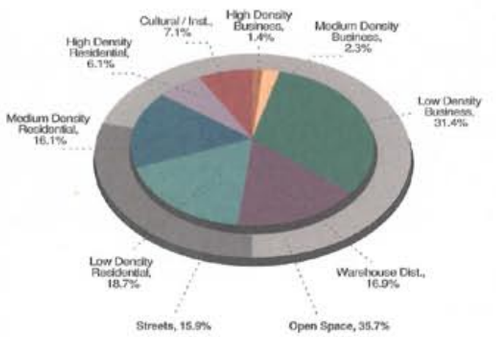
The allocation described above supports approximately 10,000 housing units with approximately 25,000 residents (at densities that vary from three to sixty dwelling units per acre) and approximately 17-20 million square feet of office, commercial and industrial space (at floor-to-area ratios ranging from 0.3 to 1.0). In addition, 1,680 acres of parks, recreation and natural areas are provided by the development program. Portions of this system also address necessary storm drainage management and water quality improvement requirements of the site.

"LIKE THE TRADITIONAL VILLAGE, THE NEW KIND PROVIDES FOR A VARIETY OF HOUSING TYPES (DETACHED, TOWNHOUSE, "GRANNY FLATS" ABOVE GARAGES AND SHOPKEEPERS' APARTMENTS ABOVE THE STORES) - WHICH IMPLIES A RANGE OF INCOMES, AGES AND FAMILY TYPES."

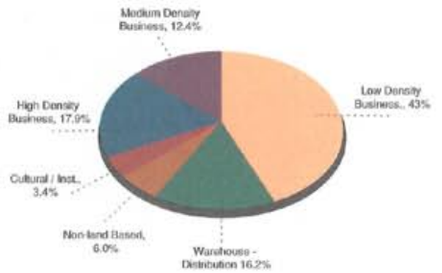
NEWSWEEK

DECEMBER 26, 1994

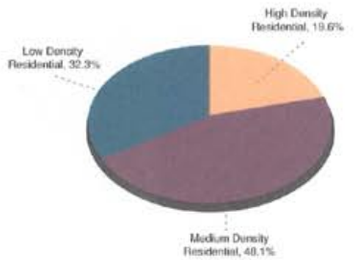
LAND BUDGET



EMPLOYMENT AND POPULATION DISTRIBUTION



On Site Employment, 31,138



Resident Population, 25,469

PRELIMINARY LAND USE ALLOCATION AND BUILDING PROGRAM SUMMARY

		BUILDING UNITS (MSF OR DU)	DEVELOPABLE (NET ACRES)	STREETS (ACRES)	OPEN SPACE (ACRES)	TOTAL (GROSS ACRES)	EMPLOYMENT OR RESID. WORKERS
Non-Development Areas							
Regional (not included in the districts)		n.a.	n.a.	33 ac*	1,154 ac	1,187 ac	n.a.
Local (within the districts)		n.a.	n.a.	175 ac*	491 ac**	666 ac	n.a.
		* (includes streets and the railroad R.O.W.)					
		** (includes community parks and local drainage.)					
		All neighborhood open spaces and local streets are included below					
Non-Residential Development							
Cultural/Inst. Public Services/Amenities	.2 F.A.R. 1000 sf/ employee	0.86 msf	99 ac	25 ac	0 ac	124 ac	864 empl (2.8%)
High Density Business/ Office/Retail	1.0 F.A.R. 250 sf/ employee	1.39 msf	32 ac	15 ac	2 ac	49 ac	5,576 empl (17.9%)
Medium Density Business/ Office/Retail	.5 F.A.R. 300 sf/ employee	1.15 msf	53 ac	18 ac	2 ac	73 ac	3,848 empl (12.4%)
Low Density Business/ Office/Retail/ R&D/Flex Light Manuf./Assembly	.3 F.A.R. 700 sf/ employee	9.37 msf	717 ac	128 ac	5 ac	850 ac	13,385 empl (43.0%)
Warehouse-Dist./ Light Manuf./Assembly	.3 F.A.R. 1000 sf/ employee	5.06 msf	387 ac	69 ac	2 ac	458 ac	5,057 empl (16.2%)
Non Land-based	6% of employees.	n.a.	n.a.	n.a.	n.a.	n.a.	1,868 empl (6.0%)
Residential Development							
Neighborhood Institutional	.2 F.A.R. 1000 sf/ employee	0.54 msf	62 ac	21 ac	(included elsewhere)	83 ac	540 empl (1.7%)
High Density Multi-family	18 du/ac avg (16+) 2.0 res/du; 36/res/ac	2,496 du (23%)	139 ac	62 ac	6 ac	207 ac	4,993 res
Medium Density Multi & Single Family	14 du/ac avg (10-17.5) 5,161 du 2500-4400 sf lots 2.375 res/du; 33.25/res/ac	5161 du (48%)	369 ac	128 ac	15 ac	512 ac	12,257 res
Low Density Single Family	7 du/ac avg (3-9) 4500-14500 sf lots 2.75 res/du; 19.25/res/ac	2,989 du (28%)	427 ac	77 ac	10 ac	514 ac	8,219 res
Totals	Cultural/Institutional. Residential	0.54 msf 10,646 du	62 ac 935 ac	21 ac 267 ac	0 ac 31 ac	83 ac 1,233 ac	540 empl 25,469 res
Site Totals	Residential	10,646 du	935 ac	267 ac	31 ac	1,233 ac	25,469 res
	Cultural/Institutional.	1.40 msf	161 ac	46 ac	0 ac	207 ac	1,404 empl
	Commercial	16.98 msf	1,189 ac	230 ac	11 ac	1,430 ac	29,734 empl
	Non-development			208 ac	1645 ac	1853 ac	
	Total	10,646 du 18.38 msf	2,285 ac	751 ac	1,687 ac		25,469 res 31,138 empl
			Gross Development Area *		**2,870 ac**		
			Gross District Area		**3,536 ac**		
			Gross Site Area		**4,723 ac**		
	Residential Average	11.4 du/acre					

*excludes non-development areas; arterial streets, principal streets, local drainage, community parks, the railroad r.o.w. and all regional parks and drainage.

The Preliminary Land Use Allocation and Building Program Summary provides a illustrative summary of the development program's land allocation, densities, square footages, unit totals and population and employment goals. The densities assumed for employment and residential uses will be influenced by market demands over time. In some areas, increased density of activity would further enhance project economics and improve the efficiency of a variety of forms of transportation and service delivery. Increased densities in some locations could increase demands on the capacities of some elements of necessary infrastructure as well. Reductions in densities below those depicted in the Preliminary Land Use Allocation and Building Program Summary could adversely affect project economics and would likely reduce the efficiency of service delivery and increase some forms of environmental impacts.

The district and neighborhood centers help establish neighborhood identity.

Districts and Centers

The land use concept for the site divides the Stapleton property into eight distinct districts. Each district is intended to support a mix of uses. The specific mix of uses depends upon location, size, site characteristics and adjacencies. The districts vary from providing great diversity to circumstances where one or more uses predominate. In every case, the goal is to promote diverse and successful communities rather than isolated, single-use developments.

Each district consists of a neighborhood, a grouping of neighborhoods or a special-use area. The districts have defined edges and an identifiable center. The edges can be natural or man-made features. Open space areas, drainage corridors, golf courses, high volume regional roadways or lower density residential neighborhoods can all serve as edges.

The district and neighborhood centers help establish neighborhood identity. Each is sized according to its role within each district. Some are modest and local in size and function, primarily serving the nearby population. Others are larger in scale, incorporating a greater mix of uses intended to service a larger population. Each center will include a public place of some kind (a park, square, community garden), an educational facility (elementary school, daycare, etc.) and a public transit stop. These centers can also serve as a location for other public buildings and uses (church, post office, library, meeting hall). In addition, the centers can provide retail services and employment opportunities within walking distance of home or workplace.

Mixed Use Districts

Mixed use districts are essential to achieving the project's social, economic and environmental goals. Mixing of uses has far-reaching implications with respect to crime, economic and social diversity, transit and access, operating costs and utility costs.

Crime - Planning for a variety of residential uses adjacent to and within commercial developments will allow thoughtful introduction of people and activity to areas which would otherwise be dormant after business hours. Potential benefits may include reduced crime and vandalism, helping to increase land values.

Diversity - Mixed-use and mixed-density developments can help achieve economic and social diversity by providing a variety of housing products for family sizes, age groups and economic levels. A diverse neighborhood will encourage regional migration to the site.

Transit and Access - Mixed-use developments encourage the use of transit by generating many relatively short trips. These trips are spread throughout the day creating a steady demand for transit as opposed to the peak morning and evening rush hours.

Illustrative plan showing the possible buildout of the District I center. A series of uses are grouped around a two acre neighborhood park or square. They include community gardens, day care, an elementary school, a bus stop, services, neighborhood businesses, church sites and elderly midrise housing.

Operational Costs - The proper integration of design elements in a mixed-use development results in operational savings in energy, maintenance, security, management, communications, utility access, parking and water supply.

Utility Costs - Mixed-use developments diversify energy and utility demands which causes a lowering of peak usage. In turn, this can cause a reduction in utility rates.

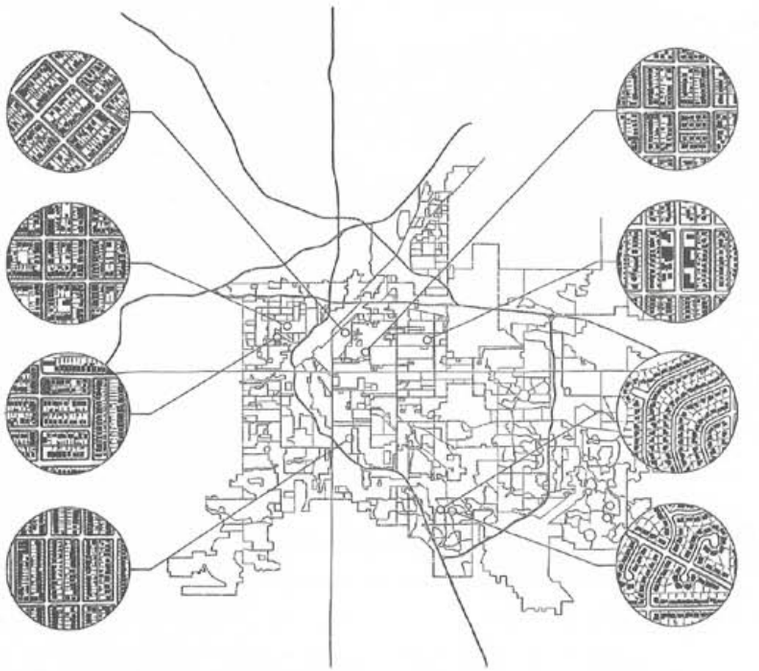
Traditional Denver residential neighborhoods such as Park Hill, Washington Park and Congress Park have pockets of increased density and mixed use which enhance the quality of life within these neighborhoods. Future neighborhoods of Stapleton will share these qualities and exploit the benefits outlined above.

The density of residential or employment-related development in each district is typically described with net dwelling units per acre (for residential development) or floor-to-area ratio (for employment-related development). Both of these measures can be confusing and easily misinterpreted. Dwelling units per acre can vary substantially depending on the type and mix of housing units as shown in the adjacent chart.

HOUSING TYPE	DENSITY
1. Large lot, single family, detached	3-5 dwelling units/net acre
2. Medium lot single family, bungalows, cottage, patio homes	6-9 dwelling units/net acre
3. Zero lot line single family, townhouse	8-12 dwelling units/net acre
4. Townhouses with stacked flats	10-14 dwelling units/net acre
5. Two families, three families, carriage houses	10-20 dwelling units/net acre
6. Courtyard apartments, garden apartments	20-30 dwelling units/net acre
7. Apartments, stacked flats	30-50 dwelling units/net acre
8. Mid/high rise apartment buildings (assumes decked parking)	60+ dwelling units/net acre

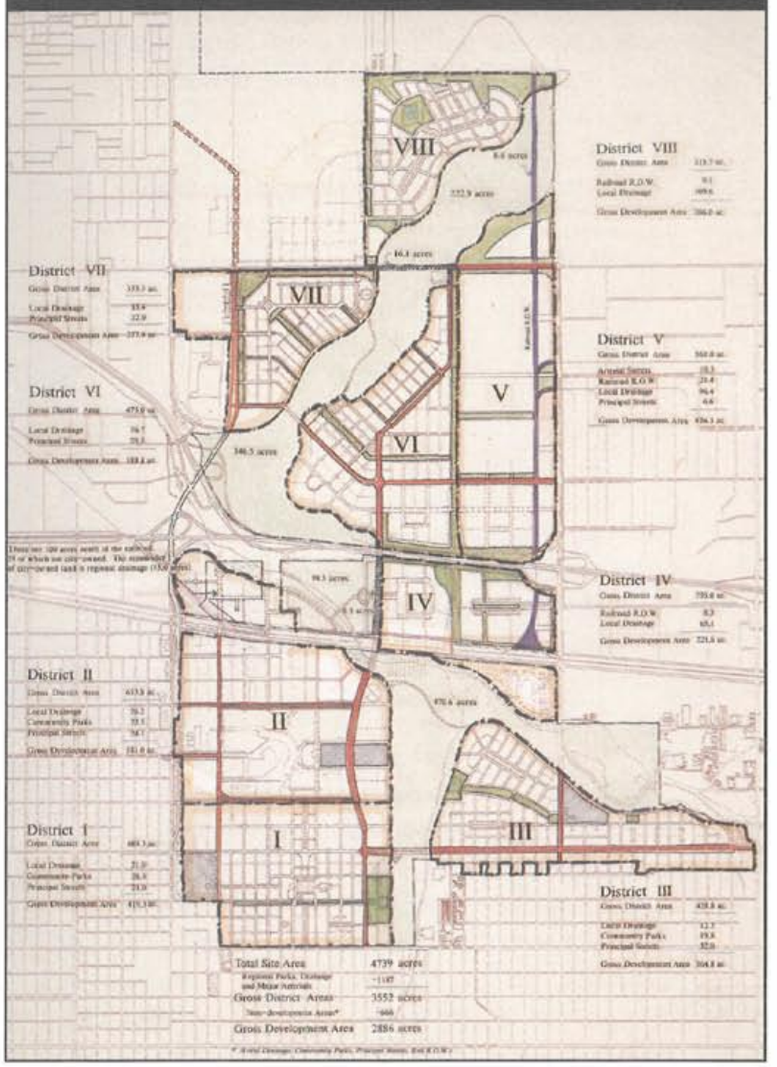
Average residential densities for the different districts range from eight dwelling units/acre to 18 dwelling units/acre. Eight dwelling units per acre is considered to be the minimum necessary to support public transit.

The Park Hill neighborhood, immediately west of Districts I and II, is shown in an aerial view. The residential street grid and alley pattern will be repeated in new Stapleton neighborhoods as will the integration of institutional, commercial and other land uses.



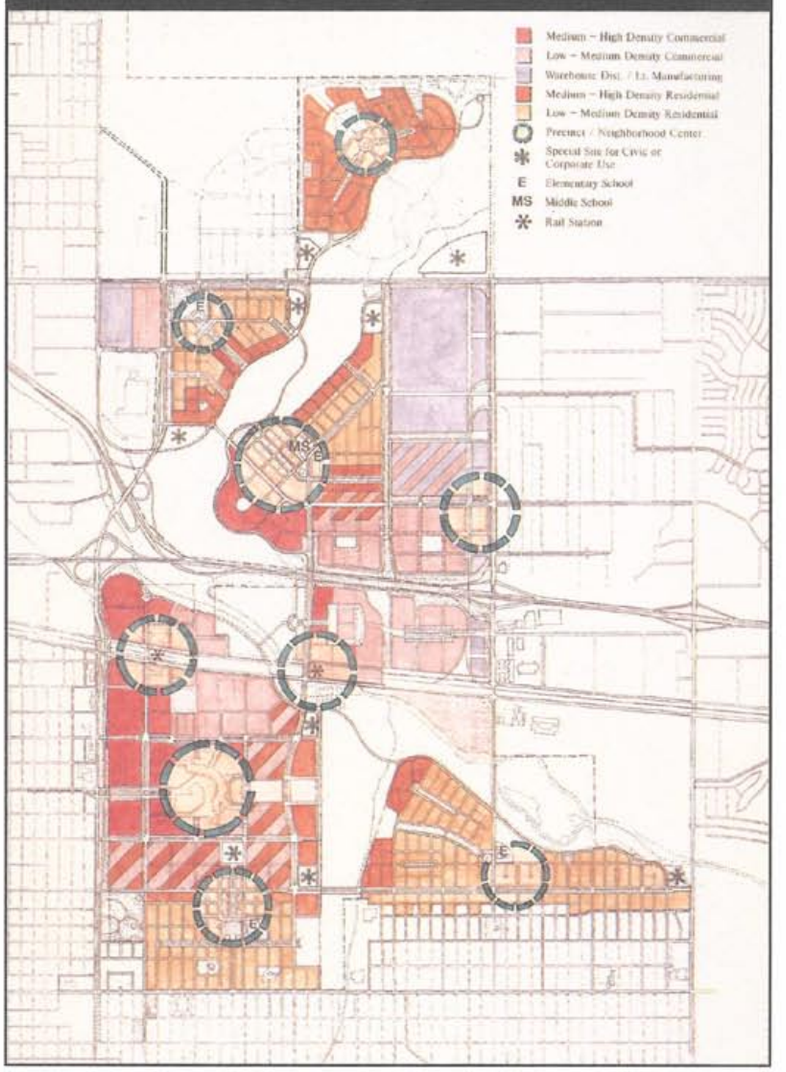
Denver residential neighborhoods reflect a great variety of block patterns, densities and mix of uses.

DISTRICTS



Major streets and open space improvements define eight land use districts within the Stapleton Development Plan. These land use districts are intended to support a mix of uses, but each with a separate and distinct character. The goal of each district is to promote diverse and successful communities rather than isolated, single-use developments. General character, scale and densities are defined, but substantial flexibility is provided for a variety of market responses.

CENTERS



Each district will contain a district center to help establish neighborhood identity. Uses within each center will vary, but at a minimum will include a public area (park, square, community garden), an educational facility (elementary school, daycare), and a transit stop. Many centers will include employment, and larger centers may also contain retail, commercial services and other public buildings.

The urban intersection of Drake and Lemay in East Fort Collins demonstrates the successful integration of land uses. The Woodward-Governor industrial campus occupies the northwest corner (upper right). A lake and luxury housing are to the northeast. A church complex is on the southeast corner. A retail center and multi-family housing is to the southwest.

Wallace Park in the Denver Technological Center provides a shared amenity that buffers high density office and residential towers on the west from lower density townhome and single family housing development to the east.

The Cherry Creek neighborhood today provides an example of a major regional destination and activity center, surrounded by an area that transitions from medium density commercial, office and residential uses to a predominately residential environment of single family homes and townhouses. A transition similar to this one may occur in the terminal area (District II) on the Stapleton site. Regional destination uses at the terminal may be surrounded by a mix of office, commercial and housing uses that will ultimately transition to the single family housing in District I and adjacent existing neighborhoods.

While the projected buildout density of a district will remain constant to preserve its ultimate character, the mix of individual uses which will define the density may vary in response to demographics, economics and lifestyle changes. For instance, a net density of eight dwelling units per acre will be realized under either of the following scenarios:

SCENARIO 1	%*	SCENARIO 2	%*
Garden apts., townhouses	25	3 story apts., garden apts.	20
2-3 families	20	2-3 families	10
Small lot single family	20	Small lot single family	30
Large lot single family	35	Large lot single family	40

*of net land area

Within any given district, the site will be able to accommodate a variety of product types and densities while still meeting the overall density and land use goals which will ultimately define the character of the district.

Floor-to-area ratio (FAR) describes the extent of development on a given site in comparison to the site's overall area. For example, if an office building covers 25 percent of a site and is one story in height, the FAR is 0.25. If the building is four stories in height, the FAR would be 1.0. The building has a floor area equivalent to covering the entire site with a one-story building. FAR is a useful measure, although density calculations based solely on FAR can be deceiving. Low density, suburban style office parks can have very low FARs due to the significant amount of land devoted to surface parking and landscaping, but still accommodate individual structures of substantial height and mass.