Winter 06: Public Transit and Transit Oriented Development in OTR and Uptown.

A failed ballot initiative of 2002 for improved public transit serves as the backdrop for several grassroots advocacy campaigns for light rail and fixed rail streetcars. A non-profit interest group, the Alliance for Regional Transit, has been active since that date promoting light rail transit for Cincinnati. Another group, the Brewery District Development Group, centered in Over-the-Rhine, is advancing two transit ideas intended to promote community and economic development: a fixed rail trolley loop serving the downtown core, and an incline rail connecting OTR with Uptown residential districts. Urban Planning, Architecture and Transportation Engineering Students and Faculty worked closely with these groups to visualize new options for urban transit and associated “transit oriented development’ in Over the Rhine, Uptown, and in the Central Business District.

Studio work also benefited from a funded research project underway entitled “Three dimensional Planning Support System for the evaluation of a Potential Bus Rapid Transit Line in Cincinnati” conducted by Dr Xinhao Wang in the UC DAAP School of Planning-the Joint Center for Geographic Information Systems and Spatial Analysis with the collaboration of UC Community Design Center and funded by the Blue Moon Fund of Charlottesville, North Carolina. Dr Wang conducted a parallel modeling seminar, with students on campus, concerning spatial analysis of various transit models. Research produced by this work is included in a forthcoming paper in Collaborative Geographical Information System Analysis and Modeling. Most importantly, funding from this research project supported travel costs for visiting speakers at an end of quarter event directed at addressing current public interest in the topic that drew more than 120 participants to the Studio.

On 3/7/06 a panel was moderated by former Cincinnati Councilman David Pepper that included Charlie Hales, Transit Planner with a focus on livable communities, transit innovation, and public-private partnerships, HDR, former City Commissioner of Transportation, Parks and Planning, City of Portland, Oregon and William Vincent, Attorney, alternative transportation energy researcher and Bus Rapid Transit advocate, Breakthrough Technologies Institute, Washington DC, former Official with US Department of Transportation. Presentation by the advocates of the Incline Rail and Streetcar proposals preceded the panel. In addition to substantial public education, the outcomes of this quarter’s studio include facilitation of a city funded study on the feasibilities of streetcars for the downtown and OTR districts that will be conducted professionally in 2006-07.

This topic proved to be very timely not only for these advocacy groups, but also for the general public whose attention was drawn to these transit initiatives, through news articles in the Cincinnati Post “Light rail dream is not dead” (2/6/06), Cincinnati Business Courier, “Streetcar Desire” (2/10/06), and CityBeat Weekly, “People, Not Cars: How to reshape Cincinnati into a city that works” (2/15/06).
Architect Mike Schuster describes his design for the government square bus terminal.

City Traffic Engineer Martha Kelly outlined city traffic policy for the student.

Cyclist Chris Pohlar advocated for bikeways.

Steve Leeper shared 3CDC plans for the city.

Planning Professor Dr. Xinhao Wang presented his Bus Rapid Transit research.

Civil Engineering Professor Dr. Heng Wei describes fundamentals of traffic engineering.

Former Councilman David Pepper discussed past and future city development trends.

Metro’s Tim Reynolds described current regional transportation systems.

Panel with David Pepper, Bill Vincent, and Charlie Hales debate transit options.

Streetcar advocate Mike Moose advised students.

Industrial Design Professor So Chin Choi outlined vehicle design.

Denny Dellinger promoted hillside inclines for OTR’s Brewery District.

Transportation Engineering Professor John Niehaus advised the studio.

Developer John Schneider of the Alliance for Regional Transit championed Light Rail Transit.

Dave Tombs | Ashim Srivastava | Christina Kay | Janelle Kelpe | Todd Baxter | Cynthia McCoy | Dan Heintzelman | Ronald Graham | Sharanya Iyer |
The machine is the single most defining entity of the twentieth century. Its role at the turn of the century was a central one; it was the dawn of the modern age facilitated by the energy and productivity of the machine. This shift in experience precipitated a new way of seeing the world. Through the window of a speeding train or from a vantage point in a building towering above the land, new perspectives on the world were made possible by the introduction of the machine.

It has been proposed that Abstract Speed + Sound was the central section of a narrative triptych suggesting the alteration of landscape by the passage of a car through the atmosphere. The related Abstract Speed and Abstract Speed-The Car Has Passed would have been the flanking panels. Indications of sky and a single landscape are present in the three paintings; the interpretation of fragmented evocations of the car’s speed varies from panel to panel. The above work is distinguished by crisscross motifs, representing sound, and a multiplication of the number of lines and planes.

From the waves swelling in the Atlantic, to the translation of people in the city, movement thrives. There exists a flow of information as well as transportation, distribution, culture, and knowledge in cities. The city node provides the membrane for which the motion happens. In an increasingly interconnected world, the shift from local environment to international market is a mere click of a mouse away. As the canvas that awaits these many influences, the twenty-first century city must skillfully support these vital economic, social, and idea exchanges at all levels.

Stuart Themudo

The picture speaks of movement in many ways. It is a public building where a horde of people are moving around in different directions. The more interesting meaning that strikes on the first glance at the picture, is the movement of the sun across the window that signifies changes. Changes that occur inside the building. Change in light. Change in weather. Change in shadows. These changes indicate Movement in the picture.

Ashim Srivastava
This image looks at movement in many different dimensions. Starting with the obvious movement of a car down a winding road, this image takes into account the dimension of time as you actually see the path of the headlights blur over time as the car passes down the hill. This idea of movement over time is why I chose this image to represent movement.

Dave Toombs

The movements of things in the city are directly reliant on the movement of other objects. This is reflected in the picture since the plastic bag relies not only on the wind to move, but on the passing cars. The movement of people in the city are reliant not just on their ability to walk, but generally on cars, cabs, buses, trains, or other transportation vehicles to move around urban areas.

Elizabeth A. Wardlaw
The visible light spectrum is an inclusive way of representing movement in the city. Whether one is in a city familiar to them, or trying to navigate through an unfamiliar place, each color in the spectrum is used to make movement efficient. Our mind is trained to connect specific colors with meanings in regards to movement. It may not be as apparent in a city that one is very familiar with, but when traveling to new places we are relying on maps, signs, experience, and interpretations to move us to our destination. The following are a few examples:
- The interstates have standard colors on their signage that we are all knowledgeable of and come to depend on for an efficient flow of traffic. What would happen if we all didn’t know that the orange triangle meant caution?
- It is universally understood that each subway line and routes is associated with one of the colors of the visible light spectrum.
- The traffic signals and signs, either intended for automobiles or pedestrians, each related to a specific color in the visible light spectrum that we are taught to understand and follow the meaning of. Even if one does not understand the language to read the signs, the signs can be followed due to the understanding of the universal colors and their meanings.

Each of these examples describe how the visible light spectrum is used in every aspect of creating efficient movement in the cities, as well as interstates moving people cross country or between countries. Each country does have a variation of each, but within a specific country there are standards set. The movement of people is largely dependent on this array of colors; red, orange, yellow, green, blue, indigo, and violet, otherwise known as the visible light spectrum.

Christina Kay

I see movement in the city as occurring on two levels, that of the vehicle and that of the pedestrian. I chose this image of the crosswalk in front of DAAP as an instance where the two levels are forced to interact. Even though the crosswalk is called out by hanging signs, the vehicular traffic dominates, and it is often dangerous to assume that a car will automatically stop for a pedestrian in the crosswalk.

Janelle Kelpe

B-Boying/Breakdancing

I find that this form of movement is very structured, from the different types of moves in the choreographed run one might perform at a competition or night club, in relation to traffic/transportation; I feel that transportation planning is structured and planned out similar to the choreography, but despite these efforts there are unpredictable patterns of movement or spontaneous direction. This freedom is similar to the change in the middle of a dance due to opposition or better direction in where it would help themselves (here we can relate this to a wreck or shutdown of a lane or entire route - drivers/travelers will then commit to a different route or way of approaching the issue). The relation I see is the freedom of movement and to make up your own “moves” as well as the choreography/structured approach one may have in a dance.

Brett Kordenbrock
This is a grouping of images to display motion. Each of these images was taken within 3 blocks of the Niehoff studio space; displaying that many forms of transportation is used in such a small area. I have displayed personal transport (bike), walking, vehicular traffic and public transit. All of these modes are shown in motion, all working together in movement through this space. Sometimes the options of movement are hindered; as seen in the out of service bus. This is where the multiple options of transportation come in and facilitate the individual needing to get around.

Cynthia McCoy

I have chose to present a "fraction of time," or "instantaneous speed." When we think of motion, we often think of it in terms of human capabilities; however, with the high-speed, high-tech world of 2006, everything has become increasingly closer to "instant" - everything we want is right at our fingertips and is made to be very convenient. With the evolution of "instantaneous speed" over the past century into what it is today, it is definitely a design consideration that we need to "catch up" in as a society.

Peter Nagel
The humble bicycle has long been an invaluable means of transportation for many urban dwellers. This image captures movement in the active nature of the geometry of the drive mechanism and wheel.

**Todd Baxter**

Movement in the city for me is walking, a pace that allows me to experience multiple encounters because of the slow movement. The interpretation that I did focuses on sight. What do I look at while walking down the street? How long does each encounter last? What draws my attention to each of these things? While on my journey through the city, each time a new experience arises. I notice things I have never before but have walked by numerous times. Some encounters last for a few seconds, some only a fraction of a second. These encounters are interpreted as images. Some images are vivid, linger in the mind and provoke thought, others are merely a glimpse, a fraction of an idea or thought, while others become blurred, a slight recollection of a series of thoughts without exact placement. The study is a collection of the series of encounters that I experienced while traveling through the city. Each image represents an encounter, whether detailed, transparent, or blurred.

Nicole Cosbitt

**CONCEPTS**

MOVEMENT: 1. a series of actions or activities directed or tending toward a particular end. 2. take or cause to take action. The Image of Martin Luther King Jr. depicts a civil rights leader that fought for the rights of African Americans and people of all cultures. His thoughts and beliefs moved millions into action. He influenced a movement that bettered the rights and lives of many people. I believe our jobs as architects and planners are to move communities to a better place that improves people's lives.

Ronald Graham
Movement occurs everywhere we go in the world. It is all around us and cannot be avoided at any costs. Thus, it was challenging to narrow this assignment down to purely one image. I began to think of what movement means to me on a consistent basis. Action, speed, confusion, and blurry were all words that immediately came to mind when thinking about the term movement. Looking for appropriate related images soon followed and I was able to find a suitable picture of what I was looking for. This image speaks of all the terms that I listed previously and seems to typify a regular person’s movement throughout a busy day.

*John Heineman*

_________

This picture that I created represents my vision of motion in a downtown city. Everywhere there is motion I highlighted. I thought it was important to distinguish between the sidewalk and the main road because they both represent different means of transportation. They also both move at different speeds. I believe this downtown motion is what keeps a city alive. I think the downtown area is one of the most important areas where energy and activity should be.

*Dan Heintzelman*

F R A C T A L A R T | The Tunnel

This art piece for me represents ‘Movement’ in two ways:

*Movement as Transformation*

The image visually represents movement in multiple scales, through space and time. The diagram with its gradual change in scale and level of detail also represents evolution, and movement is a tool for evolution and change.

*Movement Amalgamation*

The diagram also represents the city as a social, cultural, physical, natural, historic, and psychological amalgam. The fractals represent fragments that fit together to create higher meaning, which is comparable to movement which connects people beyond the physical, integrating communities at the higher level.

*Sharanya Iyer*
### Pedestrian Mobility

**HISTORY**
- Non-automated movement systems:
  - Trails
  - Sidewalks
  - Alleyways
  - Subways / tunnels
  - Bridges/skywalks
  - Shared use
  - Conveyors
  - Lifts

**MOBILITY & ACCESS**
- Pedestrian movement is affordable for anyone, anytime, anywhere.

**ECONOMIC & FINANCIAL**
- Ownership Costs:
  - Rollerblades - less than $100
  - Skateboards - less than $100
  - Bicycles - $100 - $4,000
  - Scooters - $250 - $6,500
  - Segways - $4,500
- Methods of personal mobility are affordable to everyone.
- The negative side of personal transportation is the extended amount of travel time.

**ENVIRONMENTAL & ENERGY**
- Pollution free
- Conserves fuel and energy
- Cuts down on traffic jams and congestion
- Change in surface materials.
- Narrowing road width.
- Curbs.
- Mini-roundabouts.
- Trees along the sidewalks.
- Barriers.
- Pathway lights.
- Textured walkway surfaces.

**SAFETY & SECURITY**
- Helmets should always be worn while riding.
- Wearing a helmet reduces the chance of brain injury by almost 88%.
- Bike riders should follow the rules of the road.
- Bicyclist should ride in a single file line.
- Bicycle riders should wear light colored or reflective clothing.
- The average cost of a helmet is $25.00, while bicycle related head injuries can cost a patient $40,000.

**SOCIAL EQUITY**
- Pedestrian movement is accessible to all:
  - Ramps
  - Elevators
  - Sidewalks
- Personal mobility is available to:
  - Anyone
  - Anytime
  - Anywhere

**INTANGIBLES**
- Green stripes along the pathways provide shade, fresh air, and improves the quality of the urban environment.
- Lighting provides visibility and safety, is aesthetically pleasing, and keeps the city lively.
- Provides amenities such as bus and light rail stops, streetlamps, telephones, trash receptacles, drinking fountains, and information kiosks.

**SYSTEM REQUIREMENTS**
- Walkways adjacent to parking lane.
- Walkways against walls.
- Walkways with planting strips.
- Parking blocks reduce overhang of parked cars.
- Curb drops for sidewalks.
- Ramps for accessibility.
### Public Buses

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1826</td>
<td>The first public transit system, the omnibus originated in Nantes, France.</td>
</tr>
<tr>
<td>1829</td>
<td>England adopted the model, soon followed by New York.</td>
</tr>
<tr>
<td>1831</td>
<td>The omnibus was adopted by Philadelphia.</td>
</tr>
<tr>
<td>1835</td>
<td>The model made its way to Boston.</td>
</tr>
<tr>
<td>1844</td>
<td>The omnibus model of public transportation was being used in Baltimore.</td>
</tr>
</tbody>
</table>

**Capacity** - 60 to 80 passengers (40' buses), 100 to 120 passengers (60' specialized vehicles), Up to 260 passengers in new bi-articulated buses.

- Stops are located in respect to major pedestrian generating land uses.
- Convenient 'trip link' possibilities.
- Drivers sightlines should be clear of trees, poles, etc.
- Buses should not restrict visibility of traffic signals.
- Bus stops should not be placed on curves, mid-block stops are preferable.

**Operating Costs/Pasenger** - $0.64
**Operating Costs/Pasenger Trip** - $2.40
**Passenger Miles** - 21,841 million
**Unlinked Trips** - 5,666 million
**Average Trip Length** - 3.7 miles

New Hybrid engines use batteries to capture energy from braking for use in acceleration, which vastly improves energy efficiency and reduces pollution.

- In Sept 2000 NYC switched all diesel buses to ultra-low sulfur fuel and reduced emissions greatly.
- 642 buses have been re-powered with new technology diesel engines that are up to 94 percent cleaner burning.
- Since 1998, NYC has added 325 Hybrid-Electric buses to its service.

- Avoid remoteness, remain in the public eye.
- Stay close to a public phone and public facility having extended hours.
- Landscaping should consist of low shrubbery and trees.
- Adequate lighting should be used at the stop and adjacent areas.
- Lighting should coordinate with adjacent areas and street lights.
- Restrictions for bus parking.
- Stops should take place at mid-block.

**Buses bring together different people across all divides.**

**Disabled Considerations:**
- Inbuilt systems.
- Waiting pad 2.5m x 2.5m minimum must be provided.
- Waiting pad must have 1.2m wide ramps on either side with slope of 12:1.
- Visual and tactile cues including signage on devices.
- Lifts, Ramps etc., that are not permanently installed.
- Special Bus design to provide adequate space for wheelchairs.

**Ensures connectivity with the street.**

**Increases possibilities for economic development.**

**Promotes social improvement in the locality.**

**Convenience / Opportunity Costs**
- Luxury
- Availability of Personal Space
- Environmental Impacts
- Time

**Parking space dimensions.**
- Angular parking/parking arrangements and types.
- Land-use and Zoning.
- Display height vs. Viewing heights.
- Disabilities Act (equally on the streets and within services).
- Lane widths, pavement types, markings, colors.
**Transit Streetcars**

1827 - The first mass transit system was the horse drawn omnibus, which the street car was developed after.
1873 - The cable car was introduced in San Francisco to replace the horsecars.
1890 - Most American cities had one or more cable lines.
1888 - The first electric streetcar was invented by Frank Sprague.
1950s - Many streetcar lines were replaced by buses, streetcars in America became known as trolley cars or trolleys.
- Streetcars managed to survive in San Francisco and Boston.
- Presently, many cities have reconsidered the streetcar as a means of transit.

**Safety Measures:**
- Tracks are permanent and indicate to developers that the streetcar will be permanent.
- Streetcars bring development and channel it where it is wanted.
- They can help bring tourists to an area.
- Tracks are permanent and indicate to developers that the neighborhood is here to stay.

**Construction Costs:**
- Choice of car.
- Station design.
- Type of track (if designed to accommodate future light rail, the cost will be higher).

**Operating Costs:** Can easily be less than $10 million/mile.

**Economic Benefits:**
- Streetcars are 25% more energy efficient than cars.
- Streetcars run along existing streets within cities, no new routes need to be established.

**Potential hazards:**
- Presence of overhead powerlines.
- Accidents caused by pedestrians/bicyclists crossing at a non-station area.
- Crowd + ambient noise.
- 96% of accidents caused by motorist/pedestrian.
- Fewer road safety measures than light rail.

**Intangibles:**
- Creation of jobs.
- Presence of rail shows long term commitment to growth and development.
- Better “image” than bus transit.
- Part of America’s nostalgic trend.
- Trolleys can greatly reduce downtown congestion.
- Brings people/tourists back to the CBD.
- Increases property values.
- Lower cost to the taxpayer compared to other transit.
- Existing infrastructure often used for construction.
- Becomes symbol or icon of cities.

**System Requirements:**
- Standard cars are typically on standard gauge and use former freight tracks.
- Trolleys require an immense amount of maintenance.
- Trolleys require shorter turning radius and less infrastructure than light rail.
- Transit authorities do not have specific requirements for braking systems, lighting systems, maintenance requirements, or driver training.
- Ideal system would require a 24-hour maintenance operation.

**Air Tram & Incline Railway**

1855 - Fleming Jenkins invented the telpherage (aerial tram).
1916 - Aero Car Niagara Falls, Canada opened.
1929 - Table Mountain Cable Car Cape Town, South Africa.
1997 - Sandia Peak Tramway Albuquerque, New Mexico opened.
1997 - Roosevelt Island Tramway opened, only commuter tramway in USA
1997 - Table Mountain Cable Car Reopened.
2006 - Portland Aerial Tram opened opening date.

**Construction Costs:**
- In 1915, the Niagara Aero costs $120,000 to build.

**Operating Costs:**
- Operating costs are variable according to size of system.
- Infrastructure upkeep, mechanical maintenance, and labor costs would be comparable or below light rail costs.
- In 1976, the Roosevelt Island Tramway was built for $5 million, where today it would cost $20 million.
- Currently, there is a project being construction in Portland, Oregon which is estimated at $28.5 million.

**Safety & Security:**
- Each aerial tram system has a back up motor and brake for safety measures.
- There have been minimal accidents involving the aerial tram.
- Each car is enclosed giving a feeling of personal safety, other than the Niagara Aero Car which is an open car.
- 100% visibility both of the car and from within the car.

**Social Equity:**
- The mid-west does not have an aerial tram, so there are no prior misconceptions or perceptions of them.
- Areas that could not otherwise be easily accessible can now be profitable, livable locations.
- The aerial tram has been used for many different communities, in an urban area for transportation, and in a tourist setting.

**Environmental & Energy:**
- Each aerial tram system has a back up motor and brake for safety measures.
- There have been minimal accidents involving the aerial tram.
- Each car is enclosed giving a feeling of personal safety, other than the Niagara Aero Car which is an open car.
- 100% visibility both of the car and from within the car.

**Mobility & Access:**
- Each aerial tram system has a back up motor and brake for safety measures.
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**Economic & Financial:**
- Each aerial tram system has a back up motor and brake for safety measures.
- There have been minimal accidents involving the aerial tram.
- Each car is enclosed giving a feeling of personal safety, other than the Niagara Aero Car which is an open car.
- 100% visibility both of the car and from within the car.

**History:**
- Becomes symbol or icon of cities.
- Creation of jobs.

**Economic:**
- Choice of car.
- Station design.
- Type of track (if designed to accommodate future light rail, the cost will be higher).

**Environmental:**
- Presence of overhead powerlines.
- Accidents caused by pedestrians/bicyclists crossing at a non-station area.
- Crowd + ambient noise.
- 96% of accidents caused by motorist/pedestrian.
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**Safety:**
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monorails & maglevs

1876 - United States Centennial Exposition
1911 - William H. Boyes Monorail in Seattle, WA
1952 - Alweg first tested high speed monorail
1957 - Design was adopted by Disney
1956 - Houston tests suspended monorail
1965 - I-Beam suspended monorail for New York’s World Fair
2002 - Shanghai maglev monorail takes first trip

Speeds - can reach more than 310 mph.
- Monorail turning radii vary from 40 to 80 meters depending on the size of the system.
- Stations are elevated above street level.
- Platform to vehicle is wheelchair accessible.
- Turning radii is determined primarily by speed and weight.

Construction Costs:
- Can range from around $22 to over $88 million/mile.
- The initial cost of Monorail Systems is higher, but there is no need to employ drivers.

Operating Costs:
- American Maglev Technology (AMT) suggests $13 to $19 million/mile.
- Greater economic impact than surface transportation.
- Increases vertical circulation and viability of second and third floor commercial space.
- Most monorails in operation today turn a profit.
- Monorails require very little maintenance.

Economic Benefits:
- Keeps air clean.
- Promotes a sense of community.
- Relieves congestion.
- Facilitates mobility.

Security:
- Transit police and security patrol
- Security cameras
- Does not contribute to gridlock, requires no coordination with existing traffic controls.

Monorails are electrically powered and do not cause local air pollution.
- Noise pollution is not a factor, monorails run on rubber tires that are very quiet.
- Maglev Monorails operate by magnetic force and have no negative effects on the environment.
- Monorail systems do not require impervious pavement.
- Pier system of support allows for endless possibilities at the ground level.
- Does not contribute to gridlock, requires no coordination with existing traffic controls.

Monorail Systems do not interfere with traffic or pedestrians, avoiding collisions as well as lawsuits.
- Grade separation of monorail systems contributes to their impressive safety record.
- Most of the few accidents involving monorails have been due to maintenance errors.

Monorails serve considerable numbers of passengers - stations must be able to handle volume and frequency of passengers.
- In many cases monorails are deemed attractions which typically link two or more socially significant locations.
- The financial success of many existing systems may be closely tied to the notion of novelty or futuristic reality in the present day.

Most cities that have a monorail system are considered to be on the leading edge of development or revitalization.
- Provides places with a sense of connectivity and allows people to interact.

- Rail sizes for monorail systems vary from 20" x 24.5" up to 35.4" x 59.4" depending on variables such as loads, topography, speed, and type of system.

- The various types of systems are:
  - Straddle
  - Suspended
  - Hybrid
  - Cantilevered
  - Maglev
  - PRT

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light rail & interurban

1880 - Electrically-powered street railways invented by Frank J. Sprague.
1950 - Huge decline in streetcars as increase in automobile came about.
1980 - Term 'lightrail' prevails as new label for streetcar vehicle.

Capacity - Average 120 per car, max 250 per car
Speed: Maximum 60 mph, 40 mph through downtown
- ADA accessible with ramps or on grade boarding
- Bicycle friendly
- Commuter friendly

Construction Costs:
- Varies according to site conditions (Portland cost $1,650 million for 44 miles of track).
- Choice of car.
- Station design.
- Type of track.

Operating Costs:
- Proportional to track length (Portland operating budget $170).

Economic Benefits:
- Opportunities for development in area of system increases.
- Land values increase around development.

- Excess traffic congestion and keeps air cleaner.
- Electric cars reduce the draw on fossil fuels.

- Signage
- Trespassing Enforcement
- Security cameras
- Safety devices
- Education programs
- Transit police and security patrol
- Random fare checks
- Random vehicle and facility sweeps
- Coordination in an emergency

- Catalyst for development.
- Job creating in locality.
- Enhances neighborhoods’ appeal, with sidewalks, paved roads, trees, art, and bike lanes.

- Facilitates mobility.
- Relieves congestion.
- Promotes a sense of community.
- Keeps air clean.

- Typically 2 Car set train.
- Bike racks available.
- Luggage storage provided.
- Wheelchair available-level boarding and ramps.
Memphis is the nation's 18th largest city. Memphis has a metro population of over 1 million people, ranking 44th nationally (according to the 2000 U.S. Census).

Memphis ranks 6th in the nation in the number of properties on the National Register of Historic Places and has more historic listings per capita than any city in America.

The city of Memphis was ranked the 4th most efficiently operated city in a comprehensive national study of 44 major U.S. cities by national think tank Reason Public Policy Institute.

Population: 650,100 (2000 census)
AERIAL TRAM SYSTEM

Mt. Adams

Race St.

Brewery District

P & G

Aerial Tram System
Creating Cultural Connections
The **aerial tram system** will provide an alternate mode of transportation for many residents in Cincinnati. The tram system will not make other modes obsolete, but will provide connections between the primary cultural and educational destinations in the area. This is illustrated by the ridership numbers shown below. The system will be able to accommodate a large number of individuals who want to travel by aerial tram, but not every Cincinnati resident and/or visitor. Transportation on the ground will be accommodated to support and complement the aerial tram system.

The **aerial tram** is the primary mode of transportation in the proposed system, but it is supported by other methods of transportation:

1. Increased pedestrian connections.
2. Re-routed Metro buses to accommodate the new system and stations.
3. Shuttles to specific locations, including the airport and stadiums.
4. Cab stands located within stations with the need for them.
5. Bike rental hubs in every station and other various locations around the city.
The two platforms serve as the waiting area for the aerial tram. The top level is for the tram going towards the Race Street Retail Station and the lower level is for the tram going towards Mt.Auburn Station. The predicted annual ridership for people traveling through Vine Street Station is 140,000. The maximum capacity for each tram platform is 200 people.

The Over-The-Rhine neighborhood is the largest national historic district in the nation. The name was established by the early immigrants from Germany. This neighborhood was located on one side of the canal that originally ran through downtown reminding the immigrants of the Rhine River in their home country.

Over-The-Rhine currently acts as a barrier that divides the Uptown/University of Cincinnati area and the downtown Central Business District. It has the opportunity to become a link between these two locations. One of the main problems in this area affecting its ability to become revitalized is the poverty. The Main Street Entertainment District and Washington Park are two areas where this revitalization is beginning to occur.
The First level of the Hub comprises of lobby, ticket kiosks, ATM machines and restrooms. The Second level is a revolving restaurant which also acts as waiting area. The Third level functions as the tram stop with an enclosed waiting area. The hub caters to the requirement of restaurants, cafes and bars around the neighborhood.

City West is growing to become a huge residential development in future. Being a vast residential area already, a lot of middle income professionals work downtown. The area draws a lot of visitors throughout the year due to the presence of Union Terminal museum and the Music Hall.

Urban Design Concepts

Repair by extending the powerful symmetry along the axis of the Union Terminal on the Ezzard Charles Street across the highway. Create a Gateway at the intersection, between Union Terminal and the Music Hall, which would not only be a gateway to the City West area but also to the city as a whole. The Gateway created with concrete ribs compliments the circular form of Union Terminal. Propose a mixed use complex catering to civic needs of the population like Child Day Care Center, Civic Center, Job Training Center, etc. Create a plaza with amenities catering to the commuters and the community. It is the main entrance to the hub and also acts as a spill over area. Shuttle service which connects Music Hall and Union Terminal.

1. Hub with Restaurant (6000 sq ft)
2. Lift Lobby
3. Plaza
4. Mixed Use (25000 sq ft)
5. Restaurant
6. Semi-Open Sitting
7. To Basement Parking
8. Residential Zone (12500 sq ft)
9. Public Green Space

Mixed-Use
Existing Building
Residential
Hub
The corner of 5th Street and Race Street is a symbol of Cincinnati’s failed attempt to revitalize its downtown. With the unsuccessful attempt to attract Nordstrom’s to this location, the City was left with a surface parking lot and skywalks going nowhere. This transit hub will promote revitalization of the existing amenities, and new developments. The mixed use development and integration of Crate and Barrel will provide amenities that are currently missing from downtown Cincinnati, and hopefully create a regional destination.

Fountain Square Plan:
Materials to match Granite Pavers, Stone Platform, Stone Benches, Rod Iron Tables and Chairs, Planting Beds for Flowers, Square Planting Beds for Trees

Landscape Highlights
1. Transit Hub
2. Granite Pavers
3. Stone Platforms
4. Shuttle and Bus Pick-up
5. Rod Iron Tables and Chairs
6. Canopy with Benches
7. Landscaped Planting Beds

Design Highlights
1. Transit Hub
2. Retail Kiosks
3. Crate and Barrel (35,000 sq. feet)
4. Parking Garage (200,000 sq. feet, 500 parking spaces)
5. Bars / Restaurants / Retail (50,000 sq. feet)
6. Office Space (13,500 sq. feet)
7. Landscaped Open Space
8. One-Way Parking Alley

Transit Hub Plan
50 Feet in Diameter
100 Feet in Height
8 Stories of Amenities
Ground Level - Shown in Diagram
2nd Level - Small Convenient Store
3rd Level - Cafe
4th Through 7th - Office Space
8th Level - Coffee Shop/Waiting Area
New housing on the hillsides are tied into the Brewery basin through a pedestrian escalator tube. Critical mass of development around strategic transit hub location for growth in all directions. Future mixed use develops between the hub and historic Findlay Market.

1. Ticketing Kiosk - 740 sf
2. Convenience Kiosk - 680 sf
3. Coffee Kiosk - 600 sf
4. Police Substation - 3200 sf
5. Restroom/Utilities - 3200 sf
6. Taxi Pickup
7. Community Park
8. Rental Bike
9. Bus Stop
10. Pedestrian Tube
11. Local Jobs
12. Community Child Care Facility

The Northwest corner of Over-The-Rhine was once a successful neighborhood of thriving breweries and businesses prior to 1920’s prohibition. Currently with a blighted streetscape of light industry and crime, the amenities in this area including historic Findlay Market struggle to survive. This dramatic intervention of the aerial transit hub at this strategic location will tie together a mix of community elements and work as a development catalyst for revitalization in the renewed Cincinnati Brewery District.
The **Uptown-Downtown streetcar** is of the utmost importance. This connection in and of itself creates a lot of potential residents, business people, and tourists. Its ridership will be of a broad demographic and extremely important to the future success of the OTR Basin, the CBD, and Uptown. Above 5-points the streetcar will continue on through to Short Vine and utilize a stop on Martin Luther King Jr. Drive. This stop is also a multi-modal node paired with a pedestrian walkway and Bus Rapid Transit. The BRT provides an East to West movement linking up with other main institutions as well as major arterials (i.e.-Hamilton Ave.) At this point every other streetcar will continue around the UC Campus and then link back up with the main line (south on Vine St.)

**Liberty and Central Parkway** will become a multi-modal hub. Many low-income housing would support the streetcar line that goes throughout City West and butts up against other public housing structures. This line will help tie the Light Rail Line coming down Central Pkwy thus creating a vibrant intersection and developmental possibilities paired with both the affluent commuting into the city and the lower-income/working class too, commuting to service oriented/manufacturing jobs both in the city and outside in surrounding suburbs.

**Vine Street** will be a dedicated Southbound Streetcar access below 5-points and solely Northbound Auto traffic. The Streetcar Loop continues down Vine creating pedestrian corridors, then diverges at 2nd St. and continues Northbound on Elm and Main Street. The Elm Streetcar will become a loop in which it will go in a continuous loop at McMicken and then south on Vine once again. Main St. will be the only means of going Northbound as it will continue up the hill past 5-points. This North/South function helps to support the two East/West Streetcar Loops and Light Rail as it enters and exits the city.

Utilization of the **existing services** is very important in our transit system. At the station near 2nd Street (Metro Stop) there will be a lot of activity due in large part to the 4 converging lines of which 3 are different modalities. This area is significant because of the amount of people passing by and transferring. A pedestrian oriented, mixed-use development must take place here and continue, as shown, up Vine Street as well as above Fort Washington Way (having that entire area decked).
In an attempt to promote pedestrian activity and transit use, Vine Street will become a northbound auto route paired with a contra-flow streetcar transit line (southbound). From Central to Liberty the on-street parking will be eliminated on either side of the street in an effort to expand the sidewalks (both for pedestrian and retail spillover) and create a pedestrian thoroughfare. Parking relocation will consist of angled parking on east-west streets. North of Liberty the parking on the east side of Vine will be eliminated and the sidewalks widened. Parking again will be relocated to angled spaces on crossing streets and alleys.
Potential Movement of People on Streetcar

Uptown-Downtown Loop
Estimated 1.25 million riders/year (Metro Moves 2002)
Estimated 4,000 riders/day
56,000 people use Findlay Market every year currently

New Residential
56,500 square feet total (45 units total)
North Building 22,500 square feet (18 units)
East Building 34,000 square feet (27 units)

New Underground Parking
115,000 square feet total
350-400 parking spots on 2 levels

New Retail Space
30,000 square feet total
Movie Theater 16,000 square feet (4 screen, 600 seats)
First Floor Retail 14,000 square feet (6 storefronts)
1. Amphitheatre Park for Community Events and other Venues (Gateway Feature)

2. Commercial Area (Blue) for trade/apprenticeship type job opportunities

3. Residential Housing Clusters centered around park areas Linking West End with Findlay by Opening up Elder to the Development

4. Dense Mixed-use and Retail around central station

Station utilizes both modes of transit (Light-Rail down Central and Streetcar across Liberty St. – use as Gateway Feature)

5. Roundabout with above grade streetcar station and subway for Light-rail

6. Green corridor to accommodate a bikeway and pedestrian activity

Key - Land Use:
- Residential
- Mixed-Use
- Flex Space
- Openspace
- Parking
- Civic/Institution
- Commercial
- Entertainment

Proposed Below Grade Station for Light Rail with Street level Station for Streetcar. A hybrid of the two sketches would be an appropriate fix for the transit station. The station would be of a tunnel-like atmosphere below grade with access both vertically (to the center streetcar circle) and horizontally (pedestrian tunnels which would take one to the sidewalk at each corner of the intersection).
The design focuses on the creation of interlinked urban plazas as an intra-modal transit terminal precinct. The core design construct being achieving broad based rejuvenation of the locale by dispersing rather than containing people in a building. Disseminating people in the precinct addresses issues of: coherence with the historic urban fabric, better usage of public amenities and spaces and consequent improvement in the safety, security and overall ambience of the neighborhood.
The proposed transportation oriented development on Broadway Commons has the unique ability, because of its location and large size, to be not only its only destination, but also to feasibly serve as a major park & ride, development catalyst, gateway, and catchment area for the entire Central Business District of Cincinnati, as well as for Over-the-Rhine.

Serving primarily as the major intermodal transit center for our group’s transportation proposal, it accommodates three systems: the urban streetcar line, the commuter light rail, and the short aerial tram line up to Mount Adams. This site is proposed to see lots of riders, as it is one of two major junctures in our system where people from the suburbs will either drive in and park or take the light rail, and subsequently walk or transfer to the trolley to get to work.

This site serves not only as an intermodal transit center, but as its own self-sustained node in the city. Rather than integrate this site into the city grid, I chose to take advantage its large footprint by incorporating several things that urban areas covet but can not always sustain – a large big-box retailer, in this case IKEA, a substantial office park comprised of eight connected towers, and a smaller retail pedestrian promenade. All three elements center around either the rail lines themselves or a series of interlocking spaces that are connected both physically and visually (parking is below grade).

There are also two sculptural pieces on site that give it character: a tower that triples as a tram support, an elevator/stair shaft, and a light well into the parking garage below; and also a large canopy over the hub whose form and materials emphasize movement.
Light Rail Service: To the broader community of Greater Cincinnati will be provided on the eastern corridor by a light rail service that will extend from Broadway commons North to Kings Island amusement park and South to The Cincinnati and Northern Kentucky Airport. This system includes about 36 miles. The termination of the light rail at Broadway commons should be seen as a stimulus for growth on the eastern side of Over The Rhine (OTR). This system has the ability to carry up to 106 passengers per vehicle. The cost of this system will be approximately $1,250 per passenger annually.

Bus Rapid Transit: The uptown to downtown connection of a bus rapid transit (BRT) route along Vine street will extend from the zoo, past the university and hospitals down to Liberty and over to Broadway commons. Stops will be limited to these areas and for the purposes of this project the study will focus on the transit hubs at Broadway commons and Liberty Street. This serves an 18 mile system. These two locations should be considered gateways to the OTR community. Each BRT bus will cost $700,000 each. This system has the ability to carry upwards of 100 passengers per vehicle.

Streetcars: As an initial effort to stimulate development in OTR we have identified the need for a transit loop from the central business district (CBD) into OTR. The proposed loop would be a oneway trolley that would circle counterclockwise along Main, Liberty, Race and Third streets. This serves a 3.2 mile system. The cost of each trolley is about $350,000 each, with operating costs of $162,000 annually. This system has the ability to serve 28 passengers per car.

Bicycle: Bicycle routes will connect uptown and downtown by means of a loop that begins on Central Parkway and runs up to and around the University of Cincinnati (UC), along MLK and into Hyde Park to return to the city along Eastern Avenue. A direct route will also connect downtown and UC along Sycamore Street over to Auburn and into the campus area.

Aerial Tram: The inclusion of an aerial tram will allow for connections to Mount Adams and the art museum. The aerial tram will add visual interest to the city skyline as well as the provision of a unique experience of the downtown area.
Proposed Gateway Plan

Section A

Section B

Section C

Vine Street Corridor

Gateway to Community

Multi Family Housing

Multi Family Housing

Multi Family Housing

Multi Family Housing
Visual anchors within any urban space are important factors in determining the viability and vibrance of the spaces affected by the urban framework. Cincinnati’s Over the Rhine neighborhood has a historical character and significance that makes the area quite charming but at the same time decades of deterioration and alteration of the scale of the urban fabric have served to isolate many of Cincinnati’s urban treasures such as Findlay Market and the 5 Points intersection at Vine and McMicken streets. The proposed plan provides a strong connection between Findlay market and a transit hub near the 5 Points intersection. The unique character of the 5 Points intersection suggests a significance that can be exploited to the benefit of the city by providing a public place with strong visual connections to the community at large.
The proposed plan for Broadway Commons will incorporate the existing urban grid that surrounds the site. The area along Central Parkway will have 6-7 story commercial buildings. The Transit Hub will be located along Gilbert Ave to provide easy access for buses, light rail, and expressway traffic. The area south of the Transit hub will be a multi-family residential neighborhood.
With this new system, each transit route brings people inward to the heart of the city, then directs them to their primary destination. This begins to once again make the CBD a necessary destination in the overall scheme, while for years downtown Cincinnati has lacked that importance.

why BRT, why CINCINNATI?

In a city primarily built for the use of automobiles, a new transit system using the existing road network would be most viable. Cincinnati, a city whose work center is split between uptown and downtown, calls for a quick transit system connecting both areas in effect to stimulate development in between and around primary nodes. Over the Rhine currently exists as a void between these two zones which has remained poverty stricken for many years. Fortunately, the correct application of transit has proven to enhance communities exhibiting the same attributes as OTR, via multi-modal transit hubs and other enhanced transit stops. It can be seen by the transit map that Vine Street exists as a backbone in Cincinnati’s urban fabric. It is because of this that it was chosen to be the primary route of transportation (the SPINE) of our network. It was then determined that Bus Rapid Transit would be most suitable because capital costs are low, demolition required is minimal, new multi-articulated buses have a large capacity, and quick implementation is feasible.

Lateral routes run perpendicular through the SPINE in three different locations. They serve to tap into local neighborhoods such as the City West, Mt. Adams, Covington, Newport, Northside and Hyde Park. The SPINE starts at Cincinnati’s acclaimed Zoo and ends at “the Banks” where the sports venue is located, and expectations for a new mixed use project are currently being planned.
Green Space: The TOD acknowledges valuable community green space within the community. The development relocates the Findlay market park two blocks southeast of the TOD hub. The park is expanded and includes a walking trail, basketball courts and a playground. Other open spaces include a rooftop park for the residents located in the mixed use facility, and a Plaza provides Findlay market with a courtyard area used for concerts, communal space, and additional outdoor market space.

Urban Framework: The Five Points Hub is located near Cincinnati’s historic Findlay market in Over the Rhine. The hub is located on Vine and Edler and serves both market visitors and local commuters. The TOD creates a mixed-use experience with several retail shops, town homes, apartments and an outdoor plaza. The transit hub considers a transformation of Findlay market into a major transportation, retail and market district.
**Proposed Land uses**
- Commercial establishments: small scale establishments, architecture offices
- Residential units, live-work spaces for SCPA students
- Retail corridor: restaurants, cafes, bookstores, art galleries
- Transit hub: BRT stop with subway interchange

**User groups**
- Residential neighborhood in and around Washington Park
- Existing residential on Central Parkway
- New condominiums
- Proposed residential for SCPA students
- Ensemble theatre visitors
- Kroger employees and people working in Downtown

**Urban framework analysis**
- Absence of coherent street frontage on Vine St interrupted by parking lots and vacant land-1
- Abandoned/vacant buildings on Vine St overlook narrow alleys -2
- As a result, 12th St & 13th St become desolate for pedestrian use-3
- Proposed studios, live-work spaces for SCPA students on Vine St-4
- Gateway garage at the corner of Vine St & Central Pkwy follows the character of the new mixed use corridor on Central Pkwy.-5

Bus and subway transit create movement corridors on 12th and Vine St.
This birdseye view shows the BRT hub in a close context with its surrounding buildings. The white gap between the red influence zone highlights Vine street as a major thoroughfare between this activity area. The Bus Rapid Transit hub acts as an anchor by bringing more pedestrian activity to this area.

The site includes a redesigned Post Office with dedicated access to a section of the parking garage, a restaurant, a Bus Rapid Transit (BRT) station, and a Bus Maintenance facility also located within the garage. One floor of the garage will serve as private use leaving four floors for public parking.

The elevation change of 18 ft. allows for below grade access on Jefferson Avenue and on-grade pedestrian access into the terminal.

The ultimate scheme of this project is to draw people to Vine street from all primary nodes in the Corryville area. The design of the transit hub focuses on enhancing the vitality of Vine street through Transit Oriented Development (TOD). With the location of the transit station pushed almost flush with Vine St., an activity area will be created along Vine street, enhancing the outdoor environment, thus creating a greater opportunity for new developments along Vine.
The Street Hierarchy: Using the StreetCL file provided by CAGIS, we reorganized the roads into a three-tiered hierarchy. The first tier consists of primary roads, which have a higher capacity than the others. The second tier contains secondary roads that have a lower capacity than primary roads, but not as low capacity as residential streets, the third tier. The street network and hierarchy form the basis for Network Analyst, a program used later in the study.

Spatial Analyst: The background map was created using ArcGIS to isolate commercial and office locations. Next, using Spatial Analyst, Euclidean Distance was determined for both commercial and office locations. This produced two maps which we then combined into one using a reclassification tool and a weighted overlay tool. The end result was one map that depicted distances from either a commercial or office parcel. This depicted clusters of these areas which helped decide where to place the routes.

The Final Route: The final route was determined by the aforementioned process as well as an examination of the service area. Using Network Analyst, we calculated the service areas based on a quarter of a mile, a half mile, three quarters of a mile, and one mile. Our chosen route provided the highest concentration of commercial, office, and residential areas within one quarter mile of the route.

Choosing the Route: By examining the commercial and office map; the residential densities; and locations familiar to University students, we determined an extensive list of possible origins and destinations. From this we narrowed the choices to areas near commercial and office clusters; areas with high residential densities; and areas near the University of Cincinnati.

Purpose of the study: To identify the corridors which efficiently connect the potential BRT users.
The Potential BRT Sites are based on the following Analysis: Population Density | Age Distribution | Land Use | Income | Vehicle Ownership | Major Attraction Centers

Next, the income raster and existing Bus Stops are laid over the raster of land use, income level and the parcel layer. This gives the identification of the sites that lack the BRT facility. The sites are proposed in the places which have low and medium income group, high population density, major attraction centers, employment centers and that lack the BRT facility.

The purpose of this project is to provide neighborhood connection with additional amenities and transit services. It links other modes of transport such as bikeways, streetcars and LRT by acting as interchange node.

In addition, it will connect each neighborhood and make easy access to jobs, educational institutions and other services.
Is bus ridership in the uptown / downtown study area proportional to the level of service?

Are existing bus stops located within a walkable distance to all areas of the study area?
Are existing bus stops located near areas of high population density?
Are existing bus stops located near major employers?
Are existing bus stops located near areas with a higher concentration of lower-income people?
Is there a correlation between high demand areas and bus ridership rates?
This project looks into revitalizing the streetcar as a viable mode of transportation in Cincinnati. The project will look at the historic streetcar routes and the proximity to cultural sites, tourist attractions and the central business district.

**Goal:** To provide an alternative transit option that preserves and enhances Cincinnati’s historic charm and character.

**Objectives:** Building a new tourist attraction, improving transit ridership and providing an impetus to development along fixed transit lines.
In 2002 Hamilton County Ballot Issue 7 tested voter’s readiness to fund major improvements which included enhanced bus transit, highway upgrades, and a light rail system. This became, and continues to be, a divisive issue, while traffic problems...
Bus Rapid Transit* in the USA

*High-quality, customer-orientated transit that delivers fast, comfortable and low-cost urban mobility.

How to effectively communicate?

GIS PLANNING APPLICATION

Analytical Model
GIS

Planners

Special groups
Municipalities
Architects

Public transit riders
Engineers

Investors
Rents

Automobile users
Business owners
Home owners
Developers

State governments
Federal governments

Renters

Planners

3D visualization

GIS Spatial Analysis
Modeling
Visualization

Information Technology

Issue: getting stakeholders’ support
Multiple and conflicting views
Envision of the future
Understand each other

Information Technology to improve urban and regional planning and development decision-making processes

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How to effectively communicate?
Long-term Goals

1. Collaborations between professionals of GIS, Simulation Modeling, Computer Visualization, and Planning Experts

2. Development of a system that is able to utilize the current data collected in evaluating development proposals with computers before the building phase

Project Website:
System Applications

1. Provide a contrasting view that residents and policy makers need to see before they can take a stand on the issue.

2. Foster a sense of collaboration between stakeholders based on a better understanding of how a major construction project will impact their community.

3. Engage general public involvement in planning process.
A Route Test Case

Route Selection

Integration of BRT Station and Neighborhood Redevelopment:

To promote the appreciation of community heritage
To promote the enterprise of strong local ties
To promote the awareness of neighborhood assets
To integrate with existing land uses in the surrounding area.
5.5-Mile BRT Route, BRT Speed range is 30-35 MPH

Real time information
Attractive design
Large capacity
Comfortable
Low floor

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