

American Bridge Division estimated the cost of the guideway at slightly more than \$3 million/mile for a Project 21 network in Los Angeles. That was in 1975, and inflation would tend to increase the figure substantially. On the other hand, a number of major refinements suggested by American Bridge have now been incorporated. Today's cost may not be appreciably higher.

In comparison with other systems, the operating cost of the Project 21 system should be

1. Not as good as the few rail rapid transit systems that have one-man crews and no staff in the stations,

2. About on a par with rail rapid transit systems that have two-man crews and two to three staff persons per station, and

3. Much better than buses due to the larger train capacity (170 passengers) and considerably higher effective speed.

#### DEVELOPMENT

After 10 years of refinement, Project 21 is ready for the initiation of prototypes. The guideway is thoroughly designed and has been analyzed for fatigue, winds, earthquakes, and other conditions. Main details of the power distribution, car suspension, branch/switch, and station-to-guideway interface have been worked out and documented.

The contemplated development program will include quarter-scale validation mockups in the first year, half-scale running tests in two years, and first full-scale tests in three years. Commercial use at 35 miles/h should commence in four years. A regional network at 55 miles/h is attainable in five years, the time it usually takes to dig one major tunnel.

#### ACKNOWLEDGMENT

This is an abridgment of a 40-page professional paper that contains many more details about the Project 21 system, its rationale, and its pedigree. The full paper is available from Transit Innovations.

I am indebted to two corporations and a score of professionals whose participation and constructive criticism have been invaluable in bringing Project 21 to its present status. Among the individuals who provided assistance are the following: Sol Bucksbaum and others of American Bridge Division, U.S. Steel (guideway design, producibility, and cost); James Corl and others of Insul-8 Corporation (power distribution, third rail, and collector); Lloyd H. Donnell, American Society of Mechanical Engineers, Inc. (guideway design and analysis); and Boris Pushkarev, Regional Plan Association (the urban planner's perspective).

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#### *Abridgment*

## Organizing for Effective Rail System Planning and Implementation: The Metro-Dade Experience

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The transportation planning and implementation structure of Metropolitan Dade County, Florida (the Miami urbanized area), is described, and key characteristics that make it effective are discussed. Four unusual aspects of organization for effective planning and implementation of major transportation improvements combine to form a unique decision-making process. Metropolitan government permits Metro-Dade to plan and implement transportation projects and obtain local concurrences with a minimum of delay. A detailed Comprehensive Development Master Plan for staged development is unusually precise in locating major transportation improvements and has been adopted by ordinance, which gives it the force of law. The voting membership of the metropolitan planning organization (MPO) governing board is the same group of elected officials that form the Board of County Commissioners, Metro-Dade's governing body. A staff function of the county manager's office—the Office of Transportation Administration—has authority over the planning, coordination, implementation, and/or regulation of all modes of surface transportation in the county and directs the operation of public systems including Metrobus, Metrorail, the Downtown People Mover (DPM), and special transportation services. In addition, it provides the technical and professional staff for the MPO. This unique organizational structure makes it possible for Metro-Dade to build its 20.5-mile, 20-station stage 1 Metrorail system on a planning-to-opening schedule of less than 10 years and to coordinate it with all other modes. Construction of a 1.9-mile, 10-station DPM and doubling of the Metrobus fleet to 1000 vehicles will be completed to coincide with Metrorail's opening.

In 1973, Metropolitan Dade County (Metro-Dade) contracted with Kaiser Engineers to prepare a preliminary engineering study for a rail rapid transit sys-

tem to serve the Miami urbanized area. By early 1975, the plan was ready for acceptance by the county, and implementation was authorized. Construction of stage 1 of the project—a 20.5-mile, 20-station heavy rail line—was initiated in 1977, and by mid-1984 the \$900 million system will be operating, only nine years after plan adoption.

Complementing the new Metrorail system at its opening will be two other major transit improvements: a 10-station, 1.9-mile downtown people mover (DPM) loop connecting with Metrorail at its downtown Government Center station and a 1000-vehicle Metrobus system, double its present size, that provides express, limited, Metrorail feeder, and local services.

But the most significant achievement of all has been the creation of an institutional structure that makes it possible for Metro-Dade's transit improvement program to be carried out with maximum coordination of its three major elements while keeping delays to a minimum. Lacking this institutional structure, planning-to-opening of Metrorail and the DPM and coordination of all other surface transportation modes could not be accomplished in less than 10 years if, indeed, it could be achieved at all.

## ORGANIZATIONAL STRUCTURE

Four unusual elements of organization for planning and implementation combine to form Metro-Dade's unique institutional structure: (a) metropolitan government, (b) the legal status of the Comprehensive Development Master Plan (CDMP), (c) the relation between the governing board of the metropolitan planning organization (MPO) and the general-purpose local government of the county, and (d) the Office of Transportation Administration (OTA). In brief, the unique combination of Metro-Dade's structure and operating policies works as follows.

### Metropolitan Government

Dade County's "two-tier" (county-municipal) metropolitan government was created in 1957 by citizen adoption of a charter. The charter made explicit the powers of the central metropolitan government concerning traffic, transportation, and comprehensive planning. Specifically, the charter gave Metro-Dade County authority over all modes of transportation in the county, including the power to plan and operate public transportation and to regulate private transportation both in unincorporated territory and within municipal boundaries. This latter power--regulation within municipalities--is a key to Metro-Dade's coordinated planning implementation structure.

### Legal Status of CDMP

Operating under the charter's provision that the county may "prepare and enforce comprehensive plans for the development of the County," the CDMP, which includes the long-range transportation plan, was adopted by the Board of County Commissioners.

Adoption of areawide comprehensive plans is by no means unusual. However, Metro-Dade's CDMP incorporates three significant features that, in combination, approach uniqueness:

1. The entire CDMP, including objectives and developmental policies, is adopted by ordinance and is, therefore, a law. It can be altered only through a detailed process of public and staff review and County Commission action.
2. The CDMP calls for staged development, limiting development to areas where services are in place or committed and restricting it in environmentally sensitive zones.
3. The Metro-Dade CDMP is prepared at a high level of detail, providing a direct guide for zoning boundaries and location of transportation facilities.

It should be emphasized again that none of these features is individually unique but their marriage in the Metro-Dade CDMP makes the plan a powerful tool for guiding metropolitan development.

### Legal Status of MPO

Metro-Dade County operates under the commissioner form of government: Legislative and policymaking authority is vested in a nine-member Board of County Commissioners, and administration is directed by a county manager appointed by the commission.

The Board of County Commissioners and the Florida Department of Transportation (DOT) agreed that the Metro-Dade MPO should develop transportation plans and programs that would "thereafter be implemented". Toward that end, the Governor of Florida designated the members of the Board of County Com-

missioners as the voting members of the MPO. Furthermore, staff services for the MPO are provided through an agreement with the county, a unique arrangement in which the Board of County Commissioners is also the governing board of the MPO and shares the same staff.

### The OTA

In 1974, when it became clear that Metro-Dade County would be building a rapid transit system, the office of the county manager was reorganized by administrative order to include an OTA headed by a transportation coordinator. Created as a staff function to the county manager to coordinate, monitor, and evaluate the activities of line departments and agencies that have transportation planning or implementation responsibilities, OTA's authority has grown to include oversight of planning, coordination, and implementation of all multimodal transportation activities in the county. In practice, this means that OTA is cognizant of all transportation planning and implementation in the county, either directly as one of its assigned functions or as a coordinator and/or regulator of others. In addition, as mentioned earlier, OTA provides the principal staff to the MPO.

### Summary

Metro-Dade has established a logical sequence of transportation planning and implementation activities, beginning with goals, objectives, and policies in a strong, comprehensive plan that in turn produces recommendations for adoption by the governing board of the MPO. The MPO board, then, acting in its capacity as the Board of County Commissioners, directs the county manager to carry out the recommendations. The county manager then directs his staff--OTA--and the recommendations are implemented through the broad powers of the metropolitan government. Within this context, "coordination" of transportation planning and implementation is not a wish--it is a given, at least to the extent that the elected commissioners and their county manager determine it to be.

### KEY LEGAL AND FUNCTIONAL CHARACTERISTICS

If we use Dade County as an example, it is clear that the following provisions of its Metropolitan Charter are highly desirable for effective areawide transportation planning and implementation.

### Charter Provisions

Authority must be vested in the metropolitan government to plan, implement, and/or regulate all modes of surface transportation. If the form of metropolitan government retains municipalities within it, as does Dade County's, this power must extend over them. This is an absolutely essential requirement, since it prevents a municipality from blocking a transportation improvement that requires continuity, such as a rail line. The power must be sufficiently broad, in both a legal and literal sense, to permit negotiation from a position of strength to secure local concurrence in the improvement. For example, simple authority to plan and construct a rail line through a municipality is insufficient. Urban rail systems need stations, parking garages, park-and-ride lots, feeder-bus access, and the like. Hence, local zoning regulations, building codes, off-street parking regulations, requirements for street improvements, structure heights, and dozens of other potential conflicts must be resolved through negoti-



ation in order to effect the desired improvement. Although Metro-Dade's powers are rarely exercised to the letter, their existence is a powerful negotiating tool.

#### Comprehensive Plan

Authority must be vested in the metropolitan government to prepare, adopt, and enforce a comprehensive plan. Transportation facilities profoundly affect, and are affected by, all other aspects of the urban environment. It is impossible to isolate major transportation systems from any other component of comprehensive planning.

#### Flexibility of Organization

Authority must be vested in the metropolitan government to organize itself to plan, implement, and regulate transportation improvements in the most efficient manner. Although this requirement seems self-evident, it is startling to observe how frequently areawide metropolitan agencies overlook this fundamental point and lock themselves into an organizational structure that invites conflict and competition among various departments, agencies, authorities, and divisions.

The basic difficulty in avoiding this trap lies in the historic method of handling transportation improvements. Traditionally, one areawide agency will plan, and several others implement, according to mode and level of detail. When metropolitan agreements are created, it is too often convenient to "grandfather-in" existing agencies and authorities with the almost wistful hope that they will learn to cooperate under the new rules.

Metro-Dade's charter faced this issue squarely, even though it predated the federally mandated 3-C requirements (comprehensive, continuing, and cooperative planning). The charter calls for only four departments--finance, personnel, planning, and law--and provides for others "as may be established by administrative order of the Manager" (OTA was created by administrative order).

#### Summary

Whatever form the areawide "metropolitan government" agreement may take, for transportation planning, implementation, and regulation purposes, the areawide agency must be empowered to set transportation policy and carry it out, plan comprehensively for the area, and organize itself to do so efficiently and with a minimum of internal conflicts.

#### HOW THE STRUCTURE FACILITATES COORDINATION

Because of its mandate under the charter, Metro-Dade is the only general-purpose local government that can perform coordinative transportation functions; hence, the inherent logic in selecting as members of the MPO governing board the very same "principal elected officials" of the only local government empowered to carry out transportation improvements. In this way, the major obstacle to coordination of transportation projects--a standoff between the makers of plans and those with the power to implement--can be overcome.

This is not to say that every coordinative effort slides smoothly through the decision-making process--simply that the institutional structure greatly facilitates the process. Because Metro-Dade has authority over all transportation operations in the county, coordination of projects and operations requires only an institutional structure that forces decisions along a common path. Examples of this

"internally controlled" coordination can be found in the following instances:

1. Metrobus-Metrorail interface--Bus and rail operations have been planned together, so that each mode will complement the other. A single fare will purchase a trip that makes use of any combination of these modes. Bus operations will be aimed at providing feeder service to rail as well as supplementing it. Surface street improvements, including signalization to facilitate access, are planned together with bus bays and barrier-free access at the Metrorail stations.

2. Metrorail/high-occupancy-vehicle (HOV) interface--The existing HOV (carpool and bus) lanes on Interstate 95 will be connected to a major Metrorail transfer station, parking garage, and bus bays by a flyover built with Interstate funds. This aspect of the rail project required exceptionally close coordination among the Urban Mass Transportation Administration, the Federal Highway Administration, the Florida DOT, and Metro-Dade.

3. Metrorail-DPM interface--DPM construction and operations will be closely coordinated with Metrorail. A DPM station will occupy one of the three tiers of platforms in the Government Center station in downtown Miami, facilitating transfers from Metrorail to the downtown distributor.

#### CONCLUSIONS

The Metropolitan Charter was adopted in 1957, the CDMP in its present broad form in 1974. The MPO was created in 1977, three years after establishment of the OTA. OTA's staff, which was one person during its first six months of existence, now numbers more than 300.

It would be presumptuous, as well as inaccurate, to contend that this unique organizational structure was created with clear, unerring foresight by the framers of the Metropolitan Charter and the CDMP. What actually happened was a creative response to the absolute necessity that the county organize for effective transportation planning and administration. Using powerful tools provided by the metropolitan charter and the CDMP, Metro-Dade created a unique and truly coordinated approach to dealing with today's urban transportation problems.

Unfortunately, metropolitan government that deals effectively with areawide issues is still in its infancy. Metro-Dade, which is among the oldest, is only 24 years old. Its experience has demonstrated that plans and policies involving transportation issues are still very volatile public concerns, no matter how convenient the institutional structure described in this paper may be. Indeed, it was citizen rejection of some 75 miles of planned urban expressways and endorsement of a 1972 bond issue that mandated Metrorail. Six years later, the same citizenry came close to wrecking by referendum the Dade County Metrorail before it could be built.

In short, institutional structures will never be able to plan and implement to everyone's satisfaction. Citizens will ultimately have the last word, and that is as it should be. Nevertheless, significant improvements can be made in our institutions to facilitate sound transportation planning. It is hoped that the Metro-Dade experience will be useful as an example of one way by which it can be done.