

**DEPARTMENT OF TRANSPORTATION****Federal Transit Administration****Urban Magnetic Levitation Transit Technology Development Program**

**AGENCY:** Federal Transit Administration (FTA).

**ACTION:** Notice and solicitation of proposals.

**SUMMARY:** This Notice announces establishment of a new urban magnetic levitation transit technology development program ("Urban Maglev Program") in the Federal Transit Administration (FTA), describes the statutory bases of the program, solicits proposals from eligible entities, and solicits comments on the overall program design. Sections 1218 and 3015(c) of the Transportation Equity Act for the 21st Century ("TEA-21"), signed into law by President Clinton on June 9, 1998, create two new sections in Titles 23 and 49 of the United States Code (322 and 3015, respectively) authorizing the FTA to support further development of magnetic levitation technologies for potential application in the U.S. mass transit industry. Section 1218 authorizes a total of \$5 million dollars over the six year life of TEA-21 to research and develop low speed superconductive Maglev technology. Subsection 3015(c) authorizes \$5 million per year for the 6 years to carry out a broad Maglev technology development program. [Note that TEA-21 also adds provisions in 23 U.S.C. Section 1218 for a high speed Maglev program, which is being managed by the Federal Railroad Administration (FRA).]

**DATES:** Proposals (8 copies) must be received by March 15, 1999.

**ADDRESSES:** Proposals shall be submitted to: Office of Research, Demonstration, and Innovation (TRI-1), Federal Transit Administration, 400 Seventh Street, SW, Room 9401, Washington, DC 20590, Attn: Edward Thomas, Associate Administrator, and shall reference Urban Maglev.

**PUBLIC MEETING:** A public meeting will be held, open to all interested parties, to discuss and comment on the FTA's Urban Maglev Program. The purpose of the meeting is to outline the Urban Maglev Program, to receive comments and suggestions on the program from meeting attendees, and to answer questions. The meeting will take place on February 3, 1999, from 9 a.m. to 12 noon. The meeting will be held in room 2201 at the Department of Transportation, 400 Seventh Street, SW, Washington, DC 20590.

**FOR FURTHER INFORMATION CONTACT:** Dr. Tony Yen, Deputy Associate Administrator, Office of Research, Demonstration, and Innovation, (TRI-2), at (202) 366-4047, or Timothy J. Johnson, Office of Technology, (TRI-20) at (202) 366-0212.

The public is invited to submit written comments on this notice. Written comments should refer to the docket number appearing at the top of this notice and be submitted to the Docket Clerk, U.S. DOT Dockets, Room PL-401, Nassif Building, 400 Seventh Street, SW, Washington, DC 20590. All comments received will be available at the above address. Docket hours at the Nassif Building are Monday through Friday, 10 a.m. to 5 p.m., excluding Federal holidays. Those desiring notification of receipt of comments must include a self-addressed, stamped envelope or postcard.

**SUPPLEMENTARY INFORMATION:****Electronic Access**

Internet users can access all comments received by the U.S. DOT Dockets, Room PL-401, by using the universal resource locator (URL): <http://dms.dot.gov>. It is available 24 hours each day, 365 days each year. Please follow the instructions online for more information and help.

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**I. Introduction**

The overall objective of the program is to develop magnetic levitation technology that is a cost effective, reliable, and environmentally sound transit option for urban mass transportation in the United States. It is expected that Federal funding would be used to develop U.S. components and technology. It is envisioned that funded projects will include the design of an Urban Maglev system and the development and demonstration of advanced hardware subsystems to verify

advanced technology aspects of proposed system concepts. The system design can be derived from integrating existing subsystem technologies (to create a new system) or by improving an existing system using advanced technologies. Foreign technology transfer from abroad is permitted, if it ultimately results in a U.S. technology system. FTA views a total Maglev system as composed of six principal subsystems, namely: levitation, propulsion, power collection, communications & control, guideway design, and vehicle design. While funded projects must retain a research and development purpose to overcome critical technology gaps, the emphasis is on funding deployable technologies, including the ultimate participation of an end-user.

FTA's Urban Maglev Program will combine the two statutory provisions into a single program to consider all applicable Maglev technologies. The program will be undertaken in phases to ensure that proposed system concepts have been thoroughly evaluated before further FTA financial support for system development and deployment phases is committed. Any deployment activity will be consistent with the Metro Planning Process as stated in 49 U.S.C. 5303-5 and 23 CFR 450.

The Urban Maglev Program will be organized, funded, and undertaken in discrete phases which consist of: (1) Evaluation of Proposed System Concept, (2) Prototype Subsystems Development, and (3) System Integration and Deployment Planning. After the completion of each project phase, FTA will conduct an evaluation to ensure that all milestones and deliverables stated by the funding recipient have been met and that the project remains consistent with the overall objectives of FTA's Urban Maglev Program. To the maximum extent practicable, evaluations will involve peer review, including staff from potential end users. Given the different state of Maglev technology development of potential offerors, the amount of time needed to complete each phase of the program may vary. The current funding level is estimated to be sufficient to accomplish phases 1, 2 and 3. However, an adjustment to the requirements of the program phases may need to be made depending on the offeror's proposal, the number of projects funded, and future funding appropriations. Decisions to proceed with phases 2 and 3 will be based on successful completion of phase 1 project milestones, availability of program funds, and approval by the FTA Administrator (see section VI for

proposal requirements for phases 1, 2, and 3).

## II. Background

Magnetic Levitation (Maglev) is an advanced transport technology in which magnetic forces lift, propel, and guide a vehicle over a specially designed guideway. Maglev systems reduce the need for many mechanical parts, thereby minimizing maintenance costs, reducing noise, and improving reliability. Further, since the vehicle does not physically touch the guideway, Maglev systems appear to have the potential to perform well in areas where snow and icy conditions occur. In these conditions, Maglev systems may be able to negotiate steeper grades than a conventional type of fixed guideway system. These performance characteristics enable Maglev to provide safe, efficient, and environmentally sound mass transit services in areas where conventional technology may not perform as well.

Many Maglev concepts exist. Design options exist for most of the critical subsystems including: levitation, propulsion, power systems, guideway structure, vehicle structure, and communication and control subsystems. The two principal means of levitation are electromagnetic suspension (EMS), which uses attractive magnetic forces to hold the vehicle close to the underside of its guideway, and electrodynamic suspension (EDS), which uses repulsive magnetic forces to hold the vehicle just above its guideway. EMS systems have virtually no magnetic flux radiation, whereas EDS systems have more due to the higher magnetic field strengths needed for the "repulsive" levitation approach. Among these two means of levitation, there are several design choices, which include: type of magnet (superconductive, permanent magnet, or resistive electromagnets), magnet core material (air vs. iron), and type of current excitation of coil (DC vs. AC).

Maglev system concepts have undergone varying degrees of research and development both in the United States and abroad with most research focusing on high speed applications. Several high speed technologies appear ready for deployment. While there are no high or low speed systems currently operating in the United States, it appears that several viable technologies exist in this country. The existence of these technologies, coupled with the need to relieve congestion in highly populated urban and surrounding metropolitan areas, appears to offer significant partnership opportunities for both the private and public sectors.

## III. TEA-21 Authorized Projects

### *Low Speed Project*

Section 1218 of TEA-21 (as amended by section 9003 of the TEA-21 Restoration Act) establishes a "Low Speed Project" in subsection 322(i) of Title 23 U.S.C. (Highways), focusing on low-speed technology development. Subsection 322(i) authorizes \$5 million in funding to be made available for the research and development of low-speed superconductivity magnetic levitation technology for public transportation purposes in urban areas to demonstrate energy efficiency, congestion mitigation, and safety benefits. In addition, 322(i)(2)(A) states: "there are authorized to be appropriated from the Highway Trust Fund (other than the Mass Transit Account) to carry out this subsection such sums as are necessary for each of fiscal years 2000 through 2003."

### *Advanced Technology Pilot Project*

Section 3015 of TEA-21 (as amended by section 9009 of the TEA-21 Restoration Act) defines a project similar to the low-speed project defined above. The main difference is that superconductivity need not be used, but is not excluded. TEA-21 makes available for Fiscal Years 1998 through 2003, \$5,000,000 per fiscal year to develop low speed magnetic levitation technology for public transportation purposes in urban areas to demonstrate energy efficiency, congestion mitigation, and safety benefits.

FTA intends to combine these two statutory efforts into a comprehensive Urban Maglev Program that includes research, development and assessment of applicable Maglev technologies.

## IV. Program Vision, Goal, and Objectives

### *Vision*

Develop American magnetic levitation technology to improve urban mass transportation.

### *Strategic Goals*

Develop an advanced technology Urban Maglev system that will advance mobility and accessibility strengthen America's economic growth and trade.

In support of this strategic goal, specific outcome goals of the Urban Maglev Program include: encouraging regional and local development through joint activity, and developing the latest technology for the Nation's transit systems.

### *Technical Objectives*

(1) Develop a base of knowledge on Urban Maglev low speed technology supportive of eventual deployment,

including a full system design and advanced technology hardware development and demonstration;

(2) Enhance one or more of the following critical Maglev subsystems using advanced technologies:

- Levitation
- Propulsion
- Power Supply and Delivery
- Communication & Control
- Guideway design
- Vehicle design
- Other critical vehicle and/or guideway subsystems as identified

(3) Integration of a Maglev system design, including fleet operations, safety, inter-vehicle communication and control systems, and subsystems integration;

(4) Evaluate and optimize a full scale demonstration system design with respect to:

- Cost (both construction and operation)
- System Reliability
- Maintenance and other operational requirements
- Safety Benefits and Congestion Mitigation Potential
- Energy efficiency
- Other critical evaluation criteria as identified

(5) Demonstrate low speed magnetic levitation technologies:

- Demonstrate the feasibility of a low speed Urban Maglev system
- Application identification and end user participation
- Deployment Site Identification/ Planning

## V. Program Description

### *Project Phases*

The Urban Maglev program is a deployment-oriented technology development program. The emphasis will be on funding a project or projects that incorporate advanced technologies in a Maglev system design, but yet retain the attractive characteristics needed for deployment including low cost, high reliability, energy efficiency, congestion mitigation, and safety.

It is envisioned that the majority of effort for funded project groups would be spent in phases 2 and/or 3. Phase 1 is intended to be a concept evaluation phase and should take no more than one year to complete. Note however, that decisions to proceed with subsequent phases is at the option of the FTA, and will be based on successful completion of project milestones, availability of program funds, and approval of the FTA Administrator.

The amount of time spent on phase 2 and 3 activities is expected to be

significant, probably on the order of 2 to 3 years for each phase. Exactly how much time is spent in phase 2 versus phase 3 will depend on the scope of work of the funded proposal(s). For groups upgrading an existing system concept with advanced technologies, more time may be spent in phase 2—Prototype Subsystem(s) Development. For a project attempting to integrate existing advanced technology subsystems, more time might be spent in phase 3, System Integration. FTA's intent is to design a program that is flexible enough to accommodate various approaches to designing, developing, and demonstrating Maglev system technologies.

#### Phase 1: Evaluation of Proposed System Concept

In phase 1, funding recipients will perform further development of their proposed Maglev system such that the proposed system concept can be fully evaluated by the FTA. Note that the phrase "proposed Maglev system" means the complete full-scale demonstration system concept that is planned for development by the funding recipient, not just the improved advanced technology portions. The emphasis in this phase would be to bring the proposed Maglev system concept to the point where it could be presented, studied and assessed by FTA and others involved in the program such as a peer review group. In addition, an end-user would be identified.

It is envisioned that phase 1 activities would include:

- A projection of overall system performance and a preliminary design for the proposed full scale demonstration system concept. System performance is to be estimated in the areas of: energy efficiency, safety, congestion mitigation, reliability, maintainability, power requirements, total system cost (design and construction), and other critical performance measures as defined. The preliminary design should include the guideway and vehicle systems, and other subsystems as defined. It is envisioned that computer modeling and simulation would be used by the funding recipient to estimate and project overall system performance and to present the preliminary design for the overall system.

- Documentation (for evaluation purposes) of all assumptions and methodology used to project and estimate the system performance and in forming the preliminary design for the proposed system concept.

- Identification and analysis of key risk elements (technical) associated with the proposed project.

- Provide a "letter of interest" from end-user(s)

#### Phase 2: Prototype Subsystem(s) Development

In phase 2, funding recipients will complete the development of proposed advanced technology portions of the overall Maglev system design. For example, if the funding recipient proposed an improved Maglev system using superconductive technology, the principal subsystem and all other subsystems affected by this new advanced technology would be developed during this Phase of the program. Appropriate demonstration hardware would be completed during this program phase. In addition, a Commercialization Plan explaining the proposed application and market for the overall system will be required.

Key activities of this phase would include:

- Completion of a functional specification of the prototype advanced technology subsystem(s)
- Completion of advanced technology hardware subsystem(s) where improvements are proposed and warrant prototypes for testing and verification
- Demonstration of advanced hardware subsystem(s) technology
- Commercialization Plan with potential end-user(s) involvements

#### Phase 3: System Integration and Deployment Planning

In phase 3, funding recipients will integrate the completed advanced technology portions of their proposed design to form an overall Maglev system. In addition, deployment planning activities would commence in this phase. A specific deployment site would be identified and environmental assessment activities would be initiated. It is envisioned that the end-user, identified in phase 1, would take an active role, working with funding recipients to further advance the project in these areas.

Key activities for phase 3 include:

- Completion of functional specifications for a full-scale demonstration system whereby a potential user can commit itself to procure the system
- Full-scale computer modeling and simulation to demonstrate and verify system operations
- Identification of a specific deployment site
- Environmental Assessment

Potential Future Program Activities: Demonstration System Deployment. The

end-user would continue working with a funding recipient to further advance the project. The designated operator/user would oversee efforts to advance the selected project, complete detailed engineering designs, complete site-specific deployment and planning activities, finance, equip, and construct a full-scale project.

#### Additional Program Activities

##### Technology Assessment

FTA will conduct a technology assessment of existing Maglev technologies. The results of the assessment will be used by FTA to guide its program and as an aid in evaluating technologies. The assessment will review the critical subsystems, assessing their state of development as well as evaluating these subsystems as to their applicability for low speed applications. There are many possible systems that can be conceptualized. The technologies of interest for this program are those that are partially or fully developed, such that a demonstration system could be initiated within the timeframe covered by TEA-21.

Generic technologies will be assessed with certain urban applications in mind, i.e., it is envisioned that the system designed will either be a short distance automated type intra-city shuttle, edge city or intra-suburban shuttle, or a larger scale suburban to downtown city center type system. The technologies and associated applications that have the greatest potential to demonstrate energy efficiency, safety benefits, congestion mitigation, high reliability, environmental benefits, and cost effectiveness, within the context of these applications, will be strong candidates for further development funding.

## VI. Applications

### 1. Eligibility Requirements

The applicant must consist of a for-profit U.S. company and may include one or more of the following:

- (a) A public or private educational or research organization located in the United States, and/or
- (b) A state or local public body eligible to receive FTA assistance, and/or
- (c) A non-U.S. company, educational or research organization.

The above entities may enter into a consortium or other type of joint venture suitable for the FTA Joint Partnership Program as stated in Section 3015 of TEA-21.

## 2. Content of Proposals

Each proposal should contain information detailing the Management, Technical, and Financial aspects needed to accomplish *phase 1* of the proposed project. For phases 2 and 3, the proposal should provide a detailed summary of work activities proposed for these phases. The proposal should be a comprehensive, accurate, and effective presentation. Eight (8) copies of the proposal shall be submitted. No more than 50 pages (using 12 point font or larger), each numbered at the bottom, shall be contained within the proposal. Proposals containing more than the stated number of pages may be rejected by the FTA. The proposal should be spiral bound along the left long side, without unnecessary frills, and organized in the following fashion using tabbed, numbered separators for each section. Note: No promotional literature, brochures, etc., should be included. The proposal should clearly delineate project activities occurring in phase 1. All phase 1 milestones should be clearly stated and linked to a Payment Schedule keyed to these payable milestones.

### Suggested Contents of Proposal

- Cover: Containing the Project Title and Proposer's name and Address
- Executive Summary of Proposal
- Overview of Proposer
- Transportation experience record of all entities involved in the project
- Phase 1 Project Work Plan
  - Project Plan
  - Technical Approach
  - Statement of Work
  - Schedule, including clearly defined payable milestones and deliverables for Phase 1 (keyed to a payment schedule)
  - Flow Chart (explaining the sequencing and interrelationships of the work tasks graphically for all work tasks of the project)
  - Staffing Table (including total staff hours for the proposer and its subcontractors anticipated for each work task)
- Phase 1 Project Organization and Management Plan
  - Identification of Project Manager and key personnel associated with each work task for the entire project.
  - Staff Chart graphically depicting Organization and Management Plan
  - Resumes of key project management personnel such as Project Director, Deputy Director, Project Manager, Task Leaders, etc.
- Phase 1 Financial Information
  - Total Cost of Project

- Detailed information of the percentage of Federal and non-Federal cost share for the entire project. For the non-Federal share include the percentage of cash versus in-kind contributions. All in-kind contributions must be described in detail, including source(s)
- Provide a cost proposal for phase 1 (see Section V for phase 1 description)
- Phase 1 Milestone Payment Schedule (keyed to milestones in the project work plan for phase 1)
- Summary of work proposed for phases 2 and 3, including an estimate of the total cost for phase 2 and 3

## VII. Selection Process

### Evaluation

FTA anticipates multiple awards resulting from this solicitation. In selecting projects, FTA will employ the following criteria (order of criteria does not designate priority):

- a. Amount and quality of non-Federal Share: (see Section VIII, Funding)
- b. The correlation between the proposal and the vision, goals, technical objectives, and overall program description articulated by FTA in this notice.
- c. Management capability; the applicant must demonstrate both past experience in the transportation industry, and the capability to manage the planning, designing, testing, refinement, etc. of a Maglev system.
- d. The applicant must be part of a team with demonstrated capabilities in the area of mass transportation, and meet the technical requirements stated in this notice and possess experience in managing large dollar value transportation projects.
- e. Demonstrate that the proposed Low Speed Urban Maglev System is feasible for deployment in an urbanized area and that the proposed Urban Maglev System will fulfill a useful public transportation need.
- f. Demonstrate that all major subsystems of the proposed Urban Maglev System concept are practical to develop, particularly from a cost perspective.

## VIII. Funding

### (a) Non-Federal Cost Share

FTA is seeking a 50% matching cost share for projects funded under this program. The matching share provided by the performer (Federal funding recipient) may consist of a cash and/or in-kind match, cash being considered as higher quality match.

The performer pays for all of the costs of each project. The performer is reimbursed in part by the Government. The portion not reimbursed by the Government is referred to as cost share. The Government expects to share in the costs of all tasks of a project. The Government evaluates the quality of cost share in the following terms:

### (b) Quality of Non-Federal Cost Share

#### High Quality Cost Share

These are financial resources that will be expended by the award recipients on the proposed project's Statement of Work (SOW) and will be subject to the direction of the project management team. This means the funds the non-Federal participants will spend for man-hours, materials, new equipment (prorated if appropriate), subcontractor efforts expended on the project's SOW, and restocking the parts and materials consumed. High quality cost share can include new independent research and development efforts, but only if those funds are offered by the proposers to be spent on the SOW and subject to the direction of the project management team.

#### Low Quality Cost Share

These are non-financial resources that will be expended on the proposed project's SOW and will be subject to the direction of the project management team. This is typically wear-and-tear on in-place capital assets like machinery or the prorated value of space used for the project.

#### Unacceptable Cost Share

This is a resource that either: (1) will not be expended on the proposed project's SOW, or (2) will not be subject to the direction of the management team as discussed above. Unacceptable cost share will be subtracted from the proposer's claimed total cost for the project, and the required industry cost share recalculated. Unacceptable Cost Share examples include:

- Sunk costs, i.e., costs incurred before the start of the proposed project;
- Foregone fees or profits;
- Foregone general and administrative costs or cost of money applied to a base of independent research and development;
- Bid and proposal costs;
- Value claimed for intellectual property or prior research;
- Parallel research or investment, i.e. research or other investments that might be related to the proposed project, but which will not be part of the SOW or subject to the direction of the project management team.

Typically, these activities will be undertaken regardless of whether the proposed project proceeds;

- Off-budget resources, i.e., resources that will not be risked by the proposer on the SOW, and should not be considered when evaluating cost share.

#### Joint Partnership Program (JPP)

Section 3015 of TEA-21 authorizes a new Joint Partnership Program for Deployment of Innovation (JPP). Projects determined eligible for funding under the Urban Maglev Program that meet the requirements of Section 3015 and FTA's JPP guidelines, may also be considered for inclusion under that

program. For further details on the JPP see the related Federal Register Notice published October 2, 1998, Vol. 63 page 53266.

Issued on: January 26, 1999.

**Gordon J. Linton,**  
*Administrator.*

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