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MATERIALS DISPOSAL

Following a long maritime history, engineers designing the new artery-tunnel project decided to utilize Boston's proximity to the water as a means of transporting approximately ten million cubic yards of dredged and excavated materials that will be dug up to build the two new roadways. It is estimated that a barge disposal plan would dramatically reduce surface level truck trips by over 1000 per day during peak construction.

Decking will be placed over the initial excavation in the Central Artery corridor and most work will take place underground. The process will resemble a mining operation as trucks or conveyor belts move material to barge transit points located at the ends of the 1.2-mile construction corridor for eventual marine disposal. Similar barge sites are planned in South Boston on the industrial waterfront and at Logan Airport in East Boston to keep trucks off residential streets in these two neighborhoods. This excavation process was designed to minimize disturbance to the flow of traffic above ground, and any use of trucks will be confined to the construction corridor.

Besides keeping trucks off city streets, the barge plan may also be the answer to an environmental problem that has plagued Boston Harbor for years. Project officials are considering Spectacle Island, the former site of a city dump and a horse rendering plant, which today leaches pollution into Boston Harbor, as a disposal site for excavated materials. Under the plan, excavated material (dirt and clay) would be barged to Spectacle Island to cap the seeping waste. The City of Boston, the state, and Boston residents may determine jointly how the island would be used and designed.

While some materials excavated for the new Central Artery will be barged to Spectacle Island, dredged materials from the new third harbor tunnel and some of the excavated material from the artery will be disposed at the Massachusetts Bay Foul Area, a designated ocean disposal site located 17 miles east of Nahant. Under current regulations, only material that has been excavated from navigable waters can be disposed at the Foul Area. In the fall of 1988, engineers conducted a three-month soil and groundwater classification study of 140 sites along the project route. From preliminary land use research, engineers believe that the vast majority of material will be suitable for disposal at either of the two proposed sites.

The state plans to further curb truck traffic on neighborhood streets through the use of a designated haul road in South Boston. The new road will run along the Conrail tracks from Congress Street to the Southeast Expressway connecting at Dorchester Avenue and will serve construction traffic bound for the artery-tunnel project and nearby private developments. The road will also serve as a materials disposal route leading to a barge loading site on an industrial section of the South Boston waterfront.



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BUSINESS RELOCATION

During the 1950s, construction of the elevated Central Artery claimed many homes and businesses. Building a new underground artery and third harbor tunnel however, will not involve such large scale land acquisitions and no homes will be taken for the project. In fact, design improvements have reduced the number of takings over original estimates. But for the businesses whose property is impacted, the state is prepared to assist in the relocation.

Displaced businesses are eligible to receive several relocation benefits including assistance in identifying comparable replacement locations, coverage of moving costs and related expenses.

Federal regulations provide that businesses located on property to be acquired for public works projects are not required to move without at least a 90-day notice. Much more protection and notification however has been provided to business owners impacted by the artery-tunnel who will receive a four month legal notice and have been informally receiving assistance for some time.

Early on, relocation staff identified potentially impacted properties and worked with business owners to determine their relocation needs. Relocation agents are assigned to each displaced business owner to explain the payment process and benefits. Agents provide several other services including:

- assist in the preparation of claims documentation;
- describe special provisions designed to encourage businesses to relocate within the city;
- explain the availability of other public or private programs that may provide businesses with assistance;
- advise business owners of the availability of an administrative appeal process for relocation payments.



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AFFIRMATIVE ACTION/ EQUAL EMPLOYMENT OPPORTUNITY

The new Central Artery and third harbor tunnel project is committed to providing equal opportunity for minorities, women, the handicapped, and Vietnam-era veterans. An affirmative action office is working to ensure that minorities and women have ample encouragement and opportunity to share in the \$4.3 billion in economic benefits that the project is expected to generate.

Even before construction has begun, the project is making headway on its established goal to award 11 percent of contract work to disadvantaged, minority-, and women-owned businesses. The management consultant team of Bechtel/Parsons Brinckerhoff already has committed \$10.1 million to minority- and women-owned businesses. Overall, the ten-year artery-tunnel project will award an estimated \$462 million to disadvantaged businesses.

In addition, the project has developed internal staffing goals for minorities and women in all major job categories. Comprehensive new training programs are being planned to ensure full participation in this important project.



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UTILITY RELOCATION

As many as 5000 utility lines lie along the route of the new underground Central Artery and must be relocated before major construction can begin. To achieve this delicate task, engineers have developed an innovative plan to simplify the relocation process and minimize disruption.

Traditional methods of utility relocation involve transferring lines to temporary sites and then back to the original location or a new site when work is complete. This can mean several service interruptions. On the artery-tunnel project, however, engineers will avoid multiple relocations and reduce service interruptions by moving the lines into permanent utility corridors before construction begins. Here's how it's done:

Working with local utility companies, engineers plan to construct a grid-like series of utility corridors along the project route. When these corridors are in place, quick switch-overs will be made transferring services from the old lines to the new. The project's schedule calls for work to begin in 1989 with completion slated for 1991, well in advance of the start of artery excavation. Utility relocation outside the 1.2-mile artery construction area will be done on industrial lands in South Boston and on airport property in East Boston.

To minimize any service disruptions during relocation, the state plans to implement the following measures:

- Switch-overs to the new lines will be made during off-peak hours;
- Construction staging areas will be in off-street areas, away from traffic;
- A project hotline will be established to answer utility relocation inquiries;
- Work sites will be secured during off-hours and street surfaces will be decked;
- Work will not take place in the North End's Haymarket area on Fridays and Saturdays, the busiest market days for pushcart vendors and other neighborhood merchants. All work schedules will comply with City of Boston noise regulations.



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RODENT CONTROL

State officials are planning early to ensure that rodents displaced by construction of the new Central Artery will not make new homes in local neighborhoods. Project planners are devising a comprehensive control plan to prevent any massive migration. In fact, the project's program will provide a tremendous opportunity to launch a major attack on a pre-existing urban problem.

Unlike most construction projects, which delegate rodent control to the general contractor, the artery-tunnel project will establish a team of rodent control professionals to do the job. The state has hired Dr. William Jackson, a world renowned rodent control expert who has successfully implemented programs in chronically infested urban areas, to provide specialized guidelines for Boston, with particular emphasis on underground rodent control. Dr. Jackson has prepared recommendations for the type of bait to be used, when to begin the baiting program, and the size of the areas to be baited before construction begins, and consulting assistance will continue during the construction period.

Several professional contractors will be hired by the state to implement and supervise a carefully calculated blitz extermination program which will begin 60-90 days before construction begins and continue throughout the construction period.

In addition to the implementation of the intensive extermination effort, the rodent control plan also involves a massive public education campaign on proper sanitation practices and strict enforcement of city sanitation codes.

The public education program will be coordinated with the City of Boston's Inspectional Services Department and the Code Enforcement Police. The education program will concentrate on proper garbage storage in tightly covered containers and the elimination of potential new burrows by properly maintaining buildings and yards. Informational materials will be distributed around the city and a project hotline will be set up to handle rodent-related inquiries.

With a grant from the state Department of Public Health, Inspectional Services has launched a pilot rodent control program in Chinatown, distributing 500 heavy-duty trash cans and educating residents on proper sanitation and storage. Similar efforts may be implemented elsewhere along the artery-tunnel project corridor. Fines of \$50 to \$300 may be imposed for failure to observe sanitation laws which will be strictly enforced by the city's cadre of inspection officers.

The state has been working closely with the City of Boston in preparing its comprehensive rodent control plan for the artery-tunnel project. This cooperative working relationship is expected to continue throughout the construction period.



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ALTERNATIVE TRANSPORTATION

Keeping Boston moving throughout construction of the new Central Artery and third harbor tunnel is as important to project officials as building the project itself. The success of this effort will rely heavily on the cooperation of drivers in seeking alternative means of transportation.

To help commuters get in and out of Boston, the state will employ lessons learned during the recent reconstruction of the Southeast Expressway, a project that became a national model of how to keep traffic moving during major urban construction.

Commuters will be provided with plenty of information about how and when they will be affected by construction. Media reports will be frequent and officials are studying the use of electronic variable message boards at key highway locations to alert motorists to traffic conditions, lane and exit availability, and alternative routes. Additional police details and tow trucks will also be put in place to keep traffic flowing.

There also will be plenty of alternatives to driving. Utilization of the MBTA is an excellent first option. Capacity has increased over 40 percent in the last five years, and currently, the T is conducting a multi-billion dollar expansion and modernization program. The T has ordered dozens of new cars for both rapid transit and commuter rail lines, extended platforms to accommodate the new cars, and improved service throughout the system. The Orange and Red Lines have already undergone extensive improvements. Commuter rail has been extended on both the North and South Shores. Over 3000 additional seats have been dedicated to the North Shore line along with the line's extension to Newburyport.

Water transportation is also available. Service from the South Shore has been increased from Hingham and a shuttle from Charlestown to Long Wharf was instituted in the fall of 1988. Massport is also studying service points in several other North Shore locations.

Increased use of ride-share vans, carpool programs and private bus services are other transit options.

Some other steps to be taken include:

- implement traffic management plans to keep local streets functioning smoothly;
- replace downtown parking for North End businesses before existing parking is removed;
- add new Park-and-Ride lots for the MBTA. Two lots are now under construction in Chelsea near the MBTA commuter rail station and lots are also planned in Lynn and Saugus;
- build a special haul road in South Boston to keep trucks off local streets and away from residential areas;
- work with area businesses to promote variable work schedules, flex-time, and off-peak deliveries;
- brief community groups, business associations and other interested organizations on a regular basis;
- establish a project hotline to answer commuter inquiries.



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VENTILATION

Every day, more than 180,000 vehicles crawl along Boston's elevated Central Artery, the exhaust emitted by their idling engines spilling into nearby neighborhoods and streets. With the construction of the new Central Artery and third harbor tunnel, most of these vehicles will travel in underground tunnels, out of sight and out of earshot. The exhaust will be dispersed through seven ventilation structures situated as far from residential areas as possible and in compliance with existing state and federal air quality standards. The result is expected to be cleaner air for nearby neighborhoods.

Ventilation of underground roadways is a two-way process. Utilizing a system of ducts built into the tunnel and mechanical fans housed in the ventilation building, fresh air is blown into the tunnel to maintain air quality for drivers. At the same time, vehicle exhaust is carried out of the tunnels through rooftop ducts in the ventilation building and dispersed into the atmosphere. The air discharged from the ducts will not be visible nor will any mechanical noise be audible at street level.

Every effort has been made to locate most of the mechanical ventilation equipment underground in the Central Artery area and in commercial or industrial areas in other parts of the project. Although early project plans called for a ventilation structure to be built next to a North End nursing home, that building has been relocated to a non-residential area and has been combined with retail market space and replacement parking for Haymarket and North End merchants and customers. Other ventilation buildings are planned for non-residential areas, including Bird Island Flats in East Boston, the industrial waterfront in South Boston, and in the middle of the I-93/I-90 Interchange.

Considerable attention will be focused on the design of ventilation buildings in order to integrate them visually with surrounding structures. Materials as well as the overall size and shape of the structures will be compatible with neighboring buildings. Preliminary building designs will be reviewed and discussed at community meetings before plans are finalized.

In addition, a carefully designed testing procedure has been developed for the ventilation structures to ensure that they comply with all applicable federal and state standards for air quality, both inside and outside the tunnels. Analytical studies will be made of the air quality at numerous locations around the ventilation building, both at street level and at nearby buildings. Then, if necessary, physical modeling analyses in a wind tunnel will be conducted to determine the impacts of air and wind movements caused by neighboring buildings. The particular coordinates of each structure will reflect the information gathered through this process.

Artery-tunnel project staff meet regularly with both the state and federal agencies concerned with air quality: the Massachusetts Department of Environmental Quality Engineering (DEQE) and the Environmental Protection Agency (EPA). In addition to having control over new and existing ventilation facilities under the Clean Air Act, both agencies will review and comment on the project's Supplemental Final Environmental Impact Statement to be released for public comment during the spring of 1989.



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ARCHAEOLOGY

Long before backhoes break ground for construction of the new underground Central Artery, a team of archaeologists will survey the project area for new glimpses into Boston's past. Artifacts such as fragments of animal bone, pottery, and the foundations of buildings and wharves could offer valuable new clues about the lives of the earliest residents of the city.

Experts believe that many exciting finds are possible. For example, during a recent excavation in the North End, archaeologists unearthed parts of a 18th century wharf and a 19th century square-toed shoe. Traces of colonial homes, shops and drydocks may also be found. The artery survey is possibly the greatest opportunity the city has yet had to explore its underground riches. To accomplish this, the work has been divided into three phases:

Preliminary research, or phase one, was conducted last winter, and involved the identification of potential survey sites through computer analysis. Archaeologists compared maps of Boston from three years: the original shoreline of 1630, filled harbor of 1840, and modern-day development of 1979.

Using technology developed for surveillance satellites, technicians assigned digital codes to every street and building. When displayed on a computer screen, the digitized maps offered a vivid portrait of three and a half centuries of growth and helped researchers pinpoint areas undisturbed by major development. With this information, seven potential archaeological sites were selected for testing.

Phase two, which began last fall, involves testing of the seven designated areas. The Office of Public Archaeology (OPA) at Boston University has been hired by the state to conduct the phase two work. Because most test sites are likely to be some five to 15 feet underground, beneath layers of asphalt and rubble, archaeologists will use backhoes and bulldozers for initial excavation and manual tools for close work. All test sites are off city streets, so traffic and pedestrian access will not be affected by the work.

The following additional measures will be taken to minimize any disruption during field testing:

- Test sites will be fenced or covered to prevent vandalism and accidents.
- Work at each site will be limited to short periods of two to three weeks.
- No work will be conducted on Fridays or Saturdays near the North End when Haymarket pushcart vendors are in business.
- All work hours will comply with City of Boston regulations.

Finally, should any significant resources be discovered, attempts will be made to avoid or protect the sites for future archaeological study.

If these sites can't be avoided, then a full-scale data recovery, or third phase, will be done to retrieve important material. Any phase three work will be completed well before the start of construction in the area.

The results of the survey will be widely disseminated. Project staff will provide regular progress reports at community meetings and a full-time staff person will be available at test sites to explain the process to passers-by. After work is completed, recovered artifacts will likely be displayed at public exhibits around the city and an archaeology curriculum and other educational materials are being prepared for the Boston school system.



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GLOSSARY OF TERMS

ACCELERATION/DECELERATION LANE: an additional lane that gives entering vehicles space to reach the traveling speed before merging with through traffic or exiting vehicles space to decelerate before reaching the exit ramp.

BACKFILL: material such as sand, gravel, or crushed stone used to fill the space between an excavation and the exterior of a structure or a trench.

BENT: a frame-like structure, commonly steel or concrete, which supports an elevated roadway.

BOAT SECTION: an uncovered section of roadway or ramp that connects a surface level road with an underground or below grade roadway.

BORING OR DRILL HOLE: a hole, approximately 3"-5" in diameter, drilled into the earth to study the soil and groundwater conditions.

COFFERDAM: a temporary structure used to keep earth and water from entering an excavation so that work can be done under dry conditions

CONDUIT: a natural or artificial channel, such as a waterpipe or canal, for carrying fluids. Also used to carry utility wires and cables.

COVER (FILL): material, usually earth, used to raise a piece of land to a required level.

CULVERT: a large underground pipe or tunnel containing a stream or sewer.

CUT: an excavation.

CUT-AND-COVER: a method of tunnel construction which involves digging a trench, constructing the tunnel, and then covering it and restoring the surface to allow vehicular and pedestrian movement.

DECKING: a cover, usual wood, concrete, or steel, over an excavated area which allows construction to continue below while providing a temporary surface above.

DEWATERING: removing water, by pumping or other means, from an area to be excavated.

DREDGED MATERIAL: material that is excavated from water, either the harbor or another waterway.

FOOTING: a foundation for a column or a wall.

FOUNDATION: the entire substructure below the first floor or frame of a building or other structure.

GRADE: the degree of inclination of a road or a slope. An "at grade" road is level with the ground's surface; a "below grade" road is underground.

HAUL ROAD: a road, built along or leading to/from a construction site, to provide a means for moving equipment and materials without using local streets.

HIGH OCCUPANCY VEHICLE (HOV): a vehicle, usually a bus or van, that carries three or more people.

HOV LANE: a lane exclusively for the use of HOVs.

IMMERSED TUBE: a method of tunnel construction which involves building tunnel sections on land, launching and towing them to site, and then lowering them into place below a harbor or waterway.

LAGGING: horizontal planking placed against the walls in a trench or tunnel to prevent the earth from caving in.

LEVEL OF SERVICE: a measure of the quality of traffic flow, ranging from A to F, where "A" is free-flowing traffic with little or no delay and "F" is slow-moving traffic with delays.

LOAD BEARING WALLS: supporting walls, capable of bearing their own weight, as well as other weight of a building or structure.

NOSE: the end of a traffic island or the area between diverging roadways around which traffic must pass to either side.

OPEN CUT: a method of excavation in which the work area is open at the surface (used to distinguish from cut-and-cover or tunneling work).

PILE: column of wood, steel, or concrete driven or jacked into the ground or placed in drilled holes to support a load for a structure.

PORTAL: the opening at either end of a tunnel.

PRECAST CONCRETE: concrete that is cast and cured in other than its final position.

REBAR: steel bars placed within a concrete structure to strengthen the concrete.

RIGHT-OF-WAY: the land over or under which a road, utility, or other public line passes.

SIGHT SHELVES: space to the left or right side of a roadway, usually at a curve, that improves visibility for motorists.

SLURRY WALL CONSTRUCTION: a method of constructing an underground support wall for a tunnel from the surface. Two reinforced concrete walls are constructed in a trench held open by a mixture of clay and water, called bentonite slurry, allowing excavation to continue to the desired depth.

SOLDIER PILES: a method of constructing an earth retention structure using steel piles spaced along the perimeter of the excavation. Between these, horizontal planking (lagging) is placed to create a retaining wall as the earth is removed.

TRANSVERSE GRADE BEAM: a horizontal load bearing structural member which spans excavation support walls and is used to support overhead structures.

UNDERPINNING: a permanent or temporary support system to provide strength and reinforcement to a building or structure to prevent any settlement caused by adjacent construction.

VIADUCT: a bridge carrying a roadway over an obstruction, such as a river or another section of highway, or connecting a surface road with an elevated roadway.

WEAVE: a traffic movement that results when vehicles entering the roadway cross the paths of vehicles exiting the roadway.



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FOR MORE INFORMATION

Many forms of information on the artery-tunnel project are available to the public. Please call 951-6000 and ask for the specified public information or community participation staff member to assist you in the following:

- A VHS project video, for meetings and group presentations, obtainable at the State Transportation Library, 2nd floor, 10 Park Plaza, Boston from 10 a.m. to 4 p.m. or contact the special projects coordinator.
- A speaker's bureau to handle requests for project presentations. Contact Susan Bleistift.
- A monthly general information forum held on the first Tuesday of each month at project headquarters. Contact Susan Bleistift.
- A calendar of regular community environmental and abutters meetings and workshops for impacted neighborhoods. Contact Susan Bleistift.
- ACCESS, the project's quarterly newsletter. Contact Christine Baratta.
- A series of project fact sheets and recent news articles and editorials. Contact Mary Ann Hill.
- A resource library of technical material available at the State Transportation Library, 10 Park Plaza, Boston.
- Community participation and public information staff to assist you at 951-6000 or at One South Station, Boston, MA 02110.