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EXECUTIVE SUMMARY

Public policy leaders in the San Diego region continually assess local and regional challenges in meeting complex and growing public needs across multiple services arenas. Options are considered that focus on strategies for infrastructure and services-delivery consolidations for achieving economies of personnel, economies of technology, and economies of finance — all toward advancing effectiveness and efficiencies in serving residents, communities, and visitors.

Transportation services, public safety organizations, and other public services have much in common and much to gain from collaboration, as does the public. Nationally, collaboration at a regional level is becoming common, with shared operation centers and formal partnership organizations such as TranStar, AZTech, and CapWIN, all of which have dual goals of stretching the public’s return on capital investment and providing better coordination of services to the public.

The operational concept presented in this report addresses: a) the near-term evolution of the Interim Trolley Control Center (ITCC) to a San Diego Joint Transportation Operations Center (JTOC), and b) a follow-on San Diego Regional Operations Center. The conceptual design presents a view of evolving opportunities for consolidating select public services through local and regional unified structures. It is intended that from such unified operations strategies, specific funding and implementation plans for unification models, unique to identified needs, will be developed, and refined.

Background

The opportunity for a combined operations center has two origins, a) the Mission Valley East extension of the SDTI trolley service, which rendered the existing trolley dispatch facilities marginal and badly in need of modernized systems and facilities, and b) the recognition by the City of San Diego and SANDAG that traffic management and other facilities would also need to be upgraded in order to continue to ensure safe and efficient public access to downtown in order to support the continued growth and redevelopment of downtown San Diego, the increase in tourism, and special events occurring on a near-daily basis. It was evident that collaboration among agencies would not only lead to an economy of scale in the cost of operations, but it would also foster a high level of interaction and coordination among agencies for managing special events and incidents.

Two initiatives were established. First, an expanded trolley control center was designed so as to be available in the short term for the expanded trolley service. Construction of this Interim Trolley Control Center (ITCC) is complete, and operations are being phased in. Second, in parallel with the ITCC construction, an investigation was launched into the viability of a combined operations center that would meet San Diego’s longer-term needs for collaboration opportunities involving fire, police, and public service organizations, other transit operators, traffic management operators, and public information services throughout the region. This second initiative, conceptually called a Regional Operations Center (ROC), is the subject of this document.

The ROC design would recognize that some regional collaboration was already under consideration, such as the Inter-Modal Transportation Management System. Consistency with such existing projects and with established regional plans is a primary element in the development of a ROC concept of operations.

The project team conducted numerous meetings, workshops, and presentations with existing organizations and project groups, and observed a number of operations, with the objectives of promoting an understanding of the ROC concept and gathering information on existing operations. Participants in
this process included various transportation, public safety, and public services organizations at the local and regional level.

**Evolution and Benefits**

This document proposes an evolutionary process from the ITCC to the ROC, to verify, in stages, the benefits of the collaboration as work proceeds. The evolution begins with the minimum support necessary for the Mission Valley East extension of the trolley at the ITCC, it expands to include downtown traffic control during events, and data exchange between trolley and bus operations, and further expands to include public safety personnel at the ITCC location to participate in event management. These expansion steps at the ITCC are intended to provide verification of the value of collaboration in the ROC before a commitment to a new facility is made. The ROC could be a central focal point for collaboration of various regional operations, whether they are located on-site or elsewhere, and potentially including dispatch services for transit, public safety, and public services, traffic control, public information, transit revenue operations, call centers, and other regional organizations related to justice, commerce, immigration, public utilities, and homeland security.

Potential benefits from economy of scale by sharing resources are obvious. The interaction among organizations that takes place mostly during abnormal situations, such as incidents and planned events, would also be of significant benefit to the public’s safety, security, and mobility. Benefits can be achieved in various degrees depending upon the level of participation of the agency within the ROC, which may be tailored to meet the needs, operating preferences, and budget of the participant. Benefits can be quantifiable, such as incident response times, commuting time, operating and maintenance costs, and the value of information to the public. Other benefits may be less quantifiable, such as emergency preparedness, contributions to the quality of life, and the availability of data for regional planning purposes.

**Assumptions and Composite Requirements**

In order to put forth an operational concept, assumptions are made concerning the agencies that will initially participate in the ROC. Such initial participants include: SDTI trolley dispatch and passenger station security; SDTI revenue operations; SDTC bus dispatch operations; SDTC revenue operations; city traffic engineering; representation of city police, fire/emergency services, or other personnel during events; facilities for coordination with regional EOCs when they are activated; regional traveler call center operations; and SANDAG home office facilities. Future requirements of all participants are considered, including the evolution of city traffic management from its current ad hoc operation to a full-time operation. Participation with other off-site operations, such as Caltrans TMC, is also assumed. Additional participation from transit, other cities’ traffic centers (?), public safety, and other organizations, while not assumed in this document, is possible and desirable if the full benefits of collaboration are to be realized.

The requirements of the assumed participants were tabulated, including projections for the future, for day-to-day operations and operations during events and incidents. Staff positions, responsibilities, interactions, support systems, equipment, console positions, and other requirements were included in these tabulations. Requirements were then merged into similar areas, such as Operations Theater, Call Center, Equipment Rooms, etc., and summarized.
Conceptual Design

A general description of design alternatives that would have to be considered by each participant, regarding criticality of the operation and the location of equipment and personnel, is presented. For the Operations Theater, several specific industry examples, which are in operation or under design, and their respective attributes and floorplans, are provided including Houston TranStar, Los Angeles Metro, Toronto Transit Commission, and New Jersey Transit.

Based on the tabulation of requirements for the assumed initial ROC participants, a general design of each area is presented. Each space is described in terms of the personnel and equipment occupying it, its size, and general requirements, beginning with the Operations Theater. The console positions envisioned being located in the Operations Theater, the wall displays, and other major equipment for each operation are described. An Event/Incident Management Area is envisioned to be located in a separate room adjacent to the Operations Theater and staffed by personnel of different agencies depending upon the situation. A Management Command Center, adjacent to both the Operations Theater and Event/Incident Management Area is also envisioned. A Media Briefing Room, outside the security of the operations areas, would allow the briefing of media representatives without impacting ongoing operations.

A general Call Center area would allow the merging of existing and planned public information functions related to transit, traffic, and tolls into a single expanded Regional 5-1-1 Call Center. Other areas envisioned in the ROC include separate secure areas for SDTI and SDTC revenue processing, equipment rooms, and offices. Shared space for training, conference rooms, locker rooms, etc., and building support facilities (e.g., security, elevator rooms, electrical rooms, etc.) are identified. General design considerations pertaining to building infrastructure and systems integration are also described.

A preliminary cost estimate is developed, based upon the floorspace for various types of areas and the estimated unit cost of the type of each area. SANDAG has indicated an interest in locating their home office facilities at the ROC and this space and its costs are therefore included. Because the floorspace requirement for SANDAG’s home office facilities is very large, it is itemized as a cost adder to the basic ROC facility cost.

The preliminary estimated cost of the basic ROC, with all the operations floorspace and supporting facilities described, and including the limited office space specifically identified by participants for their ROC-resident operations, is calculated to be approximately $10.5M; adding the SANDAG home office raises the cost to approximately $19.9M. It should be noted that these estimates are very preliminary and, while they include an allowance for design and engineering, they do not include site procurement and development, nor do they include the procurement or relocation costs of systems, and other costs as identified in the report.

Next Steps

The final section of this document identifies immediate and longer-term steps envisioned to be required in order for the ROC project to progress. The most difficult steps will be confirmation of stakeholder participation, agreements on sharing of costs among stakeholders, and the development of an agreement as to how the ROC will operate. Once that foundation is established, however, the development of a detailed concept of operations, site selection, facility design, coordination with regional initiatives, etc., will follow with less difficulty.
1 INTRODUCTION

The purpose of this document is to present an initial operations concept for a collaborative Regional Operations Center (ROC) for the San Diego region.

1.1 Local Activity and National Trends

Regional planners, services providers and systems operators have long recognized that transportation, public safety, and emergency management have similarities in such areas as the need for real-time information, day-to-day interaction with other operators, and requirements for communications networks and other infrastructure. Technology --- specifically, communications, systems integration, operations management, and information management --- has successfully been used to strengthen the effectiveness and efficiency of individual organizations and is now also being leveraged collaboratively, via partnerships and other agreements, to the benefit of individual organizations and the public.

Some of the ongoing projects and programs impacting the San Diego region, a number of which are collaborative in nature, include:

- Real-time Transit Management System (CAD/AVL), shared by SDTC and NCTD bus transit operations
- Regional Schedule System (RSS) shared by SDTC, SDTI, and NCTD
- Inter-Modal Transportation Management System (IMTMS) Network, shared by all cities and traffic management centers in the region
- Interim Transit Control Center (ITCC), which will benefit SDTI trolley operations and downtown event management
- CTC/SCADA System, which will support expanded SDTI trolley operations
- Fire and Emergency Management System, which will support monitoring and control of the trolley tunnel and passenger station at San Diego State University
- Automatic Fare Collection (AFC) System, shared by regional transit operators
- Regional 5-1-1 Transportation Call Center, which will provide multi-modal transportation information.

These and other initiatives are guided, coordinated, and supported by regional planning programs, including, at a high level, the Regional Comprehensive Plan, which provides regional guidance for specific functions or localities, and the Regional Transportation Plan (Mobility 2030), which addresses freeway, transit, and road networks. At a more immediate level, the Regional Intelligent Transportation Systems Strategic Plan identifies technology needs of the region’s transportation systems, and the Regional ITS Architecture promotes interconnectivity and interoperability among all transportation agencies.

Nationwide, regional partnerships or cooperatives among public and private organizations involved in transportation, safety and security, and other services, continue to develop and broaden within existing regional authorities or as independent virtual organizations. Regional cooperatives:
• Bring together transportation, public safety, and other operations to provide more effective management of events, incidents, and emergencies

• Make better use of funding and help establish new sources of funding

• Reduce construction and incident-related delays through multi-agency coordination and real-time traveler information dissemination

• Enable public and private partners to share information and resources

• Improve transit services by implementing a common fare collection system across transit operators.

These cooperative efforts take different forms, unique to each region and situation. The following examples illustrate unique organizations and successful regional operations management strategies:

➢ Southern California ITS Priority Corridor

Recognizing the limitation to further expansion of freeways, local and regional transportation managers have turned to technical and operations-based innovations. As one of the nation’s four designated ITS Priority Corridors, the Southern California region, through 16 key public entities, oversees a program that allows multi-jurisdictional coordination and collaboration through its municipal planning organizations (MPOs), including SANDAG, and through state and local agencies.

➢ Capital Wireless Integrated Network (CapWIN)

CapWIN, an integrated transportation and criminal justice information wireless network, is in operation and under further development in response to the need for improved coordination and information sharing among public safety and transportation services agencies in the Maryland, Virginia, and Washington, DC, area.

➢ Baltimore Regional Operations Coordination Project (B-ROC)

The B-ROC project involves enhanced resource sharing and coordination of incidents among 20 participating agencies and resulted from a recommendation by the Metropolitan Baltimore ITS Partnership to the Baltimore Regional Transportation Board, the MPO for the Baltimore region.

➢ Maryland Coordinated Highway Action Response Team (CHART)

Formed to manage increasing traffic to and from the Maryland shore, the CHART project built on its initial success and is now a multi-jurisdictional and multi-disciplinary program to improve real-time operations of Maryland’s highway system through technology and teamwork.

➢ Houston TranStar

TranStar, a regional operations management facility and program in the Houston Metropolitan area, was specifically studied by the project team. The consolidated, multi-function facility coordinates transportation operations and emergency management services for the greater Houston region. The TranStar “consortium partnership” was created in 1993 and is comprised of key agencies including the Texas Department of Transportation, the Metropolitan Transit Authority of Harris County, the City of Houston, and, Harris County.
TranStar management and operators attribute much of the success of TranStar to the agreement structure, which has created and advanced the cooperative spirit and the unified commitment to ensuring the success of this regional effort.

➤ Arizona AZTech

Arizona’s AZTech started as an ITS integration demonstration project in the Phoenix metropolitan area and has evolved into an operations initiative that coordinates transportation, public safety, and planning services for the region. Primary management responsibilities are shared between the Arizona Department of Transportation (ADOT) and the Maricopa County Department of Transportation (MCDOT); 40 public and private partners share decision-making authority.

The Maricopa Association of Governments (MAG), the region’s MPO, has also played a significant role in AZTech, particularly as the clearinghouse for federal funding. Key elements of the AZTech initiative include cooperative management and information and resource sharing among 40 transportation and public safety partners, and private-sector partners.

These examples of cooperative efforts are structured and managed under one or a hybrid of select organizational structures, including:

➤ Virtual Organization

A virtual organization is a partnership based on voluntary participation. It is not a legal entity and relies on its constituent agencies for corporate functions such as procurement, project management, and staffing. Generally, virtual organizations are governed by memoranda of understanding, which are contractual agreements that broadly specify responsibilities and exchange of funds. They are relatively easy to form because they do not require legislative action and work within existing governance structures. However, they usually have no legal or monetary basis to enforce decisions, and are subject to participants’ ability to reach agreement and keep commitments.

➤ Private Corporation

A virtual organization can be privatized, giving it independent legal status. This enables it to hire staff and perform corporate functions independent of its constituent agencies. Consequently, it can institute processes that are most favorable to the partnership. It must also be financially independent, supported through dues, contributions, or private revenue sources. Corporations are best suited for regional organizations that have a well-defined purpose and means of financial support. The Transportation Operations Coordination Committee (TRANSOM) in the New York / Connecticut / New Jersey metropolitan area, began as a virtual organization and transitioned to a non-profit corporation after the partnership was well established and began to expand its focus.

➤ Regional Authority

A regional authority may be the most effective means of providing regionally-based operations services. A regional authority, such as a toll authority or joint powers authority is created legislatively to perform specific functions. Similarly, existing regional authorities such as MPOs and state or local DOTs, can take responsibility for leading regional operations roles. Alternately, an agency may facilitate inter-jurisdictional partnerships to provide regional operations services collectively, or in partnership. The Metropolitan Transportation Commission (MTC), in the San Francisco Bay Area, is an MPO that has taken an active role in coordinating and performing regional operations initiatives, such as the regional fare system.
The above approaches are departures from traditional operations management in that they rely on agencies and jurisdictions working in partnership to address issues across institutional boundaries. The agreement and operations structures appropriate to a specific situation will be unique and will relate to areas of commonality, participation, staffing, decision making, program development, systems integration, costs, benefits, and funding.

1.2 Project Background

The concept of a Regional Operations Center (ROC) project arose from both transit and traffic needs. The Mission Valley East extension of the SDTI trolley service rendered the existing trolley dispatch facilities obsolete. The Metropolitan Transit Development Board (MTDB) undertook an immediate expansion of the trolley dispatch center but, recognizing that redevelopment and tourism would require further growth of downtown transportation services, at the same time began investigation into a longer-range project that would support the further expansion and coordination of bus and trolley transit services, plus event management.

Further, SANDAG, in association with the City of San Diego and MTDB, identified an emerging need for a Joint Transportation Operations Center (JTOC) to address both transit and traffic circulation needs in the City of San Diego. The need for cooperative transportation management involving the City of San Diego and MTDB transit services then fostered consideration of the inclusion of City of San Diego public safety (police/fire) and other public services in an integrated and more encompassing city-wide and regional facility.

The redesigned trolley control center, known as the Interim Trolley Control Center (ITCC), has recently completed construction at the existing trolley control center site on Imperial Avenue and 16th street. The ITCC, design, and its evolution to a JTOC and to a Regional Operations Center (ROC), are described in Section 3.

1.3 Need for a Regional Operations Strategy

From investigative and outreach work, the project team, guided by SANDAG staff and direct-participant project stakeholders, recognized that opportunities for collaboration and consolidation of public-service operations in the San Diego region extended beyond downtown. Such opportunities may involve fire, police, and public service organizations, transit operators, traffic management operations, and public information services in varying degrees throughout the region. Opportunities may involve communication systems, computer systems, facilities, and other infrastructure improvement projects, which in some cases are already recognized and under consideration.

Key events at national (9/11 terrorist attack), state (budget shortfalls), and local (Cedar fires/fiscal constraints) levels have further emphasized the importance of collaboration in addressing public needs.

Taking utmost advantage of available opportunities requires a comprehensive multi-agency/multi-function operations strategy to guide parallel activity by defining regional goals and unique opportunities for capturing service economies and efficiencies. A regional operations strategy would focus on the region’s multi-modal transportation services, public safety and security, and event/incident management operations. The strategy would define a supporting infrastructure of facilities and networks to integrate personnel and systems involved in operations, management, security, surveillance, and other functions that could be implemented through a partnership as described above.
2 PROJECT SCOPE AND DOCUMENT ORGANIZATION

2.1 Scope

As noted in the Introduction in Section 1, the scope of the overall Regional Operations Center (ROC) project has evolved from an initial focus on expanded transit service to general center city mobility and finally to a potentially much broader view that considers multi-modal transportation, public safety and security, incident and event management, and interaction with emergency operation centers --- a much more regional perspective.

The scope of this document is an initial high-level conceptual presentation of this regional focus to promote ROC participation and form a basis upon which cooperation and collaboration among organizations responsible for providing transportation and public safety and security services can grow. In support of this goal, the ROC Operations Concept Report:

- identifies general opportunities for regional collaboration and unification
- provides justification for specific agencies in the region to participate in the ROC and considers the potential extent of such collaboration and participation
- describes potential benefits of collaboration to the participants and to the region
- identifies an assumed initial participation by certain specific operations, and considers their individual and merged requirements and how they might be addressed in a new facility
- recommends a follow-on course of action that would include confirmation of agency participation, production of a detailed operations concept, proceeding with a preliminary design based upon the approved operations concept and consistent with regional planning, and proceeding with detailed design, site selection, and construction.

As such, this document presents an initial tabulation of individual requirements, a summary of merged requirements, and a general discussion of how the requirements could be met. From this initial work, the collaborative concept can be further pursued, participation confirmed, and a complete and detailed regional operations concept produced going forward.

2.2 Methodology and Work to Date

As the project has evolved from a transportation operations and management center to potentially include and involve regional public safety & security, and related operations and management services, presentations and stakeholder workshops were conducted for management and staff of various agencies and organizations in the region, including:
Operations groups involved in the workshops included:

- Dispatch operations and call centers for city police, fire and life safety, and medical transport
- Traffic engineering and event management
- Freeway management
- Transit dispatch operations (trolley and bus)
- Revenue processing operations (trolley and bus)
- Security and surveillance (trolley)
- Customer information call center operations
- Communications (City and County)
- Information technology (MTS)

Several transit and public safety dispatch/management centers, call centers, and emergency operation centers (EOCs) were visited and the operations observed. In all, over 50 meetings, workshops, and site visits were conducted.
At the workshops, the potential benefits of collaboration were presented and discussed with each group and general operational requirements of the various groups were gathered. Stakeholder worksheets, summarizing high-level requirements of operating groups, were drafted from information obtained at the workshops and from printed material regarding the operation and the drafts were submitted to the operating group for confirmation.

As the scope of this effort evolved, the number of agencies and operations to be explored grew and became inconsistent with the established budget for this portion of the project. As a result, this effort was necessarily curtailed before all potential participants could be adequately investigated and before complete information could be obtained and confirmed for all organizations. Some of the information on stakeholder worksheets and some of the operational descriptions, such as that pertaining to San Diego Public Works, were not discussed at stakeholder workshops and must therefore be considered very preliminary.

Despite its preliminary status, however, the information obtained thus far and summarized herein is adequate for an initial presentation of the benefits of collaboration and unification to various operations, and to form a basis for further consideration by potential participants. A general discussion of benefits of collaboration, based upon assumptions regarding the initial agency participation, is included in this report. The actual quantification of benefits, such as estimated cost savings or improvement in performance statistics, should be done at a later stage in the project.

2.3 Document Organization

The document is organized as follows:

1 INTRODUCTION

General description of current regional activity and nation-wide trend toward collaboration and unification

Brief background and history of the project's origins from trolley expansion, its growth to include other transit and downtown event management functions, and its evolution toward regional collaboration

General discussion of need for a regional operations strategy that guides, coordinates, and builds on the plans of individual agencies and organizations and other established plans

2 PROJECT SCOPE AND DOCUMENT ORGANIZATION

Definition of project scope and work to date

Organization of this document

3 BENEFITS OF EVOLVING TO A REGIONAL OPERATIONS CENTER

Evolution from ITCC to a ROC and the anticipated organizational participation

ITCC (phase 1) - new facilities for SDTI trolley dispatch and surveillance using temporary dispatch equipment
ITCC (phase 2) – incorporation of a new SCADA system for trolley dispatch, new wall displays, ability to share real-time data and displays with SDTC bus dispatch at IAD, and a new RIWS workstation for event management functions (initially city traffic control, but fully-functional for other regional coordination as the IMTMS functions come on line)

JTOC – same facilities as ITCC with expanded event management functionality (i.e., representation from city fire and police) as a proof of concept of the ROC

ROC – a totally new facility that includes all the functionality of JTOC plus SDTC bus dispatch; SDTI and SDTC revenue operations; call center for 5-1-1 (transportation information); expanded facilities for event and incident management and coordination with EOCs; city traffic control (non-event); facilities for supervision and support for ROC-resident operations; and SANDAG home office administration and planning facilities, including ARJIS.

4 COMPOSITE REQUIREMENTS OF ROC

Identification of assumptions regarding organizations/operations anticipated to be included in the initial ROC implementation concept; brief description of the anticipated requirements for each organization/function; reference to a tabulation of requirements of other operations that could benefit from participation in the ROC

Description of initial composite requirements in various facility design categories, such as operations theaters, equipment rooms, call centers, offices, etc.

5 ROC CONCEPTUAL DESIGN ATTRIBUTES

Summary of how the requirements could be implemented with reference to other control center facilities; separate sections dealing with various categories of requirements defined in previous section, such as the operations theater, call centers, ancillary areas, etc. Summary of facilities and equipment anticipated to be shared among participants. Budgetary capital cost estimate

6 PROJECT CONTINUATION

Summary of immediate next steps and longer-term follow-on work, including confirmation of participation and requirements, coordination with other plans and projects, detailed Concept of Operations, site investigation, etc.

Appendix A REFERENCES

Appendix B TABULATION OF INITIAL STAKEHOLDER NEEDS

Appendix C SUMMARY OF INITIAL ROC REQUIREMENTS

Appendix D TYPICAL FLOORPLANS

Appendix E HOUSTON TRANSTAR TRIP REPORT
3 BENEFITS OF EVOLVING TO A REGIONAL OPERATIONS CENTER

The construction of the Interim Trolley Control Center (ITCC) is the first step in an evolutionary process that is planned to gradually enhance organizational collaboration and interaction among trolley operations, event management, and City and regional traffic and public safety agencies. The ITCC will evolve to a JTOC (Joint Transportation Operations Center), which will further demonstrate that joint operations offer distinct advantages, as proof of concept before a full commitment to a Regional Operations Center (ROC) is made. Following is a brief description of the content and progression of each of these steps, and the benefits that are expected.

3.1 Step 1: ITCC

The ITCC began as an expansion and modernization of SDTI trolley dispatch facilities, made necessary by the extension of trolley service and the resultant increased level of operational complexity. This new control center is located on the second floor of Building A in the trolley yard, near the existing trolley dispatch center. The ITCC floor plan can be found in Appendix D; additional partial floor plans are included in this section to illustrate the evolution of the ITCC through various phases of implementation.

The features of the ITCC design pertaining to trolley operations include: (1) a wall display that will graphically depict train location and current status conditions of all trolley lines; (2) console positions for three trolley controllers, a supervisor, a public information clerk, and a security coordinator responsible for CCTV surveillance of passenger stations. Floorspace will permit the addition of another trolley controller and another security coordinator if needed in the future. Some positions may be unmanned during non-peak periods but during peak service periods, all positions associated with trolley operations will be manned.

In addition to trolley operations, the ITCC design includes a console position intended for use by city traffic engineering personnel to help manage downtown mobility during planned events, including traffic control and coordination with trolley dispatch and bus dispatch operations at the Imperial Avenue Division (IAD). The event management position will otherwise be unmanned.

The ITCC design will be implemented in two phases:

3.1.1 ITCC Phase 1

The ITCC will initially open with temporary system equipment intended to support the opening of revenue operation of the Mission Valley East extension in 3Q2005. The temporary equipment will be comprised largely of existing equipment, including voice communications, CCTV surveillance monitors, and several interim train tracking and SCADA systems for various portions of the territory.

The focus of this first phase of the ITCC is to provide the minimal facilities necessary for the expanded trolley service. Even at this early stage, benefits will be realized as a result of close interactions made possible by the collocation of trolley dispatch and security personnel.
The Phase 1 ITCC will include a static map printed from CAD drawings of the trolley track arrangements that were prepared during the ITCC design phase. The map will be attached to a temporary wall where the wall displays will eventually be mounted.

A Regional Integrated Workstation (RIWS) will also be provided that will allow access at the event management position to city and regional traffic and transit information, video, and other data available from the IMTMS (Inter-Modal Transportation Management System), a region-wide communication system that allows inter-agency information access and exchange.

When fully implemented, a new passenger information sign system will be deployed to permit flexible control over passenger signs at stations.

3.1.2 ITCC Phase 2

Completion of the full complement of systems for long-term support of the expanded trolley operations and event management from the ITCC is anticipated to be in 3Q2006; these systems will include:
- a new CTC/SCADA system, which will eventually monitor and control all trolley lines and traction power substations and provide full management and reporting of all trolley operations,
- the ability to exchange real-time displays and data with SDTC bus dispatch operations at the IAD headquarters,
- wall displays primarily intended to show train location and other real-time trolley information, but also available for displays obtained from the bus dispatch CAD/AVL system, surveillance cameras, broadcast and cable news and weather, etc.
- although not yet approved, the system that is deployed for control of passenger information signs can be expanded to become the basis of an integrated voice communications system, which would support the access, recording, and patching of radio and telephone voice calls; if not approved at this point, it could be added later.

Benefits will be realized by the ability of trolley dispatch, trolley surveillance, and city traffic personnel to work together closely to help manage public mobility during planned events, and to collectively coordinate with bus dispatch operations, with the main city traffic operations center (TOC) when it is activated, and with city public safety operations. This enhanced coordination of mobility operations will also prove to be advantageous for incident management.
3.2 Step 2: JTOC

The JTOC (Joint Transportation Operations Center) concept is the next step in the evolution toward the ROC. The JTOC will provide further evidence, with minimal investment, of the advantages of close interaction of personnel from different organizations engaged in cooperatively managing a planned event or an incident. Approval to proceed with JTOC would be sought after the ITCC has been completed and its advantages are recognized. It should be understood that if SANDAG decides to proceed with the ROC sooner rather than later, the JTOC may not need to be implemented, as its features would be fully accommodated within the ROC concept.

The JTOC will extend the event management functionality of the ITCC by including two more organizations in the operations center. Two operating positions for representatives of the city police department and city fire department, intended for usage primarily during planned events, will be added and will be configured to include at least the same equipment and capability as the event management position initially deployed in the ITCC (RIWS and voice communication facilities). It would be highly desirable, if possible, for these positions to also include workstations connected to the respective CAD systems used by the city police and fire department, both of which are candidates for near-term replacement. Since the configuration of equipment is not unique to police and fire department needs, the positions might also be used by other organizations (e.g., city public works, additional traffic management.
personnel), if necessary.

The JTOC will be located at the same site as the ITCC. The two additional console positions not in the ITCC Phase 2 design will be located adjacent to the control room in the space designated in the ITCC design as an observation and conference room, which is separated from the ITCC control room by a glass wall. The glass wall could be removed, if determined later to be advantageous, to fully integrate the new positions into the control center. Depending upon authorization and funding, the JTOC could potentially be completed in early 2007. The JTOC would provide the benefits of close interaction to event management, trolley operations, trolley security, bus operations at the IAD facility (by voice communications), and to other regional agencies through the RIWS. Experience with using this facility to cooperatively manage events and incidents having an impact on downtown mobility will provide a proof of concept to justify a further expansion of capabilities and inclusion of other operations in the design of the ROC.

3.3 Step 3: ROC

The ROC (Regional Operations Center) is envisioned to be a further extension of concepts implemented in the JTOC and ITCC. After the JTOC demonstrates the benefits of collocation and collaboration among independent organizations, an approval to proceed with the ROC design should be justifiable. Numerous additional organizations could potentially participate in the ROC, with resulting benefits to both the organization and the public, including any or all of the following:

- various bus dispatch operations,
- transit revenue operations,
- call centers (e.g., 3-1-1 for city services, 5-1-1 for traveler information, 9-1-1 for emergencies),
- dispatch operations for city fire, police, and public service departments,
- non-event city traffic control,
- commuter and light rail dispatch operations,
- and others.

The ROC also offers opportunity for:

- improved coordination with Caltrans District 11 TMC and other TMCs in the region,
- expanded facilities for event management,
- facilities for incident management and coordination with EOCs during emergencies,
support for coordination, when needed, with off-site organizations such as INS, FBI, marine port, airport, freight rail, military operations, public utilities, county public safety and security, etc.,

- offices and facilities for supervision and support for ROC-resident operations,
- SANDAG home office, administration, and planning facilities, including IT operations and ARJIS,
- space and support facilities, including communication resources, for servers and other hardware used by off-site services and operations (e.g., freeway and arterial management operations performed at the Caltrans Kearny Mesa Traffic Management Center could be supported by equipment physically located at the ROC; equipment associated with regional wireless communications systems, (i.e., county microwave) could also be located at the ROC),
- backup server site for critical systems supporting off-site services and operations.

In the initial discussions with possible stakeholders, many organizations were interviewed regarding their operational needs and discussions were held regarding plans for an integrated regional facility. The obvious economies of scale offered by sharing facilities and resources would be of immediate benefit to most organizations but, more importantly, the common thread of interaction among organizations that takes place primarily during periods of abnormal operations (e.g., during incidents and planned events) could be of significant benefit to public safety, security, and mobility.

Many organizations have common needs and methodologies, such that they might benefit from collocation and collaboration with other organizations in a new ROC facility, or at least from some form of close association with the ROC. For budgetary reasons, the investigation did not fully research all potential participants, but the information obtained is adequate to support the initial operational concepts presented herein.

By bringing together additional organizations, the ROC would require significantly more space than can be made available at the ITCC site. Further, the site selection and the design for space and other facilities should permit the ROC to continue to grow and evolve to be more inclusive in the future. If approval to proceed with ROC were granted shortly after the achievement of JTOC’s goals, work on the design might begin in 3Q2006; construction and commissioning could be completed around the end of 2009, a period of over 3 years.

3.4 Potential Benefits

The envisioned evolutionary process does not require all participation commitments to be in place before going forward. As benefits are demonstrated, momentum and support can build. Operational collaboration among organizations may initially be limited, such as initially involving only situations beyond the normal day-to-day operations (e.g., handling events that cut across jurisdictions), but such relationships can lead to mutual understandings and further cooperation that benefit both stakeholders and the public.
3.4.1 Extent of Participation

The extent of the benefits experienced by an individual organization and the public it serves will depend largely upon the level of participation of the organization. Some considerations and alternatives pertaining to the level of participation are:

- Normal operations

Staff and facilities for mission-critical “operations control center” (OCC) operations (e.g., dispatch) can be located at the ROC in a control theater that permits intensive interaction among members.

Normal operations can also be conducted from another site and the ROC equipped with backup provisions to allow staff to conduct normal operations (to some degree) from the ROC if the primary site cannot be used.

- Handling of planned events and incidents

The ROC is intended to include dedicated facilities to support activities outside of normal day-to-day operations, such as event management, incident management, and support for emergency operations being conducted from an activated EOC. An agency can assign staff to the ROC either full-time or as needed to participate in and support these activities and to conveniently interact with other organizations.

- Virtual presence

Personnel can be located at other sites and some level of virtual presence at ROC can be achieved using voice, video, and/or data intercommunication equipment to maintain close interaction with the ROC.

- Operations support equipment

Utilizing high-speed communications, the ROC can be the site for equipment that supports operations of an organization (e.g., servers), regardless of where operations are conducted. Equipment can also be off-site with communications to the ROC for operations support.

Equipment having a redundant configuration can be separated for survivability reasons; the ROC can be the site of either primary or backup equipment, with communications to other equipment at another off-site location.

- Related staff and management

Personnel involved in support functions related to ROC operations can be located at the ROC (e.g., operations supervisors, managers, support services for equipment, help desks, administrative offices, etc.)
Ancillary operations

Staff and equipment associated with ancillary, supplementary, and non-mission-critical functions can be located at the ROC (e.g., revenue processing) and may require specialized facilities to support the operation (e.g., secure loading dock specially designed for revenue transfer).

Data exchange

Independent of any other participation in the ROC, extensive data exchange between ROC operations and off-site operations is anticipated, including both real-time information (e.g., rail or bus arrival times, live video) and non-real-time information (e.g., operations summary reports).

A few examples of benefits that could be realized from location of personnel and/or equipment at the ROC are:

- Taking advantage of sharing facility security and access equipment, backup power, backup communications, and other specialized supporting infrastructure that might otherwise be financially out of reach for a site operated by single agency, effectively stretching public funding for both capital and recurring expenditures.

- Quicker and more effective decision-making to maintain downtown mobility during an incident as a result of face-to-face coordination between personnel of various organizations responsible for bus and trolley dispatch, city traffic management, and public safety.

- Use of real-time video passed to the ROC from a traffic control center to observe freeway conditions to facilitate decisions affecting traffic routing during a downtown event.

3.4.2 Quantification of Benefits

Collaboration among organizations can reap benefits that are quantifiable and others that can be cited but that are not quantified.

Examples of quantifiable benefits to the region include:

- A reduction in the average response times for responding to and closing incidents, made possible by faster decisions based upon the immediate availability of real-time information from a number of sources and direct interaction among personnel of different organizations; the reduction in response time reduces the impact of incidents on public mobility and can improve public safety.

- An increase in the frequency of obtaining and distributing to the public up-to-date information pertaining to traffic and transit status, delays, and service interruptions; the
information is closer to real-time, which enables the public to adjust travel plans more intelligently and effectively.

- A decrease in average commuting times, less time spent traveling; more predictable commuting times, less day-to-day variation.

- Less personal and business time lost in traffic tie-ups, which negatively impacts the local economy by wasting person-hours, increasing fuel consumption, and increasing air pollution.

- Reduced cost of all forms of mobility to the public, stemming from higher public usage and operational economies of scale.

- Fewer activations of city and county EOCs because more incidents could be handled by agencies working cooperatively at the ROC, saving personnel costs.

Similarly, quantifiable benefits to individual stakeholder organizations would include:

- Cost reduction brought on by sharing resources and economies of scale (e.g., manpower, facilities).

- Cost savings due to inter-organizational sharing of experience, technology, techniques, and training.

- A decrease in agency staff time required to plan and provide coordinated public services in support of scheduled events.

Quantifying the benefits of collaboration may require gathering statistics and experience from other operations, making assumptions as to the applicability of available information, considering alternatives pertinent to the implementation, projecting costs, and other activities that may be somewhat subjective rather than rigorous and statistical. For example, factors such as average vehicle occupancy, the value of an individual’s time while stuck in traffic, the average cost of public services per unit time during active incidents, etc., will significantly affect the estimated value of a perceived benefit. A quantitative analysis that estimates benefits based upon such factors can nevertheless be very useful for comparison purposes, if the underlying assumptions are also presented for consideration.

The actual quantification of benefits is beyond the scope of this document but should be pursued, with caveats as necessary, in order to provide some measure of evaluation and a basis for decisions. Such activity should be included in the follow-on steps in which agency participation is pursued and confirmed.

Whether the benefit or return on investment of any specific application of technology, however measured, is significant or marginal, the investment is leveraged by collaboration among agencies to share and widen the utilization of the resources and information provided by the application of technology.
Regional benefits that are not quantifiable, either because they are not measurable or because they are affected by many variable factors, would include:

- Limiting the geographic impact of an incident by handling it quickly.
- Improving the availability of collective operational data and performance information for evaluation and regional planning purposes.
- A higher level of consistency of policies and procedures among organizations.
- Contributing to improved handling of regional emergencies as a result of coordination among organizations at the ROC to supplement EOC operations.
- Enhancements in public safety.
- Improving the environment (e.g., air quality impact on health).
- Improvements in public perception, acceptance, and satisfaction with various means of mobility.
- Higher quality of life in the region.

Examples of unquantifiable benefits to individual stakeholders would include:

- Improvement in the public’s transit experience and general perception of the agency due to better coordination among travel modes and better public awareness of operational problems.
- Better and more secure facilities for conducting agency operations.
- Improvements in employee satisfaction due to a more organized and better coordinated operating environment.

Unquantifiable benefits are also important even though they may only be substantiated by general experience and expectations. They may be more subject to opinion than benefits quantified by assumptions, but they should not be ignored.

3.4.3 Consistency with Regional Plans

Any benefits to the region arising from collaboration of diverse operational elements within the ROC must be considered on the basis of how well the project supports established regional plans.

The Regional Comprehensive Plan (RCP) for the San Diego Region identifies and summarizes general long-term and region-wide planning interests in many areas. Chapter 4B, Transportation – Moving People
and Goods (page 115), states “Many of the transportation planning and development issues facing this region cut across the boundaries of individual jurisdictions and agencies.” Chapter 9, Implementation (page 356) cites the importance of collaborative planning and building upward from the local level towards the regional level to establish strong connections between local and regional plans and to foster cooperative implementation approaches. The RCP calls for transportation planning and implementation from a perspective higher than local and single agency concerns.

The RCP makes reference to the Regional Transportation Plan (Mobility 2030), the Regional Short-Range Transit Plan (SRTP), and the Regional Transit Improvement Plan (RTIP) for details regarding transportation initiatives. Mobility 2030 calls for employing new technologies to better manage and more efficiently operate existing transportation resources in order to maximize the return on investment of existing infrastructure, while the SRTP and RTIP deal with specific near-term problems and solutions.

The San Diego Region ITS System Architecture design is a major component of the long-term effort described in Mobility 2030 and a blueprint for the deployment of ITS technology throughout the region. The regional architecture centers around the IMTMS network, which will interconnect all the local transportation management facilities in the region, allowing them to share information. The ROC, with its foundation in transit management and extensions to other services, is a vital part of that IMTMS information exchange network, both as a supplier and user of information.

In fostering inter-organizational collaboration within the region, the ROC is fully in concert with the RCP and with the detailed long-range transportation planning efforts that are guided by the RCP.

The Automated Regional Justice Information System (ARJIS), under SANDAG, cooperatively serves 50 justice agencies, some of which will be associated with the ROC. ARJIS provides a uniform approach and consistency to public safety and is the regional focus for public safety information technology. The ROC will benefit from the regional focus of ARJIS, and will also extend it by providing access to the ARJIS network and database to appropriate personnel operating within the ROC.

Similarly, the Regional Communications System (RCS) is an ongoing collaboration of public safety and public service agencies with the expressed goal of providing interoperable wireless voice communications among agencies and wireless data network resources for the region. Agency collaboration in the RCS offers significant benefits to the public in terms of safety and emergency response, plus economy of scale benefits to individual participating agencies. RCS currently serves 11 dispatch centers and 191 agencies, including ARJIS, and currently has 16,000 users. Expansion and enhancement of the communication systems is ongoing to accommodate the rapidly increasing usage needs.

3.4.4 Summary of Targeted, Quantifiable Benefits of the ROC

Under normal operating conditions, stakeholder agencies at the ROC would operate essentially independently of one another and benefits would come primarily from the economies of scale offered by collocation and collaboration. These economies of scale arise from sharing infrastructure, facilities, information, technology, expertise, training, and potentially even certain types of personnel. Improvements to the reliability of operations and better security are also an outgrowth of collocation within a single, modern facility.
Regional benefits achieved during normal operations would come from improved interaction among agencies (e.g., during normal rush-hour conditions). During planned events and incidents, regional benefits would be more pronounced with agencies working together to manage operations, solving problems, and resolving unusual situations to improve service to the public. The ability of agencies to interact within the ROC might lead to some cost savings, but more importantly, would lead to an increase in the effectiveness of service and safety to the public. Emergency situations, in which an EOC in the region is activated, would have similar benefits arising from improved interaction between EOC and ROC personnel.

Table 3-1 summarizes benefits that can be expected from the ROC, depending upon extent of stakeholder participation.
Table 3-1: Extent of ROC Participation and Benefits

<table>
<thead>
<tr>
<th>Extent of Participation</th>
<th>Benefit To Region and Public</th>
<th>Benefit To Stakeholder Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOCATION OF OPERATING PERSONNEL:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal operations conducted at ROC</td>
<td>Economy of scale</td>
<td>Economy of scale</td>
</tr>
<tr>
<td>Normal operations conducted at ROC as backup if primary operating site is not available</td>
<td>Economy of scale</td>
<td>Economy of scale</td>
</tr>
<tr>
<td>Participation in event management conducted at ROC</td>
<td>Economy of scale</td>
<td>Economy of scale</td>
</tr>
<tr>
<td>Participation in incident management and coordination with EOC conducted at ROC</td>
<td>Economy of scale</td>
<td>Economy of scale</td>
</tr>
<tr>
<td>Virtual presence at ROC, physically located off-site (i.e., collaboration with ROC via video &amp; voice, during normal operations, events, and/or incidents)</td>
<td>Economy of scale</td>
<td>Economy of scale</td>
</tr>
<tr>
<td><strong>LOCATION OF OTHER PERSONNEL:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations management and support staff at ROC (e.g., supervision)</td>
<td>Economy of scale, convenience</td>
<td>Economy of scale, convenience</td>
</tr>
<tr>
<td>Ancillary services or supplementary operations located at ROC (e.g., revenue processing operations)</td>
<td>Some economy of scale, convenience, security</td>
<td>Some economy of scale, convenience, security</td>
</tr>
<tr>
<td><strong>LOCATION OF SUPPORT EQUIPMENT:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All supporting servers and equipment located at ROC</td>
<td>Economy of scale, convenience of support services</td>
<td>Economy of scale, convenience of support services</td>
</tr>
<tr>
<td>Primary supporting equipment at ROC; backup equipment off site (or vice-versa)</td>
<td>Economy of scale</td>
<td>Economy of scale</td>
</tr>
<tr>
<td><strong>REGARDLESS OF LOCATION OF PERSONNEL AND EQUIPMENT:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharing of information (data, video, etc.) via IMTMS or other communication means</td>
<td>Service improvements, enhanced planning</td>
<td>Service improvements, planning</td>
</tr>
</tbody>
</table>

March 25, 2005 (draft)
4 COMPOSITE REQUIREMENTS OF THE ROC

This section presents composite stakeholder requirements that will be used to develop the conceptual design of the ROC. These requirements are based upon assumptions regarding the organizations that will participate in the ROC, projections of the organization’s future operations, and estimates of facility support requirements for each participant. The requirements of each participating organization arise primarily from the services they provide and the functions they perform, but also from the opportunity for interaction and coordination among participating organizations and external agencies.

4.1 Assumptions Regarding Initial ROC Participation

To illustrate specific design issues and present the initial concept for the ROC, the following assumptions are made regarding agency participation in ROC:

a. ROC proof of principle, demonstrated by the extension of the Interim Trolley Control Center (ITCC) to form the Joint Transportation Operations Center (JTOC), as described in Section 3, has been accepted and will form the basis upon which the ROC design will be based. This base includes:

- all SDTI trolley dispatch operations
- SDTI security and surveillance operations associated with passenger stations
- city traffic engineering representation during planned events
- city police and fire/emergency services representation during planned events.

b. For the initial design of the Regional Operations Center (ROC), participation is expanded to include:

- all SDTC bus dispatch operations
- expansion of dedicated space and facilities for personnel handling planned events
- dedicated space and facilities for personnel handling incidents
- all revenue processing operations for both SDTI and SDTC
- all traveler information services operated by SANDAG
- space for city traffic monitoring and control during normal situations (not involving an event or incident)
- SANDAG home office facilities.
c. SANDAG will decommission the existing ITCC and bus dispatch center after the operations are transitioned to the ROC. Many agencies have a backup site for their critical operations should the primary center become unavailable. Retaining the existing facilities after the transition to the ROC would be an economical way of providing off-site backup and training facilities for trolley and bus operations and should be considered.

d. No significant space will be set aside for potential stakeholders who were included in the initial consensus-building but who have declined to participate in the initial ROC.

e. Facilities for interaction and exchange of data with external agencies will be required for both normal operations and incident/event management purposes; a primary need is the communications capability to interact closely with the Caltrans District 11 Traffic Management Center (TMC) and other regional TMCs for traffic management.

f. SDTI trolley operation within the ROC will include dispatch, passenger station security (video surveillance), public address, and revenue processing, as well as management offices for dispatch and revenue operations. Offices for supervision of security staff personnel, and the associated support space, are assumed to remain at their current location in the trolley yard. The SDTI security staff at the ROC is small compared to the size of the staff responsible for on-board and passenger station security and the convenient access to trolleys from the security office site is very important.

g. SDTC bus operation within the ROC will include dispatch, revenue processing, and offices for supervision of dispatch and revenue operations.

h. The Regional Scheduling System (RSS), which supports SDTI trolley operations and SDTC and MCTD bus operations, will be included within the ROC.

i. The Regional Transit Information System (RTIS) call center operations staff positions, supervisory offices, trip planning, and related call center support facilities will be included within the ROC; these facilities are expanded and merged with the SANDAG ATIS 5-1-1 traveler information services and with fare/toll collection services to form a Regional 5-1-1 Call Center.

j. All SANDAG offices and operations, including management, planning, engineering, IT, and ITS Systems Support staff and equipment, including ARJIS, data archiving functions, help desks, and computer/communication equipment will be located within the ROC.

k. The City of San Diego traffic management operation, including offices of engineering and supervisory personnel, as required for an evolution to daily (non-event) traffic control operation employing RIWS§ and other equipment will be located at the ROC.

l. Facilities and space for management of incidents and planned events will be located at the ROC and will accommodate, depending upon the situation, personnel from bus, trolley, and city traffic operations, plus city police, fire, emergency services, and public services personnel. Incident management facilities will provide for close coordination with the regional Emergency Operation Centers (EOCs) of the city and county, when either or both EOCs are activated, as well as with other public safety and security operations in the region.

m. Facilities and space for the coordination of public information (e.g., traffic and transit reports to commercial broadcast and print media) are also required at the ROC for the dispersal of information during normal operations as well as during events and incident situations.
n. ROC facilities will include equipment room space, communication facilities, other support equipment and staff required to house servers and other equipment associated with regional traffic management operations conducted at the Caltrans District 11 Traffic Management Center (TMC) plus expansion, potentially including the Freeway Management System, Regional Arterial Management System, and Lane Control Systems.

Other organizations, and either their full operations or some portion of their operations, could be accommodated in the ROC design. Potential additional participants may include the following:

- Dispatch operations for other bus transit operators such as NCTD, Chula Vista, National City, and CTS
  (note that the CAD/AVL system that serves SDTC bus dispatch operations also serves NCTD bus dispatch operations in Oceanside and Escondido, and the system has the capacity to also serve Chula Vista, National City, and CTS dispatch operations, whether they are located at the ROC or not)

- Dispatch operations for other light rail and commuter operations, such as Sprinter and Coaster
  (note that the CTC/SCADA system being procured for SDTI could readily accommodate the needs of NCTD’s Sprinter light rail operation to be dispatched from Escondido; it could also accommodate NCTD’s Coaster commuter rail operation (as well as Amtrak’s operation on NCTD’s tracks) and for dispatch operations to be performed locally instead of from Pomona and San Bernardino)

- Call centers for San Diego police, fire and other emergencies (9-1-1) and city services (3-1-1); call centers for these functions for other cities

- Dispatch operations for San Diego city police, fire and emergency services, and city public services; dispatch operations for these functions for other cities

- Dedicated space for representation of other off-site operations, such as public utilities (e.g., San Diego Gas & Electric), federal agencies (e.g., INS, border patrol), military, freight transport, marine and air terminals, etc.

Appendix B, Table B-1, Operations Assumed Included in Initial ROC Concept, summarizes these assumptions. Additional participants can easily be incorporated into the design and planning at this point in the process.

4.2 Operations of Initial Participants

Following are brief summaries of normal and abnormal operations for the assumed initial ROC participants identified above, including personnel responsibilities and operational support requirements. Further details are available in Appendix B, Tabulation of Initial Stakeholder Needs.
4.2.1 SDTI Trolley Dispatch Operations

➢ General Operation

Normal conditions: Maintain scheduled trolley service on Blue, Green, Orange, and future Red Lines (and one additional future line); interact with trolley operators regarding service problems; interact with patrons at platforms regarding service availability and problems; interact with passenger station security personnel regarding security of public and facilities; interact with on-board transit security officers regarding service and security issues

Planned events: Interact with bus transit and city traffic management personnel to coordinate services, maintain public mobility, and react to needs as they develop; interact with city police and other organizations if necessary to maintain public safety and security during the event

Incident situations: Interact with city police, city fire and emergency services, and other organizations, as required, regarding maintaining/restoring services, safety, and security.

➢ Staff, Responsibilities, and Interaction

Rail Controllers: four positions during peak operations, one per line, responsible for supervising trolley operators to maintain service, handling service delivery problems due to equipment failure, congestion, etc.; interact with trolley operators, other rail controllers, public information clerk, supervisor, and security officers to maintain service; interact with outside agencies when necessary; one future position

Public Information Clerk: one position responsible for handling service queries from the public via calls from patron phones on platforms; monitoring platform CCTV images for crowding, safety, security, and during calls from patrons; interact with rail controllers regarding service problems and security issues; handles fare machine intrusion, facility intrusion, and other facility alarm conditions (note: this position is dedicated to SDTI and is not to be confused with the Public Information Office, who is a media representative and not associated with any specific operation)

Central Control Supervisor: one position responsible for overseeing the controllers and clerk, assisting with problems and providing backup to controllers; interact with all personnel in the control center and outside agencies as required.

➢ Support Systems and Equipment

CTC/SCADA system: train control functions, monitoring and supervisory control for traction power and station facilities

Integrated Communication System (ICS): future system for radio and telephone voice communications, patching, recording; control of public address; current radio and telephone facilities will support communications initially

Variable Message Sign System: control of sign content from central location

Network PCs: corporate LAN services
Video surveillance system: monitoring the public’s safety and security at passenger stations and other SDTI facilities

MTS Fiber Communications System: data communications from CTC/SCADA equipment at the ROC to RTUs and other equipment at remote sites (e.g., traction power substations, passenger stations); video communications from cameras at remote sites to the ROC; voice communications from patron telephones at passenger stations to the ROC; data communications for network PCs.

Operations Facilities

Console equipment for Rail Controllers and Central Control Supervisor: 2 CTC/SCADA screens, ICS screen, network PC screen, microphone

Console equipment for Public Information Clerk: CTC/SCADA screen, ICS screen, network PC screen, microphone, space for an array of approximately 24 CCTV images (initially 12 in ITCC) for platform monitoring

Wall displays: 2 high by 7 wide array, visible to all trolley operations personnel; space for future expansion to 2 high by 9 wide array; used for real-time data and video images (initially a 2-high by 5-wide array of 60” display cubes in the ITCC for Blue, Green, and Orange Lines)

Supervision and Support Personnel

Offices: 4 (est.)

Other Requirements, Preferences

Rail controllers should have easy access to trolley security personnel, bus dispatchers and city traffic control personnel.

4.2.2 SDTI Trolley Passenger Station Security Operations

General Operation

Normal conditions: Maintain security at passenger station facilities; interact with rail controllers, transit security officers, and city police regarding security issues

Incidents and planned events: Similar to normal operating conditions, additional emphasis on crowd control in addition to safety and security.

Staff, Responsibilities, and Interaction

Security Officers: at least one position is manned during normal operations, two positions during events and when quantity of security cameras is increased over time; responsible for monitoring CCTV images at stations and platforms to maintain security and crowd control; interact with on-board transit security or city police, if necessary; interact with rail controllers, if necessary, to address problems; one future position.
Support Systems and Equipment

**Video surveillance system:** security and safety monitoring at passenger stations, video recording

**Integrated Communication System:** radio and telephone voice communications, patching, audio recording

**MTS Fiber Communications System:** video communications from cameras at remote sites to the ROC.

Operations Facilities

**Console equipment for Security Officers:** camera controls, voice communications equipment; a single array of 54 CCTV images initially (expandable to at least 100) for security monitoring, viewable from all current and future security office positions.

Supervision and Support Personnel

**Offices:** none (supervision of security operations is to remain at existing facilities at trolley yard).

Other Requirements, Preferences

Security officers must have easy access to rail controllers and visibility of rail control wall displays.

4.2.3 SDTC Bus Dispatch Operations

General Operation

**Normal conditions:** Maintain scheduled bus service; maintain security of public and facilities; interact with revenue and non-revenue vehicle operators and field supervisors regarding service and security issues; provide bus bridges when trolley service is interrupted.

**Planned events:** Interact with trolley and city traffic management personnel to coordinate services, maintain public mobility, and react to needs as they develop; interact with city police and other organizations to maintain public safety and security, as well as service.

**Incident situations:** Interact with city police, city fire and emergency services, and other organizations as required regarding maintaining/restoring services, safety, and security.

Staff, Responsibilities, and Interaction

**Communications Supervisors:** two positions during normal operations, responsible for all coordination between bus operators, field supervisors, outside agencies, and others when necessary to maintain service, safety, and security; two additional positions will be implemented for SDTC management or for backup, but they will not be staffed; these positions should be adequate for the foreseeable future as no further expansion of SDTC service is anticipated (potential need exists for additional consoles for other bus dispatch operations in
the future, see below).

Support Systems and Equipment

RTMS CAD/AVL: vehicle tracking and monitoring, route and schedule adherence, incident management, radio control (transit trunking)

Integrated Communication System: telephone voice communications, patching, recording, public address

Variable Message Sign System: control of sign content from central location

Network PC: corporate LAN services

Caltrans Fiber System, and other fiber and copper (leased) landlines: data communications to NCTD dispatch locations and to RCS microwave sites

Regional Communication System (RCS): county microwave, used for backhaul to/from radio base stations.

Operations Facilities

Console equipment for Communications Supervisors: 2 CAD/AVL screens, ICS screen, network PC screen, keyboard, microphone at each position

Wall displays: none initially, space for a potential 1 by 2 array for SDTC needs in the future, visible to all bus dispatch personnel, for real-time data, map displays, and video images (potential need for additional space in the event other dispatch operations are added in the future).

Supervision and Support Personnel

Offices: 5 (est.)

Other Requirements

Communication Supervisors should have easy access to rail controllers and city traffic personnel.

Two additional console positions are conceivable in the future in the event that bus service operators in addition to SDTC elect to use the RTMS CAD/AVL system and to locate dispatch operations at the ROC; these positions are not required and not justifiable at this time, but would best be located near SDTC positions if space is available; could also involve one or two additional wall displays.

4.2.4 SDTI Revenue Operations

General Operation
Normal conditions: Perform revenue counting and processing for SDTI operations; all revenue functions are performed in dedicated ancillary space, apart from other ROC operations and having tight security provisions (maintenance facilities for ticket vending machines, cash containers, and other revenue equipment are not planned to be included in the ROC).

Planned events: Perform pre-event setup/preparation for temporary additional ticket sales facilities and personnel; process the additional revenue stream after the temporary facilities are closed.

Incident situations: Not applicable (note: TVM security alarms are monitored by SDTI dispatch and security operations, along with other real-time alarms).

➤ Staff, Responsibilities, and Interaction

Counting room personnel: ultimate staff level is 5; involved in handling and processing the cash in the dedicated ancillary space (does not include mobile staff that services ticket machines and delivers the cash containers to this facility).

➤ Support Systems and Equipment

Dedicated equipment: cash handling and counting equipment, including PCs, operated by the counting room staff will be located in the ancillary space, not interconnected to outside systems.

➤ Operations Facilities

Counting rooms: facilities for all revenue processing, including space for special preparation prior to events and storage within the secure area; 1 supervisor office within secure counting area

Vaults: internal temporary storage

Secure loading docks: handling of incoming deliveries from pickups at vending machines; also for armored car transfers of cash to banks for deposit

Security: CCTV, mantrap, secure transfer of revenue into and out of counting rooms; secure access to all areas, etc.

➤ Supervision and Support Personnel

Offices: 1 near the counting room but outside the high security area.

➤ Other Requirements

Storage areas for records, receipts, etc., outside the secure area

Intrusion alarms from ticket vending machine should be directed to the Security Officer in the Operations Theater. If other indications pertaining to ticket vending machine service problems (e.g., full, out of change, jammed, out of tickets) are to be handled by this group, they could be directed to a PC in the supervisor’s office.
4.2.5 SDTC Revenue Operations

➢ General Operation

Normal conditions: Perform revenue counting and processing for SDTC operations (currently contracted and done external to SDTC operations; assumed to be transferred to internal responsibility and located at ROC with initial planning patterned after the SDTI revenue operation, but maintained completely separate of SDTI revenue operations, both in facilities and management); all SDTC revenue functions will be performed in dedicated ancillary space, apart from other ROC operations and having tight security provisions (maintenance facilities for fareboxes and other revenue equipment are not planned to be included in the ROC)

Incidents and planned events: Not applicable.

➢ Staff, Responsibilities, and Interaction

Counting room personnel: ultimate staff of 10; involved in handling and processing the cash in the dedicated ancillary space (does not include staff that delivers cash containers removed from buses at garages and delivers them to this facility).

➢ Support Systems and Equipment

Dedicated equipment: cash handling and counting equipment, including PCs, operated by the counting room staff will be located in the ancillary space, not interconnected to outside systems.

➢ Operations Facilities

Counting rooms: facilities for all revenue processing, including space for special preparation prior to events and storage within the secure area; 1 supervisor office within secure counting area

Vaults: internal temporary storage

Secure loading docks: handling of incoming deliveries from pickups at bus garages; also for armored car transfers of cash to banks for deposit

Security: CCTV, mantrap, secure transfer of revenue into and out of counting rooms; secure access to all areas, etc.

➢ Supervision and Support Personnel

Offices: 2 near the counting room but outside the high security area.

➢ Other Requirements

Storage areas for records, receipts, etc., outside the secure area

Intrusion and security-related alarms (e.g., from fare equipment at transit centers) should be directed to the bus operations positions in the Operations Theater. If other indications from the
equipment are to be handled by this group, they can be directed to a PC in the supervisor’s office.

4.2.6 MTS Regional Transit Information (RTI) Call Center

- General Operation
  
  **Normal conditions:** Respond to telephone queries from public regarding schedules, transfers, delays, current conditions; maintain automated call responses based upon schedules and conditions; supervise website trip planning facility operation

  **Incidents and planned events:** No change in functionality, possibly additional staffing on duty.

- Staff, Responsibilities, and Interaction
  
  **Call-takers, transit:** 22 positions currently, staffing level varies; responsible for responding to public questions regarding schedules, routes, and service status; allow space for 30 positions ultimately

  **Supervisors:** One raised position with visibility of all call-taker positions; allow for an additional future position that may ultimately be required.

- Support Systems and Equipment
  
  **ATIMS:** Automatic Transit Information and Management System (Mantech) is a trip planning system currently in use by call-takers; includes web-based On-Line Transit Information System (OTIS) and interfaces to Info Express system

  **Info Express:** (Automated Phone Information System), which provides automated voice responses to telephone calls; include equipment for recording messages

  **Network PC:** corporate LAN services.

- Operations Facilities
  
  **Call-taker positions:** 1 PC screen for access to ATIMS for trip planning, schedules, and other information; keyboard; microphone; racks with hardcopy schedules and other reference material at each position

  **Supervisory positions:** equipped the same as call-taker positions, plus network PC

  **Wall displays for transit information:** none initially, potential of 2 single screens at strategic positions in the transit call center for display of real-time status information pertaining to delays, detours, incidents, congestion, and other service difficulties for reference by call-takers.

- Supervision and Support Personnel
  
  **Offices:** 2
Other Requirements

Ancillary space requirements to be implemented in the immediate area of the call center include:

- Conference/training room equipped with call-taker console equipment
- Storage for schedules and other supplies
- Recording room for creating messages for automated response equipment; also should contain Info Express system to allow staff to conveniently change automated messages without going to a common equipment room.

4.2.7 IMTMS Regional Traveler Information Call Center

General Operation

Normal conditions: Respond to telephone queries from public regarding delays, current conditions, etc.

Incidents and planned events: No change in functionality.

Staff, Responsibilities, and Interaction

Call-takers for freeway and arterial traffic: 4 positions currently, responsible for responding to public questions regarding traffic conditions; 10 identified for full deployment of regional IMTMS; allow space for 13 ultimately.

Support Systems and Equipment

RTIS: Regional Transportation Information System, a region-wide 5-1-1 traveler information system as part of IMTMS deployment

IMTMS Network: data communications with regional transit operation centers in the 18 cities in the region

Operations Facilities

Call-taker positions: 1 PC screen for access to real-time information; keyboard; voice communication equipment

Wall displays for freeway and arterial information: none initially, potentially 2 for display of real-time information regarding delays and congestions, and live video of strategic areas and trouble spots.

Supervision and Support Personnel

Offices: 2 (est.)
Other Requirements

TBD

4.2.8 Electronic Fare and Toll Collection Call Center

General Operation

Normal conditions: Respond to telephone queries from public regarding transit fare collection and problems with fare collection equipment, as well as problems and questions from the public pertaining to automatic electronic collection of highway tolls from transponders in private and commercial vehicles; similar in function to the Regional Telephone Information (RTI) Center and most efficiently would be implemented as an extension to the RTI Center.

Note that calls from passenger assistance telephones at trolley passenger stations would be taken by the Public Information Clerk in the Operations Theater; these calls may involve assistance with the use of ticket vending machines and allow the clerk to observe the patron via CCTV images of the station platforms available at that console position. There are no plans to make video available to call-takers in the call center.

Incidents and planned events: Not applicable.

Staff, Responsibilities, and Interaction

Call-takers for fare collection: 6 positions planned, responsible for responding to public questions regarding fare collection; allow space for 8 ultimately.

Support Systems and Equipment

Automatic Fare Collection equipment: TBD

Operations Facilities

Call-taker positions: 1 PC screen for access to real-time information; keyboard; voice communication equipment.

Supervision and Support Personnel

Offices: 1 (est.)

Other Requirements

TBD

4.2.9 City Traffic Engineering

General Operation

Normal conditions: currently no daily staffing for normal traffic monitoring and control, but anticipated to gradually grow and eventually require the daily staffing up to the ultimate...
anticipated to gradually grow and eventually require the daily staffing up to the ultimate number of operating positions identified below to interact with field devices to maintain traffic flow

**Planned events**: maintain traffic flow according to event plans and make adjustments to plans as necessary; interact with bus and trolley operations and Caltrans District 11 TMC as required; interact with city police and other organizations as necessary to maintain public safety and security; staffing is currently determined by the anticipated need of specific events

**Incident situations**: interact with personnel of city police, city fire and emergency services, and other organizations as required to maintain/restore traffic flow, safety, and security; staffing is applied according to the specific needs of an incident situation; interact with personnel of transit operations, Caltrans District 11 TMC, and other organizations to maintain/restore public mobility.

> **Staff, Responsibilities, and Interaction**

  **Associate Traffic Engineer**: 2 positions initially, for traffic monitoring and control, signal timing adjustments, control of signage, and other field devices, traffic data collection, CCTV monitoring, responses to minor incidents; 4 positions ultimately

  **Senior Traffic Engineer**: 1 position, oversees and assists associate traffic engineer positions

  **Communications and Electrical Maintenance**: 1 position initially, for diagnosis of field equipment problems; 2 positions ultimately.

> **Support Systems and Equipment**

  **CCTV equipment**

  **QuikNet Traffic Control System**

  **Fiber Communication Systems**: communication to intersection controls, signage, and other field equipment.

> **Operations Facilities**

  **Console equipment for all positions**: 3 screens per console (est.), including ICS and RIWS functionality

  **Wall displays for traffic information**: 2 initially; potential for occasional need of up to 6 shared displays in the future (can be shared with transit; also this need is partially met by the wall displays in the Event/Incident Management Area).

> **Supervision and Support Personnel**

  Offices: 8 (4 for traffic engineer/operations; 2 for maintenance personnel; 2 for managers.)
Other Requirements

File room

Maintenance shop is assumed to be at a site other than ROC.

4.2.10 SANDAG Offices and Facilities

General Operation

The ROC facility is to become the SANDAG home office. As such, it will house all management, administration, planning, and engineering services, including corporate IT functions, SANDAG corporate IT data center and network equipment, and ITS Technical Support.

Additional operations, such as the MTS corporate data center at the IAD may continue to exist at other locations but are also candidates for inclusion in the new ROC facility at some point. Space is included for the data center, but management offices for SDTC, SDTI, etc., are not explicitly included, although they may be considered to be part of the estimated general expansion identified for SANDAG corporate offices; otherwise, these offices are assumed to remain at their current locations at the IAD, Mills Building, etc.

Staff, Responsibilities, and Interaction

Virtually all SANDAG home office business will be conducted from the ROC facility.

Support Systems and Equipment

Space is allocated for all computer and communication systems used at the current SANDAG corporate offices, including corporate network services, data archiving, ARJIS, etc., based upon the current floorplan and without detailed investigation at this time. In most cases, existing systems may remain at current locations until they are replaced, but space will be available whether used for replacement systems or relocated existing systems.

Space is also allocated for ITS Technical Support, including all staff and real-time support systems.

Operations Facilities

Not applicable

Supervision and Support Personnel

See below, included in gross floorplan estimate

Other Requirements

SANDAG corporate offices: the gross area of the current lease is approximately 33,000 sq ft (includes offices, conference rooms, storage areas, administrative support areas, computer equipment rooms, ARJIS operations, board room, etc., based upon the floorplan of the current

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office suite - floors 5, 7, 8, and 10; approximately 1,200 sq ft of this space are used for computer equipment in the current layout.; to allow for a 50% growth and expansion of operations, the gross area for SANDAG operations will be assumed to be 50,000 sq ft, of which approximately 2,000 sq ft is estimated for computer equipment.

ITS Technical Support: this operation supports ITS equipment that was formerly included under the MTS IT Department, as well as other SANDAG ITS deployment; the MTS IT Department currently has about 1800 sq ft of floorspace for equipment in the IAD, and requested triple that amount in the ROC to allow for future expansion, not including the office space for the support staff, which is identified and allocated separately; for purposes of this initial tabulation of requirements, the entire future space projection is allocated in the ROC equipment rooms.

4.3 Shared Operations

4.3.1 Management of Planned Events and Incidents

General Operation

Normal conditions: Not applicable to normal operations

Planned events and incident situations: depending upon the type and extent of the situation, the quantity and type of personnel required to manage it will vary, but the general goals are always the same – to work toward completing the event and/or clearing the incident situation while preserving public mobility, safety, and security.

A dedicated Event/Incident Management Area, apart from the operations theater, with dedicated console positions is needed for use by personnel of various organizations to cooperatively manage and coordinate activity directed at a particular event or incident; a separate Management Command Center is also needed to allow senior management personnel to meet privately, strategize, and conduct high-level coordination.

Staff, Responsibilities, and Interaction

Coordinators: coordinators (up to 4) will be personnel from a specific organization (e.g., transit, traffic, police, fire and emergency services, public services) as appropriate to contribute to managing a specific active event or incident; coordinators are responsible for working as a team and with on-site and off-site operating personnel of various organizations as necessary; if the city and/or county EOCs are activated, coordinators will interact with and support EOC operations

Management: depending upon the situation, management of various agencies and organizations may be present to oversee the efforts of the coordinators and to conduct high-level interaction with external organizations

Support Systems and Equipment

No systems are specifically dedicated to event and incident management; systems pertaining to specific normal operations will be utilized.
specific normal operations will be utilized.

▶ **Operations Facilities**

Console equipment for Coordinator positions: consoles will be identically equipped: one screen for the ICS and two general purpose screens with access to any system used in the ROC, including agency corporate network access, depending upon login authorization

Wall displays in Event/Incident Management Area: 2 (1 high x 2 wide array) for real-time data displays, live video from CCTV and broadcast sources, and video conferencing

Management Command Center: a separate area, apart from the incident/planned event area will allow management to meet privately to set strategy, and communicate with external parties; the area will be equipped with telephones, video conferencing equipment, and a conference table with space for at least 12 managers or other personnel as needed

Wall displays in Management Command Center: 2 (1 high x 2 wide array) for real-time data displays, live video from CCTV and broadcast sources, and video conferencing.

▶ **Supervision and Support Personnel**

Offices: none

▶ **Other Requirements**

The Event/Incident Management Area must have visibility into the main operating theater.

The Management Command Center must have visibility into both the Event/Incident Management Area and the Operations Theater; could also be used as a visitor's center when not being used as a command center.

**4.3.2 Public Information**

▶ **General Operation**

Normal conditions: one person is envisioned to provide general information to the public via media personnel, such as reports of traffic delays, accidents, transit service problems, etc.

Planned events and incident situations: depending upon the type and extent of the situation, additional reports and briefings may be provided to advise the media and public of situations, problem areas, and recommendations regarding mobility during event and incident situations

A dedicated Media Briefing Room, apart from any operations areas and personnel, is needed to allow briefings to be conducted without impacting ongoing activity; facilities should be provided for video presentation in the briefing area and direct video feeds to media equipment; depending upon the situation, media briefings may be conducted by the Public Information Officer (normally located at a console in the main Operations Theater) and/or by various management personnel involved in the management of events and incidents.
Staff, Responsibilities, and Interaction

Public Information Officer: responsible for issuing information concerning ongoing operations and conditions to the public and media; this position is of primary importance during an event or serious incident but will also provide information during normal operations (e.g., traffic reports during rush-hour); one console position in Operations Theater. (note: this position is not associated with any specific operation at the ROC and is not to be confused with the SDTI Public Information Clerk, who is a part of the SDTI dispatch operation)

Management: depending upon the situation, management of various agencies and organizations may be present to conduct public and media briefings.

Support Systems and Equipment

No systems are specifically dedicated to incident and event management; systems pertaining to specific operations will be utilized.

Operations Facilities

Console equipment for Public Information Officer position: one console, located in the Operations Theater, will have a telephone (or possibly an ICS screen) and one screen with controlled read-only access to data and CCTV displays

Wall display in Media Briefing Room: 1 wall display for presentation of recorded and live video from CCTV and broadcast sources during media briefings is recommended; should also have ability to display live activity in the Operations Theater.

Supervision and Support Personnel

Offices: none

Other Requirements

The Media Briefing Room should be near the main entrance for ease of access by external personnel and must and have no impact on ongoing operations; space should allow for about 20 attendees; ability should be provided for media personnel to receive video feeds from the ROC.

4.4 Other Potential Participants

A number of other organizations have much in common with the assumed initial ROC participants discussed above. Such organizations, as well as the public, could benefit from participation in the ROC, potentially broadening the ROC’s regional focus to encompass responsibility for freeways and arterials, and to encompass public safety and security services. In addition to listing the organizations and operations assumed to be included in the initial ROC concept, Appendix B, Table B-1 identifies other potential participants. A number of these other potential participants were researched during the initial stakeholder meetings and presentations. Their participation is not precluded by this initial concept and they could easily be incorporated into the design at this point or in subsequent early phases of the project.
4.5 Composite Requirements of Initial Participants

The space requirements of the initial participants can be categorized into several area types within the ROC: Operations Theater, Call Center, Equipment Rooms, ancillary space, and office space. Space for managing events and incidents, including operations space, management space, and media briefings, are shared requirements. Other shared requirements include personnel support such as conference rooms, training rooms, locker rooms, lunchrooms, etc., and general building support, such as electrical and mechanical rooms, lobbies, hallways, elevators, building security, etc. These shared personnel support and building support requirements are addressed at a high level at this time, pending further definition of the requirements of initial participating organizations.

For most initial participants, normal operations are largely independent of other organizations, and this will not be changed by participation in ROC. Planning for an organization’s normal operations at the ROC is therefore based mainly upon current operations and future projections. A primary concept of the ROC, however, in addition to fulfilling the needs of each organization for normal independent operations, is to also establish each operation as part of a larger entity that addresses the broader public needs, which implies supporting interaction and coordination among organizations.

4.5.1 Operations Area Requirements

The most important area of the ROC is the Operations Area, from which control and dispatch functions for various operations will be performed. It is important that the design of this area accommodate both normal operations and the inter-organizational coordination and direction required for the management of planned events and incidents. The Operations Area is comprised of the Operations Theater, the Event/Incident Management Area, the Management Command Center, and the Media Briefing Room. See Appendix B, Table B-2, Operations Area Requirements, for additional details.

4.5.1.1 Operations Theater

The organizations having a presence in the Operations Theater and their facility requirements are summarized below. Initial space planning will consider the detailed requirements summarized in Table B-2.

**SDTI**

- All Rail Controller and Supervisor console positions; located near SDTC bus and city traffic operations
- Public Information Clerk console position with space for an array of up to 24 CCTV displays (3-high array); located near Rail Controller positions
- Wall displays, all of which must be visible from all Rail Controller positions; capability of displaying data and video from SDTC and traffic in addition to trolley operation
- Security Officer console positions with space for an array of up to 100 CCTV images visible from the Security Officer positions

**SDTC**

- Communications Supervisor console positions; located near trolley and city traffic operations
- Wall displays (future), visible from all SDTC positions; capability of displaying data and
video from SDTI and city traffic in addition to bus operations

Desired but not required: space for other bus service provider personnel that can be supported by the bus CAD/AVL system; possible additional wall displays; located near SDTC operations to allow console backup

City Traffic
Traffic Engineer and Communications & Maintenance console positions; near bus and trolley operations (will also frequently coordinate by voice with Caltrans District 11 TMC, off-site)

Wall displays (future) for display of live video and real-time data from traffic and transit operations; visibility of transit wall displays

Public Info
Public Information Officer console position; staffed as needed, during rush hour, planned events, and incidents.

4.5.1.2 Event/Incident Management Area

Personnel from various organizations, depending upon the situation being addressed, will staff this area. No staff may be present if there are no active events and no significant incidents.

Event/Incident Coordinator console positions

Wall displays, visible from all Event/Incident Coordinator console positions, and from inside the Management Command Center; these displays are functional replacements for those at the current city traffic operations center

Visibility into the Operations Theater is required, with reasonable visibility of the wall displays inside the Operations Theater

Face-to-face interaction with personnel working in adjacent Management Command Center; interaction with theater personnel via telephone/intercom; interaction with external organizations via telephone and video conferencing

4.5.1.3 Management Command Center

This area allows private management meetings and high-level coordination during planned events and emergencies.

Conference table

Wall displays, visible from anywhere in room

Visibility into the Operations Theater and into the Event/Incident Management Area is required, with reasonable visibility of the wall displays in those two adjacent areas

Face-to-face interaction with personnel in the Event/Incident Management Area; interaction with personnel in the Operations Theater via telephone/intercom; interaction with external organizations via telephone and video conferencing
4.5.1.4 Media Briefing Room

This area allows dissemination of information to the public in an unsecured area with no impact on operations.

- Seats, podium
- Wall display, visible from anywhere in room; capability to provide live and recorded video during briefing and to provide a live view of operations activity from a camera in the Operations Theater
- Video feeds for direct connection to equipment brought by media personnel

4.5.2 Regional 5-1-1 Call Center Requirements

The Regional 5-1-1 Call Center is envisioned to incorporate call centers for regional transit, traffic, and fare collection into a single area under common supervision. Since the different types of call center functionality have some unique requirements, there may be a difference in how some call-taker positions are equipped (e.g., all are envisioned to have electronic access to a static database and real-time status information, but transit call-takers also prefer quick access to numerous hardcopy files of schedule and route information). Incoming 5-1-1 calls will be automatically routed to the next position in the appropriate call-taker group. Supervisor positions will overlook all call-taker groups. See Appendix B, Table B-3, Call Center Requirements, for additional details.

- Call-taker positions for transit, freeway and arterial traffic, fare collection
- Raised supervisory console positions, able to perform all functions of all call-taker groups
- Wall displays (future) visible from appropriate call-taker positions (transit, freeways and arterials traffic
- Dedicated conference/training room adjacent to call center and equipped with consoles for training/testing of call-takers
- Dedicated storage for schedules (sent out by transit call-takers in response to calls) and other supplies
- Recording room with equipment to allow creation of new messages for the automated message system (Info Express); the system should also be located in a small server room in the same area to allow staff to conveniently change automated messages without having to go to and gain access to the common equipment room (other supporting equipment to which operations staff does not need access, such as automatic call routing equipment and various servers, will be located in the common equipment room)
4.5.3 Equipment Room Requirements

This area will have space to contain all the equipment, racks, and enclosures for both real-time and non-real-time support systems and equipment for all operations, with a few exceptions. Following is a general summary of the systems and equipment that may be included and not included and some general requirements for the equipment room area. See Appendix B, Table B-4, Equipment Room Requirements, for additional information.

Equipment and systems included in Equipment Room:

- Real-time trolley support systems (e.g., CTC/SCADA)
- CCTV surveillance equipment
- Public address equipment
- Variable message sign equipment
- Real-time bus transit support systems (e.g., RTMS CAD/AVL)
- Call-center support systems except Info Express (e.g., ATIMS, 5-1-1 call routing equipment)
- City traffic systems (e.g., QuikNet)
- Regional IMTMS systems (e.g., RAVL, FMS/ATMS, RAMS) (space for equipment used to support regional ITS functions performed at other sites)
- Integrated Voice Communication System (ICS) (telephone, radio, paging, patching, etc.)
- Communications systems (e.g., city fiber system, MTS fiber system, microwave equipment)
- Telephone systems
- Video conferencing equipment
- MTS IT Systems (e.g., AS/400, Fare Collection, Storage Area Network, Corporate LAN)
- SANDAG Systems (e.g., Corporate LAN, Data Archiving, ARJIS)
Equipment and systems used in ROC but not located in Equipment Room:

Info Express (automated telephone information system) is located in the 5-1-1 Call Center for convenience in changing recorded messages

General Requirements

Estimated space for all identified systems and potential systems, plus space for expansion

Empty space to be used for transition is included in the above estimate (when equipment is replaced, for the period during which new equipment is being installed and tested but before old equipment is decommissioned and removed)

The estimated space should be subdivided into two equipment rooms, separated by at least a firewall, and physically isolated as much as practical to allow separation of redundant equipment within the building (some redundant equipment may also be located off-site)

Lockable areas within equipment rooms to restrict access to only appropriate agency personnel

Backup power

Seismic mounting

Cable distribution via overhead cable trays

High ceiling to accommodate equipment racks and cable trays

Fire protection system (e.g., FM200)

Redundant access to all external communications paths, including:

- Redundant fiber and copper communication cables to the building will approach the building below ground via divergently-routed paths; the redundant cables will enter at opposite ends of the building

- Supporting communications electronics will be redundant and located in separate equipment rooms

- Cabling from the equipment rooms to operational areas will be redundant and divergently routed within the ROC

- Fiber and copper backhaul from radio and microwave communication equipment will be redundant and divergently-routed, whether the tower and
antenna are on site or remote.

4.5.4 Ancillary Area Requirements

4.5.4.1 SDTI and SDTC Revenue Processing Areas

Revenue processing areas for SDTI and SDTC are envisioned to be functionally similar, but completely separate and independent areas with independent security. See Appendix B, Table B-5, Ancillary Space Requirements, for additional information.

- **Counting Areas** *(separate, totally independent areas each having the following attributes)*
  - Counting room with secure personnel access into the area via mantrap
  - Means for secure transfer of cash containers from loading docks into the counting room without personnel entering or leaving the counting room
  - Large table area for emptying cash containers and handling cash
  - Count: space for coin and bill counting equipment and other revenue processing equipment
  - Vault
  - Secure storage
  - Counting Room Supervisor Office adjacent to the counting room and within the secure area, with a view into counting room
  - Special air filtration requirements for cash handling areas

- **Secure Loading Docks**
  - Means for secure transfer of cash containers to secure area *(including ability to secure the vehicle from the outside before the containers are transferred to the counting area)*
  - Separate secure bays for vehicles bringing in SDTC and SDTI revenue containers; possibly a third secure bay for use by both operations for armored car pickup of cash for transfer to bank

- **Non-secure areas**
  - Supervisory offices *(near the counting room operations)*
  - Storage for receipts, records *(adjacent to counting room operations)*
4.5.5 Office Space Requirements

Office space for supervisors of specific ROC operations (e.g., transit dispatch, call centers) will be located convenient to the operational area, if practical. Following is a general summary of office space needs with desired proximity to operations. See Appendix B, Table B-6, Office Space Requirements, for additional information.

- **Offices that should be near their related operations areas**
  - SDTC bus dispatch operations staff and supervision
  - SDTI trolley dispatch operations staff and supervision
  - SDTC revenue processing supervision
  - SDTI revenue processing supervision
  - City traffic engineering, maintenance, and management offices
  - Call center supervision

- **Offices that should be near the equipment rooms**
  - Technical and maintenance staff for communication systems, computer systems, and other electronic equipment in the equipment room and in operational areas

- **General offices not directly related to the supervision of operations areas**
  - SANDAG ITS Technical Support staff, administration, and management
  - SANDAG general offices, including regional planning, engineering, management, including ARJIS.
4.5.6 Common/Shared Space Requirements

Common space includes specific areas that are required by the tenant operations but that can be shared because requirements are general, such as for conference rooms. Savings are realized both due to elimination of duplication of such areas that are not needed all the time. Savings are also realized by economy of scale, such as with locker rooms. The quantity and size of these areas begin with the specific requirements of each operation and economizing where possible.

Common space also includes building support space, such as mechanical rooms, lobbies, and elevators. This space is determined from the basic overall design of the facility rather than individual operations.

Following is an initial tabulation of these requirements; see Appendix B, Table B-7, Common/Shared Space Requirements, for additional details. Table B-9, Staff Summary, is an initial tabulation of the quantity of personnel that will determine the size of some of the areas.

➢ Areas shared among operations

- Training rooms - general non-specific, non-dedicated
- Locker Rooms - theater staff, call center staff, revenue processing staff, and other personnel without offices
- Conference rooms
- General storage areas
- Public meeting/board room

➢ General Building Support

- Building maintenance office, shop, storage
- Building security station
- Air conditioning/mechanical rooms
- Elevators, elevator equipment rooms
- Lobbies, hallways
- Lavatories
- Kitchen/lunch facilities
- Electrical distribution rooms
- Generator room
- Telephone rooms, wiring closets

4.5.7 Infrastructure Requirements

Infrastructure requirements refer to general capabilities needed by ROC participants in order to operate from the ROC (e.g., data communications). Since ROC participants have many common infrastructure needs, the economy of scale from sharing infrastructure should be considerable. The quality of infrastructure (e.g., reliability, security as a result of redundancy) will also be better as a result of sharing.

The various forms of infrastructure will have space implications (e.g., communication equipment in the equipment room). Following are infrastructure needs that are shared by some participants. Appendix B, Table B-8, *Infrastructure Requirements*, provides additional details.

- **Data communications to external operations**
  - Connection to external fiber systems owned by city, Caltrans, SANDAG, etc., including IMTMS, for exchange of video and data
  - Connection to backhaul from county microwave (RCS) system
  - All connections redundant, divergently routed

- **Voice communications**
  To the extent possible, all communications in operations areas should be handled by one or more Integrated Communication Systems that provide convenient access to telephone, radio, and paging communications, patching, recording, and interoperability among participants.

  Interoperability of voice communications with city police, fire department, and other external organizations, such as using external, IP-based units that require specific action to enable and disable interoperability.

- **Backup power**
  - Power should be provided from two separate substations by separate divergent routes
  - A UPS should be provided for short-term needs of critical loads
  - A backup generator on-site at the ROC is required for longer-term backup
  - The ROC should have an external means of connecting a portable generator brought to the site
Building management and security system

- Building access, intrusion, fire/smoke alarms, etc.
- Environmental management (heat, cooling, air flow)
- Security station and mantrap in lobby to gain access to secure areas; some areas (e.g., Public Briefing Room, Board Room) can remain unsecured.

4.5.8 Systems Integration

Systems integration refers to interconnections among systems for sharing data, sharing displays, issuing directives and notifications, etc., as deemed appropriate and cost effective to implement. In general, system integration opportunities are not dependent upon collocation; systems in different physical locations can exchange information if the appropriate communications infrastructure is available. But integration is more convenient and less costly, and therefore more likely to be implemented, if the systems are in physical proximity.

Being a focal point of systems and information, and providing a cooperative environment, the ROC promotes the integration of systems within the ROC and between the ROC and other sites. For example, the ROC will be a node on the IMTMS network, and as such will be able to share video and data with traffic operation centers in the 18 cities in San Diego County served by the network.

Due primarily to standards for data communications and data formatting, the sharing of information among disparate systems has become relatively easy. The integration of systems does, however, require agreement among the responsible parties regarding the specific pieces of information that are and are not permitted to be transmitted and received, the format of the information, how the information is permitted to be used, and any other conditions put forth by either party. Depending upon the situation (e.g., perception of vulnerability and trust), security measures such as firewalls may be employed to enforce access rules and limitations on the exchange. A common approach used for sharing real-time data from mission-critical operations support systems is to provide an intermediary information repository, to which the operations support systems can supply data in near real-time for access by external systems, the corporate network, etc. This approach protects mission-critical systems and is recommended for the ROC.

Table 4-1 is a listing of ROC operations support systems and related systems and potential areas of integration with other systems. Please note the following:

- Communications systems are considered an enabler of systems integration and are therefore not listed
- Off-line interfaces are not listed (e.g., manual transfer of data via an intermediate media rather than a direct connection, such as is done for the transfer of trolley schedules from the Regional Scheduling System to the CTC/SCADA system)
- Interfaces to general support systems (e.g., wall display server, information repository) are listed only under the specific operations support systems that interface to them.
Table 4-1 Candidates for Operations Support System Integration

SDTI Trolley CTC/SCADA System
- Wall Display Server (static and real-time display information)
- Information Repository (provide real-time trolley operations data for long-term retention and external access; obtain data from other operations to be determined)

Trolley Video Surveillance System
- CTC/SCADA consoles (passenger station surveillance camera images)
- Wall Display Server (any video images)
- IMTMS Network/RIWS Terminals

SDTC RTMS CAD/AVL System
- Regional Scheduling System (obtain schedule data for bus transit routes; may be implemented via Information Repository)
- Information Repository (provide real-time bus operations data for long-term retention and external access; obtain data from other operations to be determined)
- Wall Display Server (static and real-time display information)
- Variable Message Signs (existing)

City Traffic Video Surveillance System
- Wall Display Server (any video images)
- IMTMS Network/RIWS Terminals

ICS (Integrated Voice Communication Switch)
- Variable Message Signs at Passenger Stations (control of sign content)
- Public Address Systems at Passenger Station (audio output)
- Telephone system (voice communications)
- Trolley Radio System
- Transit Police Radio System
- Patching of ROC voice communications to voice communications systems of other agencies (e.g., public safety radio systems), interconnected via internet, phone lines, or other communications paths, to be determined
- Potential interface to CAD/AVL radio system, feasibility to be determined

SANDAG Corporate Network
- Information Repository for general corporate access to operating data placed there by real-time operations support systems

Building Security and Control System
- Potential interface with CTC/SCADA system for annunciation of alarms, either during off-hours or at all times
- Information Repository (provide data for long-term retention and external access)

Call Center Systems
- Telephone system
- Automatic call distribution system
- TBD if there is any integration among call center support systems (e.g., ATIMS, RTIS, Info Express)

Systems that may not be integrated to operations support systems at the ROC (but that may interface to the Information Repository, TBD)
- Revenue processing support systems/equipment, including AFC system
- RIWS terminals
- Regional ITS Systems (FMS, ATMS, RAMS, RAVL, Lane Control System) are already integrated via the IMTMS; will not change if they are located at the ROC
- QuikNet Traffic Control System
- Video conferencing equipment for Management Command Center
- MTS IT Systems (AS/400, Storage Area Network, Corporate Network are integrated among themselves)
- SANDAG IT Systems (e.g., ADUS, ARJIS)
5 ROC CONCEPTUAL DESIGN DESCRIPTION

The purpose of this section is to present preliminary ideas, alternatives, and design criteria to generally illustrate how the eventual ROC design could be implemented. A budgetary capital cost estimate, based upon assumptions and estimated square footage, is also presented.

Requirements upon which this discussion is based, which were discussed in previous sections, are summarized for reference in Appendix B, Tabulation of Stakeholder Needs (Tables B-1 through B-9). Appendix C, Table C-1, Estimated ROC Space Requirements, summarizes space requirements of various areas.

5.1 General Considerations

The ROC is envisioned to consist of a number of distinct functional areas, as discussed in Section 4. Each area has unique design requirements that should be addressed separately before the areas are integrated in a complete facility design, especially the areas of the ROC that pertain to operations:

- The Operations Theater, from which all normal dispatch operations and related functions of participating agencies will be performed;
- Areas primarily intended for the coordination and management of abnormal operations -- the Event/Incident Management Area, the Management Command Center, and the Media Briefing Room;
- The Regional 5-1-1 Call Center, which will handle all incoming calls from the public for various purposes and during both normal and abnormal operations;
- Specialized areas, which will be designed and implemented based on specialized participant needs; initial specialized requirements are for revenue processing functions for trolley and bus operations.

Other areas in the ROC will exist primarily in support of these operations areas, including equipment rooms, offices, building support, and shared areas. ROC infrastructure, such as secure power and communications facilities, will be designed as appropriate to support for stringent requirements of operations areas.

A primary consideration in the design of the areas pertaining to operations is the criticality of the functions performed by the operation. Some functions can be considered critical, that is they must continue despite the unavailability of a portion of the supporting facilities, including space, equipment, and infrastructure. Other functions may be less critical. The assignment of specific levels of functional criticality appropriate to various ROC operations is beyond the current scope of this effort. Examples, however, could be:

- Critical: A function that, if lost, could place the public at physical risk and/or threaten facilities or property with significant damage or destruction.
Infrastructure that supports critical functions or services should have a very high availability. There should be no single point of failure that would compromise or preclude the function from being carried out. Further, fallback procedures should be in place that would allow operations to continue, perhaps at a reduced level, to protect the public and property and prevent serious impact of a failure. An example might be a redundant, high-availability CAD system used by police to dispatch officers; to lessen the effect of the few minutes of downtime that might on occasion be experienced with the CAD system, an alternative fallback means of communication would be available to allow some measure of dispatch to continue.

- **Important**: A function that, if lost, could significantly inconvenience, but not endanger, the public.

An example of the loss of an important but non-critical function might be a system failure that causes a severe disruption of regularly scheduled transit service.

- **Non-critical**: A function that, if lost, may compromise a desirable but non-essential service, but otherwise does not impact, inconvenience, or jeopardize the public or threaten property. Non-critical functions can be lost at any time with acceptable impact.

An example of the loss of a non-critical function might be the inability to arrange a convenient transfer for a transit patron, or an outage that prevents a call center from handling reports of problems with ticket vending machines.

Functions may not be readily classified into the above, or some other, categorization of criticality. Each operation must consider the functions it provides and make practical value judgments and tradeoffs in the design of supporting facilities, equipment, and infrastructure, considering such items as:

- The likelihood and the impact of a single and coincident multiple occurrences of failures, natural events, and threats;
- The availability of backup facilities;
- The acceptability of reduced functional capability and/or capacity provided by backup facilities;
- The acceptable duration of the reduced capability;
- Cost.

Each participating operation must determine the potential need for:

- Off-site backup facilities and if needed, the capability provided by the backup facility
- Backup/redundant equipment and infrastructure to support operations and if needed, where such equipment should physically be located (e.g., all at the ROC in one location;
all at the ROC but split between two separated, isolated locations; split between the ROC and an off-site location, all off-site, – any of which may be appropriate).

The ROC facility design must provide all necessary support, both infrastructure and space, to allow the above decisions to be made independently by each participant. It will be generally assumed, for purposes of this document, that:

- The ROC will be the location of primary operations of all initial participants; the existence of a backup operating site for individual participants should be considered but it is irrelevant to the design of the ROC operations areas;
- All centrally-located equipment supporting the operations theater will be redundant and all will be located on site, with primary and backup equipment in separate, isolated rooms (worst case space requirement)
- All communications in and out of the ROC will be redundant, will enter the building at opposite ends of the building, and will follow diverse routes outside of the ROC.

The following sections discuss how the various areas could be implemented.

5.2 Operations Areas

The operations areas, primarily the Operations Theater, will include a number of agencies and organizations that, under normal conditions, will operate essentially independently of one another, with at most minor interaction. The personnel and supporting consoles and display equipment of these independent operations should therefore be arranged to optimize internal operations. The physical location of operations in relationship to one another, however, should support convenient interaction and exchange of information, where needed and/or beneficial (primarily in abnormal situations).

To illustrate various design approaches, Appendix D, Typical Floorplans, includes floorplan diagrams of operations theaters of Houston TranStar, Toronto Transit Commission, Los Angeles MTA, and New Jersey Transit. Each example is unique in the types of functions performed in the theater and in the configuration of personnel and equipment required to carry out the functions. Comparative highlights of these theater configurations follow and are tabulated in Table D-1, Summary of Attributes of Example Operations Theaters:

**Houston TranStar:** (commissioned)

- Most similar to the ROC’s intended functionally in that it includes multi-modal transportation and public safety operations
- Small number of wall displays in relationship to the number of operations and personnel; four wall displays are shared by all operations, which dictates a relatively narrow room with multiple rows of consoles; presumably the organizations that are closer to the displays (e.g., bus, rail, police) are those to which the displays are more important
Efficient use of space for consoles, but the configuration is generic in its layout, rather than being customized according to functional needs, personnel responsibility, and organizational inter-relationships. Compromises in the layout require intermingling of personnel performing unrelated functions, potentially distracting considering the close proximity of the consoles.

No situation room (the building houses a county EOC that overlooks the operations theater)

Dedicated media briefing room.

For further details of the team's visit to this facility, see Appendix E, TranStar Trip Report.

**Toronto Transit Commission:** (commissioned)

- Functional areas are within same operations theater but are generally separated physically into rail operations, power dispatch, bus dispatch, and call-takers
- Within a functional area, personnel are segregated by responsibility (e.g., by rail line, with the line's controller and communication personnel located together)
- Large number of wall displays, separated into functional areas (rail operations, power dispatch) and dedicated functions (each rail line)
- Call-takers and bus dispatch operations integrated into operations theater behind other personnel; do not require visibility of wall displays
- Situation room overlooking the operations theater, with visibility of wall displays in theater; also has a single dedicated wall display unit.

**Los Angeles County MTA:** (conceptual design)

- Complete isolation of dissimilar functional areas (e.g., rail and bus operations) into independent and isolated theaters
- Segregation of rail operations controllers by rail line
- Large number of wall displays in rail operations theater, dedicated to each rail line and determining the spacing of consoles for each rail line
- Wall displays in bus dispatch control theater are shared by all bus dispatch console positions
- Independent and identical console positions in bus control theater usable for any bus dispatch assignment; significant expansion space
Situation room at the rear of the rail operations theater with visibility into the rail operations theater (a separate EOC overlooks both the rail and bus operations theaters from the second floor).

**New Jersey Transit:** (commissioned)

- Complete isolation of dissimilar functional areas (e.g., rail operations control and power dispatch) into independent theaters
- Segregation of rail operations controllers by rail line
- Large number of wall displays in rail operations theater, dedicated to each rail line and determining the spacing of consoles for each rail line
- Dedicated wall displays in power dispatch theater are shared by all console positions
- Situation room at the rear of the rail operations theater has visibility into the rail operations theater
- A visitor's center/conference room on second floor overlooks the theater

While none of these examples can alone be cited as a recommended design for use as a starting point to fulfill the requirements of the ROC, some general functional characteristics and elements can be drawn from these examples for consideration in the ROC design presented in subsequent sections.

### 5.3 Operations Theater

Operations to be conducted in the ROC Operations Theater initially include SDTI trolley dispatch and passenger station security, SDTC bus dispatch, and city traffic engineering. Initial recommendations regarding general and specific design attributes for the theater and for the ultimate size planned for the individual operations within the theater are as follows:

#### 5.3.1 General Design of Theater Area

- Inclusion of all operations in the same theater to allow interaction, as necessary, between:
  - SDTI trolley dispatch and SDTI security (frequent interaction, normal and abnormal situations)
  - SDTC bus dispatch and SDTI trolley dispatch (very infrequent interaction for transfers and bus bridges)
  - City traffic engineering and SDTI trolley dispatch (occasional interaction)
  - City traffic engineering and SDTC bus dispatch (occasional interaction)
  - All operations and incident/event coordinators (frequently interaction during abnormal situations)
All operations, including incident/event coordinators, and the public information officer (frequent interaction, especially during abnormal situations)

(note: call-takers, which are included in the operations theater in one of the example theater designs described above, are in a separate, totally isolated call center area in this design)

- Visibility into theater from Event/Incident Management area and from the Management Command Center
- Quantity of wall displays and their visibility from consoles is a major factor in console placement and room layout
- Raised floor construction
- Special lighting design for operations areas
- No outside windows
- High security

5.3.2 SDTI Dispatch and Security Operations

- 5 console positions for Rail Controllers, side by side, each console having primary visibility of specific portions of the 2 x 9 wall display array, as appropriate, for a specific line to be handled from that console
- 2 console positions, side by side, behind the Rail Controllers, for Central Control supervisor and Public Information Clerk, secondary visibility of all wall displays; approximately 24 CCTV images for the Public Information Clerk
- 3 console positions for Security Officers, and approximately 100 CCTV displays in a three-high array; each console position with primary visibility of about a third of the displays and reasonable visibility of the remainder; the area and number of positions could potentially be reduced by employing video image processing to eliminate need for constant observation
- Interaction between Rail Controllers and Security Officers by intercom or direct voice contact; reasonable visibility of operations wall displays by Security Officers is highly desirable
- A back-to-back operation between rail operations and security is desirable, which would allow Security Officers normally facing away from operations wall displays to turn around and see the rail operations wall displays, when necessary
• Estimated space requirement, approximately: 3,000 sq ft

5.3.3 SDTC Dispatch

• 4 consoles positions for Communications Supervisors, no specific adjacency requirements (can be side-by-side, or two rows of two consoles), with visibility of 2 wall displays

• Estimated space requirement (SDTC bus dispatch only), approximately: 800 sq ft

5.3.4 City Traffic Engineering

• 4 console positions for Associate Traffic Engineers, preferably side-by-side, with visibility of wall displays

• 1 Senior Traffic Engineer console behind the Associate Traffic Engineers for supervision purposes

• 2 Communications and Maintenance positions, near the traffic engineer positions to allow interaction

• 2 wall displays initially; locate traffic engineer positions near rail and bus transit to support potential sharing of displays (note that displays in Event/Incident Management Area are also available for abnormal situations)

• Estimated space requirement, approximately: 1,200 sq ft

5.3.5 Public Information

• 1 position for Public Information Officer with general visibility to all operations in theater; can be located anywhere relative to other personnel

• Estimated space requirement, approximately: 150 sq ft

5.4 Event/Incident Management Area

• 4 Event/Incident Coordinator positions, occupied by personnel from various operations during planned events and incidents, depending upon the situation

• 2 wall displays visible from coordinator positions and from the Management Command Center

• Adjacent to Operations Theater and Management Command Center
• Visibility of wall displays and personnel in the Operations Theater
• High access security
• Estimated space requirement, approximately: 800 sq ft

5.5 Management Command Center

• 12 positions at a conference table, occupied by personnel from various operations during planned events and incidents, depending upon the situation
• 2 wall displays visible from positions at the conference table
• Adjacent to Event/Incident Management Area and Operations Theater
• Visibility of wall displays and personnel in the Operations Theater
• Visibility of wall displays and personnel in the Event/Incident Management Area
• High access security
• Estimated space requirement, approximately: 800 sq ft

5.6 Media Briefing Room

• Used for briefing of media personnel, by personnel from various operations during planned events and incidents, depending upon the situation
• Near main entrance, not a high security area
• No visibility into Operations Theater, Event/Incident Management Area, nor the Management Command Center
• One wall display for display of live and recorded video; connectors for direct feed of video to media personnel
• Estimated space requirement, approximately: 400 sq ft

5.7 Call Center

Call center functions to be performed in the ROC are those planned and/or currently performed by the MTS Regional Transit Information Center, the SANDAG ATIS 5-1-1 Center, and MTS Fare Collection Information Center, merged into a single Regional 5-1-1 Call Center. The quantity of call-taker positions are current approximate, or estimated, number of positions, inflated assuming future growth, are worst case and may be reduced by the application of automation technology.
- 30 Regional Transit Information Center call-taker positions ultimately, facing supervisor positions
- 13 SANDAG ATIS Center call-taker positions ultimately, facing supervisor positions
- 8 Fare Collection Information Center call-taker positions ultimately, facing supervisor positions
- Potential for merging/overlapping call-taker positions and functionality; some distinction may remain, however, because of the need for some positions to be equipped differently (e.g., hardcopy information for rapid access to transit schedules)
- Call-taker positions are essentially office space with partial cubicle walls for sound isolation; no requirement for high ceilings, no raised floor (cable service from above)
- 2 Supervisor positions, in a raised floor area and facing call-taker positions
- 2 wall displays for freeway and arterial video; space to allow for the potential future placement of several additional wall displays in strategic positions for call-taker view of real-time information (e.g., detours, accidents) entered by supervisors
- Dedicated conference room equipped complete call-taker positions for training
- Storage for hardcopy schedules mailed to callers by call-takers
- Recording room for messages used in automated answering equipment
- Estimated space requirement, approximately: 4,500 sq ft

5.8 Ancillary Areas

- Operations to be included in dedicated ancillary areas of the ROC are:
  - SDTI revenue processing
  - SDTC revenue processing (currently outsourced but assumed to be done internally and have same requirements as SDTI operation)
- The revenue processing areas for SDTC and SDTI are to be separate operations, each including:
  - A secure area for revenue processing, with storage and a vault
  - A supervisory office in the secure revenue processing area
  - A secure loading dock
  - Facilities for the secure transfer of revenue between the loading dock and revenue processing area
- All space should be on the first floor, if at all possible, for the convenience of cash transfer between loading dock and processing area

- High access security, all areas under video surveillance

- Estimated total space requirement, including both revenue processing operations, approximately: 4,550 sq ft, total

### 5.9 Equipment Rooms

- Includes all computer and communications equipment associated with operations support, ITS Technical Support, and the SANDAG home office equipment requirements

- 2 equivalent equipment rooms, preferably not on outside walls, at opposite ends of the building to allow separation of redundant components, which may be a requirement for some mission-critical systems

- Cable entry from outside via buried conduit entering the building and remaining underground to the equipment rooms; two separate conduit entry points, separated from one another and each leading to one of the equipment rooms via diversely-routed conduit paths; underground conduit between the equipment rooms not coincident with either incoming conduit path

- Rooms able to be subdivided into lockable areas of flexible size, if required by some agencies and operations

- Cable access and distribution via overhead trays; 15 ft ceiling

- Includes space for computer, communications, and support equipment included in current MTS IAD Computer Room

- High access security

- Estimated space requirement, approximately: 8,000 sq ft, total

### 5.10 Offices

- SANDAG home offices and facilities (based upon current operations and estimated growth as indicated in Section 4), approximately: 48,000 sq ft

- Miscellaneous offices for operations personnel (SDTI 5; SDTC 7; Call Centers 5; Traffic Engineering 8), ITS Technical Support (24), and Building Support (2), approximately: 7650 sq ft
- Estimated total office space requirement, approximately: 56,000 sq ft

5.11 Shared Space

- Training Rooms
- Locker Rooms, Lavatories
- Conference Rooms
- Kitchen/lunchroom
- SANDAG Board Room
- Estimated total space, approximately: 6,500 sq ft

5.12 Building Support

- Lobbies, hallways, stairs
- Elevators, Elevator Rooms
- Telephone Rooms
- Mechanical Rooms
- Generator Room
- Electrical Distribution Rooms
- Building Maintenance, Storage
- Building Security Station, etc.
- Other support services
- Estimated total space, approximately: 9,000 sq ft

5.13 Infrastructure

- Secure Access

Several levels of security are envisioned:

- Unsecured areas: Public lobby, Board Room, and Media Briefing Room
- Access to general offices via mantrap authorized by security desk in lobby
Access to high security areas via card access, each card individually authorized for specific areas (e.g., Operations Theater, Event/Incident Management Area, Management Command Center, Equipment Rooms, Revenue Processing Areas, Loading Docks)

Security system alarms handled at security desk in lobby, including fire and smoke alarms. Video surveillance of all areas, with image processing to eliminate need for constant observation, and recording.

Security system is part of, or associated with building management system, which handles hearing, cooling, air flows, and other environmental function.

- Redundant Power

Selected site should have independent, diversely-routed feeds from two utility substations.

Site should have a UPS with battery backup for short term outages of critical equipment and backup generation for longer term outages and an on-site fuel storage.

- Redundant Communications

All communications to site, should enter underground, from opposite ends of the building, and be divergently-routed to the building.

Connections are required to city, Caltrans, MTS, and IMTMS fiber, and backhaul from RCS microwave.

5.14 Systems Integration

- Initial system integration should minimally include:

- Wall Display Server driven from:
  - SDTI Trolley CTC/SCADA System
  - SDTC RTMS CAD/AVL System
  - City Traffic CCTV Surveillance System
  - SDTI Trolley CCTV Surveillance System
  - Broadcast TV
  - Caltrans CCTV and other regional CCTV available on IMTMS

- Information Repository to/from:
  - SDTI Trolley CTC/SCADA System (data storage)
  - SDTC RTMS CAD/AVL System (data storage)
  - SANDAG Corporate Network (access to near-real-time data)
  - Regional Scheduling System (schedule data storage and transfer to SDTI CTC/SCADA System, SDTC RTMS CAD/AVL System, and Call Center Support Systems
  - Building Security and Control System (data storage, alarms to SDTI CTC/SCADA)
- Variable Message Sign System
  - SDTC RTMS CAD/AVL System
  - SDTI Trolley CTC/SCADA System
- IMTMS Network
  - RIWS Terminals (existing, interface to regional ITS systems)
  - City Traffic Video Surveillance System (make video available to region)
  - SDTI Trolley Video Surveillance System (make video available to region)
- ICS (Integrated Voice Communication Switch System – used for voice communications)
  - Public Address Systems
  - Telephone System
  - Trolley Radio System
  - SDTC Bus Radio (via CAD/AVL system), if possible
  - Patching equipment using Internet or other communications to link to public safety voice communications systems
- Call Center Support Systems
  - Telephone system
  - Automatic Call Distribution System

### 5.15 Budgetary Capital Cost Estimate

Table C-2 summarizes the preliminary square footage required for various purposes and operations and categorizes requirements into types of space — operations theater, call center, equipment room, office, and ancillary space — that will have very different costs. For example, the cost of theater space must cover a raised floor and special requirements for lighting and environmental controls; equipment room costs must cover redundant power and air handling; office space is the least costly. Using a cost per square foot appropriate to the various types of space, as indicated in the table, a preliminary cost estimate for the ROC facility was calculated.

Since the inclusion of the SANDAG home office is such a large single item, and since the floorspace required for this operation in the future is very subjective, the SANDAG home office was broken out as a separate cost estimate. Summarizing information from Table C-2:

ROC facility not including SANDAG home office:

- Floorspace: 45,000 sq ft
- Preliminary cost estimate (architectural/engrg services and construction): $9.6M
- With 10% contingency: $10.5M
ROC facility including SANDAG home office:

- Floorspace: 95,000 sq ft
- Preliminary cost estimate (architectural/engrg services and construction): $18.2M
- With 10% contingency: $19.9M

Following Table C-2, a number of other cost items are listed that are not covered by the above cost estimate. Depending upon the site selection and other factors, many of the items listed can add substantially to the estimated cost.

This estimate should be considered, at best, very preliminary and only a starting point for subsequent refinement; it should at this point be used only for broad decision-making and general planning. Detailed cost estimates of both capital and operating costs, and updates to the estimates as planning and design work proceeds, are part of follow-on steps. An equitable agreement among participants as to the apportionment of costs among them is also critical; apportionment of costs can be based upon floorspace used by a participant, on the number of personnel on site, on the extent and types of ROC infrastructure used (e.g., backup power), or other factors and combinations of factors. Agreement on the apportionment of costs is as critical to the success of the ROC as the design and overall cost of the facility.
6 PROJECT CONTINUATION

The purpose of this section is to identify and summarize immediate next steps and longer-term follow-on work in the development and implementation of the ROC.

6.1 Confirmation/Extension of Initial Participation in ROC

- Use this document to introduce and promote the ROC concept and to illustrate the potential benefits of collaboration and interaction.
- Confirm support and potential involvement to the extent described herein of the identified initial participating agencies.
- Extend participation to other appropriate agencies, operations, and functions, if interested and appropriate.
- Reach a general mutual understanding among potential participants of the respective level of interest, support, and commitment to the ROC.
- Reach a general understanding among potential participants regarding funding issues and sources, cost apportionment among participants, and the impact of cost and funding issues on intended participation.

6.2 Coordination With Other Projects and Plans

- Verify consistency with and support of established regional plans and agency plans.
- Contribute to an update of a regional operating strategy that encompasses the ROC.
- Establish and maintain coordination with related projects at the regional, state, local, and individual agency level, both ongoing and planned projects.
- Continue to coordinate with other projects and present ROC plans as the project evolves.

6.3 Verification of Requirements

- Based upon the revised/confirmed list of initial participants and other ongoing projects and plans, review/verify/revise all requirements of individual participants, common requirements, and appropriate standards.
- Update cost estimate; update funding plans; review/confirm with participants.

6.4 Detailed Concept of Operations

- Produce a detailed Concept of Operations for all participants, including the development of detailed scenarios for handling specific situations and interaction among participants.
- Produce a preliminary Management Plan.
- Develop design criteria to guide the preliminary design process.
- Update requirements and cost estimate; review/confirm with participants.

6.5 Preliminary Design

- Produce a preliminary design that meets all requirements, including participant space, building support, operations support systems, communications, and other infrastructure.
- Produce an initial implementation plan and schedule (high-level).

6.6 Site Selection Process

- Assemble specific requirements and preferences of participants, finalize site selection criteria, and agree on a site selection process.
- Conduct a formal site investigation, evaluations, and selection process; make a recommendation.

6.7 Detailed Estimate of Capital and Recurring Costs

- Estimate capital cost (e.g., building, support facilities, services) and identify issues.
- Estimate operating/recurring costs (e.g., operations and maintenance) and identify issues.

6.8 Finalization of Participants and Operations

- Finalize participation of all organizations and operation.
- Finalize ROC management structure.
- Finalize funding and cost apportionment plan.

6.9 Review/Modification of Preliminary Design, Operations, Cost Estimates

- Review/update/adjust/finalize design, operations plan, management plans, schedule, cost estimates.

6.10 Finalize and Proceed with Site Procurement, Design, Contract Documents, Construction

- Finalize plans, agreements (e.g., MOUs).
- Finalize procurement agreement for the selected site.
- Finalize facility design, produce contract documents, and proceed with awards, construction, etc.
Appendix A

REFERENCES
### References

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<th>Item</th>
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<td>April, 2000</td>
</tr>
<tr>
<td>3</td>
<td>San Diego Region System Architecture Summary</td>
<td>August 25, 2002 (draft)</td>
</tr>
<tr>
<td>4</td>
<td>City of San Diego Wireless Communications Long-Term Plan</td>
<td>December 1, 2002</td>
</tr>
<tr>
<td>5</td>
<td>Existing Network Assessment and Basis of Design for Future Network System</td>
<td>January 31, 2003</td>
</tr>
<tr>
<td>6</td>
<td>San Diego Region Intelligent Transportation Systems Architecture: Detailed Document</td>
<td>February, 2003 (draft)</td>
</tr>
<tr>
<td>7</td>
<td>San Diego County Regional Communications System – RCS Overview</td>
<td>February 18, 2003</td>
</tr>
<tr>
<td>8</td>
<td>ITCC Basis of Design Report</td>
<td>March 12, 2003</td>
</tr>
<tr>
<td>9</td>
<td>Fiber Optic Cable Furnishing, Installing, Terminating, and Testing</td>
<td>April 18, 2003 (65% submittal)</td>
</tr>
<tr>
<td>10</td>
<td>San Diego Region Strategic ITS Implementation Plan</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Regional Transportation Operations Collaboration and Coordination (US Dept of Transportation, FHWA)</td>
<td>April, 2004</td>
</tr>
<tr>
<td>12</td>
<td>Mobility 2030, The Transportation Plan for the San Diego Region</td>
<td>April, 2003</td>
</tr>
<tr>
<td>13</td>
<td>2004 Regional Transportation Improvement Program (RTIP)</td>
<td>July, 2004</td>
</tr>
<tr>
<td>14</td>
<td>Regional Comprehensive Plan for the San Diego Region</td>
<td>July, 2004</td>
</tr>
<tr>
<td>16</td>
<td>San Diego Region IMTMS Preliminary Intermodal Operation Policies (NETC)</td>
<td>July, 2003</td>
</tr>
<tr>
<td>17</td>
<td>Consolidating Regional Public Safety (SANDAG; Powerpoint presentation)</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Document</td>
<td>Date/Version</td>
</tr>
<tr>
<td>------</td>
<td>---------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>18</td>
<td>A New Vision of Mobility: Guidance to Foster Collaborative Multimodal</td>
<td>January, 2004</td>
</tr>
<tr>
<td></td>
<td>Decision Making (Transit Cooperative Research Program and National</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cooperative Highway Research Program)</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Operations in a Regional Transportation Organization Environment (ITE</td>
<td>January, 2001</td>
</tr>
<tr>
<td></td>
<td>Journal)</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Regional Transportation Operations Collaboration and Coordination (US</td>
<td>April, 2004</td>
</tr>
<tr>
<td></td>
<td>Dept of Transportation, FHA)</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Getting More by Working Together – Opportunities for Linking Planning</td>
<td>November, 2004</td>
</tr>
<tr>
<td></td>
<td>and Operations (US Dept of Transportation, FHA)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dept of Transportation, FHA)</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Florida Intelligent Transportation Systems Benefits (Florida Dept of</td>
<td>June, 2002</td>
</tr>
<tr>
<td></td>
<td>Transportation)</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Regional Collaboration to Improve Safety, Reliability, and Security (Public</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B

TABULATION OF INITIAL STAKEHOLDER NEEDS
Table B-1: OPERATIONS ASSUMED INCLUDED IN INITIAL ROC CONCEPT

<table>
<thead>
<tr>
<th>Organization</th>
<th>Operation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SDTI Rail Operations</strong></td>
<td>Dispatch Operations</td>
<td>Pattern after ITCC</td>
</tr>
<tr>
<td></td>
<td>Dispatch Supervisory Offices</td>
<td>Supervisory personnel for dispatch operations</td>
</tr>
<tr>
<td></td>
<td>Security/Surveillance Operations</td>
<td>CCTV surveillance of passenger station facilities, pattern after ITCC; no offices</td>
</tr>
<tr>
<td></td>
<td>Revenue Operations</td>
<td>Counting room, security, cash handling facilities</td>
</tr>
<tr>
<td></td>
<td>Revenue Supervisory Offices</td>
<td>Supervisory personnel for revenue operations</td>
</tr>
<tr>
<td><strong>SDTC Bus Operations</strong></td>
<td>Dispatch Operations</td>
<td>Pattern after expanded IAD Radio Room</td>
</tr>
<tr>
<td></td>
<td>Dispatch Supervisory Offices</td>
<td>Supervisory offices for dispatch operations</td>
</tr>
<tr>
<td></td>
<td>Revenue Operations</td>
<td>Counting room, security, cash handling facilities</td>
</tr>
<tr>
<td></td>
<td>Revenue Supervisory Offices</td>
<td>Supervisory personnel for revenue operations</td>
</tr>
<tr>
<td><strong>Regional 5-1-1 Call Center Operations</strong></td>
<td>Call Center Operations</td>
<td>Pattern after existing MTS RTI Call Center for transit, expanded for general 5-1-1 traveler information, including traffic and fare/toll collection services</td>
</tr>
<tr>
<td></td>
<td>Call Center Supervisory Offices</td>
<td>Supervisory personnel for call center</td>
</tr>
<tr>
<td><strong>Regional ITS Technical Support and Equipment</strong></td>
<td>Server/Communications Equipment Rooms</td>
<td>Space for all SANDAG ITS regional computer, communications, and other systems equipment, some of which is currently at the Caltrans District 11 TMC in Kearny Mesa</td>
</tr>
<tr>
<td></td>
<td>Staff and Supervisory Offices</td>
<td>Offices for hardware/software staff and supervisory personnel, including Helpdesk</td>
</tr>
<tr>
<td><strong>City of San Diego Traffic Management</strong></td>
<td>Center City Traffic Management Operations</td>
<td>Expanded from current TOS (which is primarily used for events) to allow for evolution to traffic monitoring/control on a daily, non-event basis</td>
</tr>
<tr>
<td></td>
<td>Traffic Management Supervisory Offices</td>
<td>Supervisory personnel for above</td>
</tr>
<tr>
<td><strong>Event/Incident Management</strong></td>
<td>General Purpose Operations Facilities (not for a specific organization)</td>
<td>Console positions with general access to all systems depending upon user login (e.g., access to RIWS, ICS, SCADA); might be used by representative of city police, fire/emergency services, transit, traffic, etc., depending upon specific event or incident situation</td>
</tr>
<tr>
<td></td>
<td>Management Command Center</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Media Briefing Room</td>
<td></td>
</tr>
<tr>
<td><strong>SANDAG Home Office</strong></td>
<td>Management, administration, planning, engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARJIS management and support personnel, equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SANDAG IT facilities (Regional Data Consolidation &amp; Mgmt, ARJIS, ADUS, etc.)</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** The following are **NOT** included in the assumed participants in the initial ROC implementation concept:

<table>
<thead>
<tr>
<th>City of San Diego Public Safety and Security and Public Service Operations</th>
<th>Fire/EMS Department Dispatch Operations</th>
<th>Fire/EMS Department Call Center Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Police Department Dispatch Operations</td>
<td>Police Department Call Center Operations</td>
</tr>
<tr>
<td>Public Safety and Security and Public Service Operations for other cities</td>
<td>Public Works Dispatch Operations</td>
<td>Public Works Call Center Operations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-1-1 (and mobile 9-1-1 currently at Caltrans TMC)</td>
</tr>
<tr>
<td>City of San Diego Public Safety and Security and Public Service Operations</td>
<td>9-1-1</td>
<td></td>
</tr>
<tr>
<td>(see above)</td>
<td>Station 38</td>
<td></td>
</tr>
<tr>
<td>Other Light Rail and Commuter Rail Operations</td>
<td>Other Rail Transit Dispatch Operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sprinter</td>
<td>Coaster</td>
</tr>
<tr>
<td>Other Rail Transit Dispatch Operations</td>
<td>NCTD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chula Vista</td>
<td>National City</td>
</tr>
<tr>
<td></td>
<td>CTS</td>
<td></td>
</tr>
<tr>
<td>Representation for other off-site operations</td>
<td>Public Utilities</td>
<td>SANDAE (Sempra Energy)</td>
</tr>
<tr>
<td></td>
<td>Federal agencies</td>
<td>WNS, Border Patrol, FBI</td>
</tr>
<tr>
<td></td>
<td>Military</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Freight transport</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marine ports</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Airports</td>
<td></td>
</tr>
<tr>
<td></td>
<td>etc</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Personnel (fully expanded)</td>
<td>Console Equipment</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>SDTI Trolley Dispatch</td>
<td>4 Rail Controllers</td>
<td>1 screen for voice communication to vehicle operators, maintenance staff, etc., via radio, telephone, and for public address (ICS)</td>
</tr>
<tr>
<td>SDTI Security</td>
<td>2 Security Officers</td>
<td>1 screen for voice comm and public address (ICS)</td>
</tr>
<tr>
<td>SDTC Bus Dispatch</td>
<td>4 Communication Supervisors</td>
<td>2 screens for RTMS CAD/AVL, including radio communications</td>
</tr>
<tr>
<td>City Traffic Engr &amp; Maintenance</td>
<td>4 Associate Traffic Engineers</td>
<td>1 SCADA screen for handling alarms</td>
</tr>
<tr>
<td>Public Information Officer</td>
<td>1 Public Information Officer</td>
<td>1 screen with limited display-only access telephone or possibly an ICS screen, TBD</td>
</tr>
</tbody>
</table>

**Event/Incident Management Area (adjacent to Operations Theater)**

| Event/Incident Management Area | 25 general purpose Coordinator positions that can be used for both event and incident management | 2 screens with capability of login access to all systems (SCADA, RIWS, corporate network, etc.) | 2 (1 x 2 array) for system displays, CCTV, live video, video conferencing, etc. | Coordinator positions equipped for access to all systems, including the RIWS, and general purpose voice and video conferencing (e.g., for coordination with city and county agencies) Area at rear of theater separated by a glass wall to allow visibility of wall displays in control theater | Could also be used as a Visitor’s Center |

**Media Briefing Room**

| Briefings regarding event and incident operations | As needed | None | Space for approximately 20 attendees |

**Totals**

<table>
<thead>
<tr>
<th>Personnel</th>
<th>Wall Displays</th>
<th>CCTV</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>26</td>
<td>66 + expansion</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
### Table B-3: CALL CENTER REQUIREMENTS

<table>
<thead>
<tr>
<th>Operation</th>
<th>Positions</th>
<th>Wall Displays</th>
<th>Notes re required design factors</th>
<th>Notes re desired design factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Call Center</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTI Call Center (transit)</td>
<td>30 Call-takers (22 initially)</td>
<td>2 single displays (none initially); current transit status information for call-takers</td>
<td>Call Centers are separate functional areas with common supervision; transit call-taker positions are equipped with extensive hardcopy material (schedules)</td>
<td>Facing supervisor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Individual call-taker positions are separated by cubicle walls for sound isolation</td>
<td></td>
</tr>
<tr>
<td>IMTMS RTIS 5-1-1 Call Center (freeway, arterial traffic)</td>
<td>13 Call-takers (10 initially)</td>
<td>2 single displays; primarily for CCTV of traffic</td>
<td>same as above</td>
<td>Facing supervisor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EFC Call Center (fare collection)</td>
<td>8 Call-takers (6 initially)</td>
<td></td>
<td>same as above</td>
<td>Facing supervisor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Call Center Supervision</td>
<td>2 Supervisors (1 initially)</td>
<td></td>
<td></td>
<td>Supervisor area should be raised</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personnel</td>
<td>53</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wall Displays</td>
<td>4</td>
<td></td>
<td>Note: these three distinct call center operations are assumed to be incorporated into a single Regional 5-1-1 Call Center operation under common supervision, even though the operations must retain their individuality; one supervisor currently manages the existing RTI (transit) call center and will be assumed to be initially adequate for the regional call center (2nd supervisor position is future)</td>
</tr>
</tbody>
</table>
### Table B-4: EQUIPMENT ROOM REQUIREMENTS

<table>
<thead>
<tr>
<th>Operation</th>
<th>Equipment/Systems</th>
<th>Est Space (sq ft)</th>
<th>Notes re required design factors</th>
<th>Notes re desired design factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For Specific Operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support for SDTI Trolley Dispatch</td>
<td>Central Train Control/SCADA System (CTS/SCADA)</td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SDSU Tunnel Fire Life Safety</td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Automated Fare Collection (AFC) System</td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
</tr>
<tr>
<td>Support for SDTI Surveillance/Security</td>
<td>CCTV Surveillance Equipment</td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
</tr>
<tr>
<td>Support for SDTI Revenue</td>
<td>None (all in ancillary area)</td>
<td>0</td>
<td>Equipment located in ancillary area</td>
<td></td>
</tr>
<tr>
<td>Support for SDTC Bus Dispatch</td>
<td>RTMS CAD/AVL and associated equipment</td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
</tr>
<tr>
<td>Support for SDTC Revenue</td>
<td>None (all in ancillary area)</td>
<td>0</td>
<td>Equipment located in ancillary area</td>
<td></td>
</tr>
<tr>
<td>Support for RTI Call Center</td>
<td>Automatic Transit Info System (ATIS)</td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td>Note: Automated Telephone Info System (Info Express) in call center area for convenient access to change messages</td>
</tr>
<tr>
<td><strong>ITS Technical Support</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Numerous systems that were part of MTS IT Department, including:</td>
<td>5400</td>
<td>Lockable subdivisions within equipment room to provide isolation/security of MTS equipment and other equipment from access by technicians of other agencies</td>
<td>The systems managed by MTS are charging; the floor space estimate was made in gross terms instead of by tabulating individual systems.</td>
</tr>
<tr>
<td></td>
<td>Storage Area Network (SAN)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electronic Payment Systems (Fare collection, Smart Card System)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regional Scheduling System (RSS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other systems identified in notes column on this page as: included in the MTS ITS requirements estimate*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SANDAG IT</strong></td>
<td>Systems that were part of SANDAG corporate information systems, including:</td>
<td>2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regional Data Consolidation &amp; Mgmt Data archiving, ADUS ARJS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other systems TBD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Support for City Traffic Engineering &amp; Maintenance</strong></td>
<td>QuickNet management system, Siemens CTN</td>
<td>400</td>
<td>Assuming these are for traffic only (different from the City fiber system)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>City TOC Fiber Comm System - Siemens CTN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>City TOC Fiber Comm System - ADC Magnum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support for Event/Incident Mgmt</td>
<td>(nothing specific)</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Support for IMTMS Hardware</strong></td>
<td>Regional Automatic Vehicle Location System (RAVL)</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regional Arterial Mgmt System (RAMS)</td>
<td></td>
<td>(est 500 for IMTMS based on list of hardware, double to allow for future requests)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced Traveler Information Mgmt System (ATIMS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Freeway Management System / Advanced Transportation Management System (FAMS/ATAMS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOSNet (Caltrans Field Device Backup) Future (parking, circulation mgmt, expert, etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared Among Operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated Voice Comms System (ICS)</td>
<td></td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
</tr>
<tr>
<td>Support for Wall Displays</td>
<td></td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
</tr>
<tr>
<td>Access to Regional Network (which includes or provides access to: IMTMS Network, TOSNet, MTS Fiber System, Caltrans Fiber Comm System, City Fiber Comm System, City Microwave, VHF Radio, etc.)</td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone System</td>
<td></td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
</tr>
<tr>
<td>Video Conferencing Equipment</td>
<td></td>
<td>---</td>
<td>Included in MTS ITS requirements estimate*</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>8800</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Table B-5: ANCILLARY SPACE REQUIREMENTS

<table>
<thead>
<tr>
<th>Operation</th>
<th>Space</th>
<th>Size</th>
<th>Notes re required design factors</th>
<th>Notes re desired design factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(fully expanded)</td>
<td>(sq ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>For Specific Operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDTI Dispatch</td>
<td>No requirements</td>
<td>0</td>
<td></td>
<td>No allowance for equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>maintenance/repair functions</td>
</tr>
<tr>
<td>SDTI Revenue</td>
<td>Revenue Counting Room</td>
<td>1000</td>
<td>Mantrap, secure, air filtration</td>
<td>Patterned after SDTI</td>
</tr>
<tr>
<td></td>
<td>Vault</td>
<td>incl above 200</td>
<td>View into counting room</td>
<td>requirements</td>
</tr>
<tr>
<td></td>
<td>Secure Storage</td>
<td>800</td>
<td>Secure access/parking, secure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Counting Room Supervisor (in secure area)</td>
<td>incl above</td>
<td>transfer to counting room</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loading Dock (1 bay)</td>
<td>200</td>
<td>Outside secure area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auxiliary Storage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDTC Dispatch</td>
<td>No requirements</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDTC Revenue</td>
<td>Revenue Counting Room</td>
<td>1500</td>
<td>Mantrap, secure, air filtration</td>
<td>Patterned after SDTI</td>
</tr>
<tr>
<td></td>
<td>Vault</td>
<td>incl above 200</td>
<td>View into counting room</td>
<td>requirements</td>
</tr>
<tr>
<td></td>
<td>Secure Storage</td>
<td>800</td>
<td>Secure access/parking, secure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Counting Room Supervisor (in secure area)</td>
<td>incl above</td>
<td>transfer to counting room</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loading Dock (1 bay)</td>
<td>200</td>
<td>Outside secure area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auxiliary Storage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTI Call Center</td>
<td>Training Room (dedicated)</td>
<td>250</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Server Room</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Storage</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recording Room</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ITS Department</td>
<td>Storage for Help Desk</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>City of San Diego Traffic Management</td>
<td>File Room</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Event/Incident Management</td>
<td>No requirements</td>
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**Total** 6064
<table>
<thead>
<tr>
<th>Operation</th>
<th>Staff</th>
<th>Qty</th>
<th>Floorspace (sq ft)</th>
<th>Notes re required design factors</th>
<th>Notes re desired design factors</th>
</tr>
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<tbody>
<tr>
<td>General/Corporate Office Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SANDAG Administration, planning, engineering,</td>
<td>TBD</td>
<td>TBD</td>
<td>(see gross floorspace estimate for SANDAG operations)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>administrative and support personnel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations and Dispatch Supervisor Office Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDTC Bus Dispatch</td>
<td>Operations Staff</td>
<td>5</td>
<td>750</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDTI Trolley Dispatch</td>
<td>Operations Staff</td>
<td>4</td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDTI Security</td>
<td></td>
<td>0</td>
<td>0</td>
<td>Offices for security staff, including officer briefing room and support areas, will all remain at current location</td>
<td></td>
</tr>
<tr>
<td>SDTI Revenue</td>
<td></td>
<td>1</td>
<td>150</td>
<td>Near revenue processing area (outside secure area)</td>
<td></td>
</tr>
<tr>
<td>SDTC Revenue</td>
<td></td>
<td>2</td>
<td>300</td>
<td>Near revenue processing area (outside secure area)</td>
<td></td>
</tr>
<tr>
<td>City Traffic Engrg &amp; Maintenance</td>
<td>Traffic Engr Operations Management Maintenance</td>
<td>8 (total)</td>
<td>1200</td>
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<td></td>
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<tr>
<td>Call Centers</td>
<td>Supervisors</td>
<td>3</td>
<td>450</td>
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</tr>
<tr>
<td>ITS Technical support</td>
<td>Software Developers Systems Engineers Technicians Help Desk Administration Regional Scheduling</td>
<td>6</td>
<td>3600</td>
<td>for 6 technicians for 4 help desks</td>
<td></td>
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<tr>
<td>Special Requirements</td>
<td>Event/Incident Management</td>
<td>assume none required</td>
<td>0</td>
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<td></td>
</tr>
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<td>Total</td>
<td></td>
<td></td>
<td>7050</td>
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## Table B-7: COMMON/SHARED SPACE REQUIREMENTS

<table>
<thead>
<tr>
<th>Space</th>
<th>Size (sq ft)</th>
<th>Notes re required design factors</th>
<th>Notes re desired design factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shared Among Operations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training Room</td>
<td>800</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Training Room</td>
<td>800</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Training Room</td>
<td>400</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Locker Room (M)</td>
<td>2000 (incl above)</td>
<td>To be sized per size of non-office staff</td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Locker Room (F)</td>
<td></td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Lavatories (M)</td>
<td></td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Lavatories (F)</td>
<td></td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Conference Room</td>
<td>800</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Conference Room</td>
<td>400</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Conference Room</td>
<td>400</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Conference Room</td>
<td>400</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Lunch facilities</td>
<td>500</td>
<td>To be sized per staff size</td>
<td>Rough estimate</td>
</tr>
<tr>
<td>General storage areas</td>
<td>1000</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Public Meeting/Board Room</td>
<td>2000</td>
<td>Needed for SANDAG corporate home office administration</td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Other, miscellaneous</td>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>General Building Support</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building maintenance office</td>
<td>1000</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Building maintenance shop, storage</td>
<td></td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Building security station, equipment</td>
<td></td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Mechanical rooms</td>
<td>500</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Lobbies</td>
<td>1000 (incl above)</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Hallways</td>
<td></td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Elevators</td>
<td></td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Electrical distribution rooms</td>
<td>1000 (incl above)</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Generator room</td>
<td></td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Telephone rooms</td>
<td>500 (incl above)</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Wiring closets</td>
<td></td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td>Other, miscellaneous</td>
<td>1000</td>
<td></td>
<td>Rough estimate</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15500</td>
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</table>
Table B-8: INFRASTRUCTURE REQUIREMENTS

<table>
<thead>
<tr>
<th>Operation</th>
<th>Item</th>
<th>Notes re required design factors</th>
<th>Notes re desired design factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Backup generator/UPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Redundant Power Feeds (from multiple substations)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potable water supply and storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Natural gas supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Perimeter security, parking security</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multiple roadway access</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Building management system</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fiber connectivity to Regional Network, which provides access to</td>
<td>Includes access control, intrusion detection, fire/smoke alarms, CCTV surveillance and recording, environmental controls, etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>enterprise networks of most organizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Redundant, divergently-routed communication connectivity to external</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>fiber and copper communication cables and for backhaul from</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>microwave and radio antenna towers on site and at remote locations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table B-9: STAFF SUMMARY

<table>
<thead>
<tr>
<th>Organization</th>
<th>Operation</th>
<th>Personnel On Duty (note 1)</th>
<th>Est Staff Size to Support the On-Duty Reqts (note 2)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Normal Oper's</td>
<td>Estimated breakdown of normal operations (hrs/days)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Events /</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Incidents</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ultimate) 24/7 16/7 8/7 8/5 (addtl)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ultimate)</td>
<td></td>
</tr>
<tr>
<td>San Diego Trolley Inc (SDTI)</td>
<td>Trolley Dispatch Operations</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trolley Dispatch Supervisory</td>
<td>4</td>
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</tr>
<tr>
<td></td>
<td>Offices</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Security/Surveillance Operations</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trolley Revenue Operations</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trolley Revenue Supervisory</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offices</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Diego Transit Corporation (SDTC)</td>
<td>Bus Dispatch Operations</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bus Dispatch Supervisory</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offices</td>
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</tr>
<tr>
<td></td>
<td>Bus Revenue Operations</td>
<td>8</td>
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</tr>
<tr>
<td></td>
<td>Bus Revenue Supervisory</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offices</td>
<td>8</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Allowance for other bus</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>operations (non-SDTC)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Telephone Information (RTI) Center</td>
<td>Call Center Operations Call Takers</td>
<td>20</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Call Center Supervisory</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offices</td>
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<td></td>
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</tr>
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<td>IMTMS ATIS 511 Call Center</td>
<td>Call Center Operations Call Takers</td>
<td>12</td>
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</tr>
<tr>
<td></td>
<td>Call Center Supervisory</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Offices</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EFC Call Center</td>
<td>Call Center Operations Call Takers</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Call Center Supervisory</td>
<td>1</td>
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<tr>
<td></td>
<td>Offices</td>
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</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ITS Department</td>
<td>Administrative Personnel</td>
<td>TBD</td>
<td></td>
<td>TBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City of San Diego Traffic Management</td>
<td>Center City Traffic Management Operations</td>
<td>7</td>
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</tr>
<tr>
<td></td>
<td>Traffic Management Supervisory</td>
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</tr>
<tr>
<td></td>
<td>Offices</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ROC Operations/Shared</td>
<td>Public Information Officer</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dedicated Event / Incident Mgmt Area</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dedicated Mgmt Command Center</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROC Building Support</td>
<td>Building Security</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Building Mgmt, Maintenance, Support Services</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>16</td>
<td>151</td>
</tr>
</tbody>
</table>

Notes:
1. On-duty refers to the number of personnel that could ultimately be on-duty at one time, during normal operating scenarios and additional personnel that could be present during abnormal situations (event management, incident management). This number is used for estimating items such as parking spaces, lunchroom size, etc.

2. Staff size is an estimate of the number of personnel that will be needed to fill the on-duty requirements. For a position that is staffed for all three shifts 7 days/week, about 4.2 people are required on average; a position that is staffed two shifts for 7 days/week requires about 2.8 people; one shift or 7 days/week, about 1.4 people. For supervisory personnel working from an office, no additional shift coverage is assumed and a factor of 1 is used. This number can be used for estimating quantities pertaining to total personnel, such as lockers (deleting personnel with offices).
Appendix C

SUMMARY OF ROC SPACE REQUIREMENTS
### Table C-1: Estimated ROC Space Requirements

<table>
<thead>
<tr>
<th>Initial Participants and Functions</th>
<th>Theater/Call Center Space</th>
<th>Equip Room Space</th>
<th>Office Space</th>
<th>Ancillary Space</th>
<th>Total Space</th>
<th>% of Total Includeed Space</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MBC</td>
<td>40%</td>
<td>54%</td>
<td>10%</td>
<td>22%</td>
<td>3778</td>
<td>3150</td>
<td>0</td>
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</table>

**Estimated ROC Space Requirements**

<table>
<thead>
<tr>
<th>Position</th>
<th>Wall Displays</th>
<th>Total</th>
<th>SANDAIR Home Office</th>
<th>Other</th>
<th>Office</th>
<th>SANDAIR Home Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
<th>% of Total</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Qty</td>
<td>Ultimate Qty</td>
<td>Sq ft</td>
<td>Current Qty</td>
<td>Ultimate Qty</td>
<td>Sq ft</td>
<td>Current Qty</td>
<td>Ultimate Qty</td>
<td>Sq ft</td>
<td>Current Qty</td>
<td>Ultimate Qty</td>
<td>Sq ft</td>
<td>Current Qty</td>
<td>Ultimate Qty</td>
</tr>
<tr>
<td>Tactical</td>
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<td>6</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>19</td>
<td>11</td>
<td>48</td>
<td>1442</td>
<td>0</td>
<td>2</td>
<td>6</td>
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</tr>
<tr>
<td>Ultimate Qty</td>
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<td>7</td>
<td>152</td>
<td>19</td>
<td>11</td>
<td>48</td>
<td>1442</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>150</td>
<td>0</td>
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<tr>
<td>Initial Qty</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>6</td>
<td>7</td>
<td>10</td>
<td>15</td>
<td>19</td>
<td>11</td>
<td>48</td>
<td>1442</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>150</td>
</tr>
<tr>
<td>Auxiliary</td>
<td>0</td>
<td>0</td>
<td>152</td>
<td>19</td>
<td>11</td>
<td>48</td>
<td>1442</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>150</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Current Qty</td>
<td>40%</td>
<td>54%</td>
<td>10%</td>
<td>22%</td>
<td>3778</td>
<td>3150</td>
<td>0</td>
<td>0</td>
<td>2288</td>
<td>15</td>
<td>564</td>
<td>4950</td>
<td>13590</td>
</tr>
</tbody>
</table>

**Space per type of position:**
- **150 sq ft:** Operations monthly positions, 45 sq ft / call center position; 40 sq ft / conference table position(s), also for wall displays, the backgounds for wall displays is assumed to be about 48 sq ft, for Realtime displays about 24 sq ft.
<table>
<thead>
<tr>
<th>Position</th>
<th>Theater/Call Center Space</th>
<th>Equip Room Space</th>
<th>Office Space</th>
<th>Ancillary Space</th>
<th>Total Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Ultimate</td>
<td>Sq ft/Person</td>
<td>Current</td>
<td>Ultimate</td>
<td>Sq ft/Person</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>150</td>
<td>2</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>SUBTOTAL</td>
<td>4</td>
<td>7</td>
<td>150</td>
<td>0</td>
<td>440</td>
</tr>
</tbody>
</table>

2. City of San Diego

a. Front Desk Operations: Maintenance

<table>
<thead>
<tr>
<th>Position</th>
<th>Theater/Call Center Space</th>
<th>Equip Room Space</th>
<th>Office Space</th>
<th>Ancillary Space</th>
<th>Total Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Ultimate</td>
<td>Sq ft/Person</td>
<td>Current</td>
<td>Ultimate</td>
<td>Sq ft/Person</td>
</tr>
<tr>
<td>10</td>
<td>13</td>
<td>150</td>
<td>2</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>SUBTOTAL</td>
<td>10</td>
<td>13</td>
<td>150</td>
<td>0</td>
<td>780</td>
</tr>
</tbody>
</table>

3. SANDAG

a. Regional STIS Operations: IT (Regional Data System), SANDAG (RDU, ADUS, etc.)

<table>
<thead>
<tr>
<th>Position</th>
<th>Theater/Call Center Space</th>
<th>Equip Room Space</th>
<th>Office Space</th>
<th>Ancillary Space</th>
<th>Total Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Ultimate</td>
<td>Sq ft/Person</td>
<td>Current</td>
<td>Ultimate</td>
<td>Sq ft/Person</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>150</td>
<td>2</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>SUBTOTAL</td>
<td>5</td>
<td>8</td>
<td>150</td>
<td>0</td>
<td>24</td>
</tr>
</tbody>
</table>

4. Shared Operations

a. Technical Support

<table>
<thead>
<tr>
<th>Position</th>
<th>Theater/Call Center Space</th>
<th>Equip Room Space</th>
<th>Office Space</th>
<th>Ancillary Space</th>
<th>Total Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Ultimate</td>
<td>Sq ft/Person</td>
<td>Current</td>
<td>Ultimate</td>
<td>Sq ft/Person</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>150</td>
<td>2</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>SUBTOTAL</td>
<td>4</td>
<td>4</td>
<td>150</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes:
- Space per type of position: 150 sq ft / operations (center) positions, 78 sq ft / call-takers positions, 50 sq ft / conference table positions, also for null displays, the height for each (75 sq ft). Null displays assumed to be about 4 sq ft, for personal workstations about 24 sq ft.
- N/A-1550 SQ FT Display space for support systems included above, plus Electrical Pymt Regional Staffing System, etc.
- SUBTOTAL 1600 |

- Total for SANDAG Regional Planning, ARUS, etc.
- SUBTOTAL 2400 |
- SUBTOTAL 3950 |
- SUBTOTAL 5150 |
- SUBTOTAL 78.6% |
- SUBTOTAL 648 |
- SUBTOTAL 648 |
- SUBTOTAL 150 |
- SUBTOTAL 1946 |

Initial Participants and Functions
- Wall Displays
- Current City
- Ultimate City
- Total
- SANDAG
- Office
- Purpose
- Staff
- Total
- Total
- Notes
- Initial Participants
- Functions
- Wall Displays
- Current City
- Ultimate City
- Total
- SANDAG
- Office
- Purpose
- Staff
- Total
- Notes
### Initial Participants and Functions

#### Theater/Call Center Space

<table>
<thead>
<tr>
<th>Positions</th>
<th>Wall Displays</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Outdoor Displays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current City Sq ft</td>
<td>Current City Sq ft</td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
</tr>
<tr>
<td>Staff</td>
<td></td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

#### Equip Room

<table>
<thead>
<tr>
<th>Positions</th>
<th>Wall Displays</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Outdoor Displays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current City Sq ft</td>
<td>Current City Sq ft</td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
</tr>
<tr>
<td>Staff</td>
<td></td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

#### Office Space

<table>
<thead>
<tr>
<th>Positions</th>
<th>Wall Displays</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Outdoor Displays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current City Sq ft</td>
<td>Current City Sq ft</td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
</tr>
<tr>
<td>Staff</td>
<td></td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

#### Ancillary Space

<table>
<thead>
<tr>
<th>Positions</th>
<th>Wall Displays</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Outdoor Displays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current City Sq ft</td>
<td>Current City Sq ft</td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
</tr>
<tr>
<td>Staff</td>
<td></td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

### Notes

- Initial Participants and Functions
- Wall Displays
- Total空间
- SANDBAG Office
- Other
- Purpose
- Staff
- Total
- Notes: 1. All information shown is preliminary and will be updated as detailed requirements are established.

### ULTIMATE STAFF

<table>
<thead>
<tr>
<th>Theater/Call Center Positions</th>
<th>75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event/Outlook Management Positions (staffed as needed)</td>
<td>16</td>
</tr>
<tr>
<td>Office Staff (not including SANDAG home office)</td>
<td>51</td>
</tr>
<tr>
<td>Ancillary Area Staff (revenue processing personnel)</td>
<td>15</td>
</tr>
<tr>
<td>TOTAL</td>
<td>157</td>
</tr>
</tbody>
</table>

### Building Support

<table>
<thead>
<tr>
<th>Positions</th>
<th>Wall Displays</th>
<th>Total</th>
<th>Total</th>
<th>SANDBAG Office</th>
<th>Other</th>
<th>Purpose</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current City Sq ft</td>
<td>Current City Sq ft</td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff</td>
<td></td>
<td></td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td>(incl. roof)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Common/Shared Space

<table>
<thead>
<tr>
<th>Description</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training Rooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locker Rooms, Bathrooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conference Rooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen, Lunchroom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AN/NC Board Room</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Building Support

<table>
<thead>
<tr>
<th>Description</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Maintenance Office, Storage, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TOTALS

<table>
<thead>
<tr>
<th>Total</th>
<th>Staff</th>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
</table>

### Notes

- Staffing per type of position: 150 sq ft (operations personnel only); 75 sq ft (staff positions: 60 sq ft conference rooms; 50 sq ft office); 24 sq ft (reception); 15 sq ft (safety deposit boxes).
- Note: initial estimates are very rough initial estimates for support of the initially defined operations and personnel included in the theater, call centers, and associated offices and ancillary areas; any occupied space for the SANDAG home office is covered by the gross square footage assumed for SANDAG home office facilities.

---

**Notes:**
1. All information shown is preliminary and will be updated as detailed requirements are established.
2. Staffing per type of position: 150 sq ft (operations personnel only); 75 sq ft (staff positions: 60 sq ft conference rooms; 50 sq ft office); 24 sq ft (reception); 15 sq ft (safety deposit boxes).
3. Note: initial estimates are very rough initial estimates for support of the initially defined operations and personnel included in the theater, call centers, and associated offices and ancillary areas; any occupied space for the SANDAG home office is covered by the gross square footage assumed for SANDAG home office facilities.
Table C-2: Preliminary Construction Cost Estimate

A. Facility Cost (without inclusion of SANDAG home office)

<table>
<thead>
<tr>
<th>USER OF SPACE</th>
<th>TOTAL</th>
<th>FLOORSPACE ESTIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theatre</td>
<td>Call Center</td>
</tr>
<tr>
<td></td>
<td>SANDAG home office</td>
<td>other</td>
</tr>
<tr>
<td>MTS</td>
<td>2,773</td>
<td>3,198</td>
</tr>
<tr>
<td>City of San Diego</td>
<td>1,149</td>
<td>0</td>
</tr>
<tr>
<td>SANDAG (not including home office space)</td>
<td>786</td>
<td>1,048</td>
</tr>
<tr>
<td>Shared Operations</td>
<td>786</td>
<td>1,048</td>
</tr>
<tr>
<td>Common/Shared Space</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Building Support</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Space (not including SANDAG home office space)</td>
<td>4,722</td>
<td>5,269</td>
</tr>
<tr>
<td>Est cost / sq ft</td>
<td>300</td>
<td>150</td>
</tr>
</tbody>
</table>

Approximate Cost/Area: $1,416,600 $750,300 $0 $1,147,500 $0 $2,454,800 $1,225,000 $9,774,090

Architectural and Engineering services: 10% $877,405
Contingency: 10% $877,405

TOTAL: $10,528,860

B. Facility Cost (with SANDAG home office located in ROC facility)

<table>
<thead>
<tr>
<th>USER OF SPACE</th>
<th>TOTAL</th>
<th>FLOORSPACE ESTIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theatre</td>
<td>Call Center</td>
</tr>
<tr>
<td></td>
<td>SANDAG home office</td>
<td>other</td>
</tr>
<tr>
<td>MTS</td>
<td>2,773</td>
<td>3,198</td>
</tr>
<tr>
<td>City of San Diego</td>
<td>1,149</td>
<td>0</td>
</tr>
<tr>
<td>SANDAG (not including home office space)</td>
<td>786</td>
<td>1,048</td>
</tr>
<tr>
<td>Shared Operations</td>
<td>786</td>
<td>1,048</td>
</tr>
<tr>
<td>Common/Shared Space</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Building Support</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Space (not including SANDAG home office space)</td>
<td>4,722</td>
<td>5,269</td>
</tr>
<tr>
<td>Est cost / sq ft</td>
<td>300</td>
<td>150</td>
</tr>
</tbody>
</table>

Approximate Cost/Area: $1,416,600 $750,300 $600,000 $1,147,500 $7,200,000 $1,147,900 $2,484,800 $1,225,000 $16,874,090

Architectural and Engineering services: 12% $1,867,405
Contingency: 10% $1,867,405

TOTAL: $10,528,860

The above is a very rough and preliminary estimate of the construction cost for the building shell based purely on estimated floorspace. Other costs not included above:

- Site selection and procurement
- Internal staff costs during design
- Construction management (consultants, internal staff)
- Fees, permits, approvals
- Site improvements (e.g., utility, access, drainage, demolition)
- Costs of bringing utility service to site, including power, communications, water, sewer, etc.
- Parking, landscaping
- Furnishings, furniture
- Control of theater equipment (e.g., consoles, human-machine interface, wall displays)
- Modifications or moving of existing equipment (computer systems, communication systems)
- New support systems (computer systems, communication systems)
- User-specific dedicated equipment (e.g., fare processing)
- Training equipment

*These items will vary considerably depending on the site selected.
Appendix D

TYPICAL FLOORPLANS

Contents:

Table D-1: Summary of Attributes of Example Operations Theaters

Floorplans of Example Operations Theaters

Houston TranStar
Los Angeles MTA
Toronto Transit Commission
New Jersey Transit

Floorplan of San Diego Trolley ITCC
# Table D-1: Summary of Attributes of Example Operations Theaters

<table>
<thead>
<tr>
<th>Agency</th>
<th>Layout / Configuration</th>
<th>Operations</th>
<th>Console Positions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Houston Transtar</strong></td>
<td>Rectangular theater room, 6 parallel rows of consoles, 4 wall displays</td>
<td>Bus Dispatch</td>
<td>7</td>
<td>In operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light Rail Dispatch</td>
<td>2</td>
<td>There is a separate visitor room with a view into the operations theater</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transit Police Dispatch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>City Police Dept Dispatch</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>City Fire Dept Dispatch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Motorist Assistance</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>City Traffic Mgmt</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Freeway Mgmt</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>County Sheriff</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>County Traffic</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private Media</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Public Media Room</td>
<td>Near main entrance to building</td>
<td>Meeting/presentation facilities for public briefings</td>
<td>10-15 (est)</td>
<td>Connections for video feeds from TranStar operations to media operations</td>
</tr>
<tr>
<td><strong>Toronto Transit Commission</strong></td>
<td>Semi-circular theater room, 3 main rows of console, 28 wall displays (space for SB), 3 additional rows at rear of theater for bus operators (C/S) and transit call-taker positions</td>
<td>Train Control &amp; Comms</td>
<td>7</td>
<td>In operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicle Maintenance</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power Control</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Superintendent</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Security Dispatch</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Infrastructure Maintenance</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bus Dispatch (C/S)</td>
<td>8 (+ 6 future)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transit Call-takers</td>
<td>6 (+ 2 future)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Media/Traffic Reporter</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Situation Room</td>
<td>Elevated, view of operations theater wall displays, shares one dedicated wall display with adjacent Training Room</td>
<td>Conference Table</td>
<td>10 (approx)</td>
<td>Situation Room is also used for visitors</td>
</tr>
<tr>
<td>Training Room</td>
<td>Elevated, view of operations theater wall displays, shares one dedicated wall display with adjacent Situation Room</td>
<td>Trainer/Trainee</td>
<td>2</td>
<td></td>
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<tr>
<td><strong>Los Angeles Metro</strong></td>
<td>Semi-circular theater room, 3 rows of consoles, space for 36 wall displays</td>
<td>Train Controllers</td>
<td>10 (+ 4 future)</td>
<td>Under design</td>
</tr>
<tr>
<td>Rail Operations Theater</td>
<td></td>
<td>Rail CCTV Observers</td>
<td>10 (+ 4 future)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assistant Managers</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Situation Room</td>
<td>Behind Rail Operations Theater, view of wall displays in Rail Operations Theater</td>
<td>Conference Table</td>
<td>10</td>
<td>In addition to the Situation Room, there is an EOC on the second floor of the building; the EOC has 18 or more positions, a dedicated wall display, and a view into both operations theaters</td>
</tr>
<tr>
<td>Bus Operations Theater</td>
<td>Semi-circular room, 4 rows of consoles, space for 12 wall displays</td>
<td>Bus Controllers</td>
<td>24 (+ 8 future)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assistant Manager</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>New Jersey Transit</strong></td>
<td>Rectangular theater room, 3 rows of consoles, space for 23 wall displays</td>
<td>Train Control &amp; Comms</td>
<td>11 (+ 7 future)</td>
<td>In operation</td>
</tr>
<tr>
<td>Rail Operations Theater</td>
<td></td>
<td>Support Personnel</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Train Control Supervisor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Rail Power Control Theater</td>
<td>Rectangular room, 2 rows of consoles, space for 11 wall displays</td>
<td>Power Control</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power Supervisor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Situation Room</td>
<td>Behind Rail Operations Theater, view of wall displays</td>
<td>Conference Table</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
TranStar
Control Room Layout & Console Functions

HOUSTON TRANSTAR
Appendix E

HOUSTON TRANSTAR TRIP REPORT
Trip Report

San Diego Region
Joint Transportation Operations Center
Project Management Team

February 2004
I. Executive Summary

On December 12, 2003, members of the JTOC Project Team visited Houston’s TranStar, the greater Houston region’s Transportation & Emergency Management center. The visit and associated interviews with select TranStar and Houston Metropolitan Transit Authority staffs was intended to learn specific details about TranStar operations plus to receive first-hand insight from key individuals associated with its origins, organization and its current operations. JTOC Project Team members completing the trip included James Dreisbach-Towle; Bart Blakesley and Dave Schmauk (Macro Corporation); and Manny Puentes (ITS Consensus). Our host and primary TranStar familiarization guide was Bob Walsh, Director of IT Technical Applications for Houston’s Metropolitan Transit Authority (Metro). Through the course of a full day we visited Houston Metro and the TranStar Center - - and interviewed:

- Bob Walsh, Director of IT Technical Applications, Houston Metro,
- Shedrick Baptiste, Senior Project Manager, Houston Metro,
- Loyd Smith, Director of Traffic Management, Houston Metro,
- Michael Dewey, Manager of LAN & Communications, Houston Metro,
- Bill Good, IT Project Manager, Houston Metro,
- Artee Jones, Executive Public Information Officer, Houston TranStar,
- Rusty Cornelius, Community Liaison, Harris County Office of Emergency Management.

The visit was useful in advancing our project team’s knowledge of multi-agency/multi-function centers, including lessons-learned. Interviews helped further our team’s understanding of issues and opportunities associated with a broad partnership aimed at facilitating multi-agency transportation and emergency response operations. Key project team observations include:

- A multi-agency operations center relies on a creative public-public partnership structure, responsive to local and regional institutional needs.
- A multi-function operations center requires sound communications networks and links.
- Formal operations protocols responsive to multi-level operations requirements promote day-to-day good working relationships with operations theatre personnel.
- The inter-mingling of Operations Theatre personnel in an open-floor environment promotes free and open communication, in turn promoting a unified team environment useful to cooperative management of ordinary tasks - - and especially useful to managing extraordinary issues.
- A Situation Room is important to accommodating multi-discipline teams responding to regional emergencies.
- Co-location of private-partner interests (media / traveler information) within the Operations Theatre generates multiple benefits, especially benefits in promoting broad public support through real and perceived benefits.
- Early and effective branding of a multi-agency / multi-operations Operations Center promotes essential partnership commitments and equally essential public identification and support.
II. About Houston's TranStar

*TranStar*, the name adopted by its partner agencies, refers to the multi-function facility and associated planning, design and coordination of operations directed at transportation and emergency management services for the greater Houston region. The *TranStar* "consortium partnership" was created in 1993 and is comprised of key agencies including:

- Texas Department of Transportation (TxDOT)
- Metropolitan Transit Authority of Harris County (Metro)
- City of Houston
- Harris County

*TranStar* is managed through an "inter-local agreement" that prescribes the sharing of resources and the management of the organization toward finding solutions for providing services to the citizens of the region (*Appendix A*). According to interviewed staff, the inter-local agreement is credited for much of the success of *TranStar*, as it has created and advanced the cooperative spirit and the unified commitment to ensuring the success of this regional effort.

The *TranStar* 52,000 square-foot facility built at a cost of $13.5 million was officially opened to service in April of 1996. Through its multi-agency, multi-function services, *TranStar* pursues its broad goals to:

- Maximize service through leveraging resources and through interagency coordination,
- Expand opportunities to increase public-private partnerships,
- Use innovative and practical technologies,
- Maintain an environment that supports creativity and encourages risk-taking,
- Foster partnerships, cooperation and communication among transportation, emergency management and public safety professionals,
- Promote enhanced awareness and communication with customers,
- Provide leadership and assistance to neighboring communities.
Key functions and activities managed within TranStar and its Operations Theatre nerve center include:

**Transportation Management** - Utilizing Intelligent Transportation System applications, TranStar monitors, identifies and manages transportation system operations through integration of freeway, toll facilities, arterial, and transit facilities and surveillance and control systems, including:

- Freeway Vehicle Detection Stations
- Freeway Speed Sensors (Toll Tag Readers)
- CCTV Cameras
- Dynamic Message Signs
- Motorist Assistance Program
- Ramp Metering System
- Light Rail System
- Bus Dispatch System
- Regional Computerized Traffic Signal System
- HOV Lane System
- Highway Advisory Radio System
- Advanced Traveler Information System
- Roadway Weather Information System
- Traffic Enforcement Services

**Emergency Management** - Through its Operations Theatre and associated Emergency Operations Center, TranStar mitigates, identifies and provides coordinated response to emergency situations,

**Leveraging Resources** - Through coordination and communication protocols, TranStar Operations Theatre personnel leverage engineering, law enforcement, information technology and emergency management resources toward common service objectives,

**Innovation Pursuits** - Utilizing common systems and applications protocols, TranStar address multiple functions through centralized systems and networks,

**Expanded Benefits** - Through its consortium partnership, TranStar produces multiple benefits to multiple users.

In short, the TranStar partnership, as prescribed in the Houston-Galveston Traffic Management Area (TMA) ITS Strategic Plan has successfully integrated transportation and emergency services subsystems into a unified transportation management center (TranStar). TranStar operates as a public-public and, for purposes of traveler information, as a public-private partnership, dedicated to enhancing transportation services to the greater Houston-Galveston Metropolitan Region.

The Houston-Galveston Transportation Management Area (TMA) comprises eight counties with a total area of 7,800 square miles and a population approaching 4.0 million. The principal urban sub-area, Harris County, with a population exceeding 3.0 million and an area of 1,787 square miles includes the City of Houston. The region includes 42 other incorporated cities, the Harris County Toll Authority and the service area of Houston METRO. The majority of the region’s ITS development occurs within Harris County, with TxDOT serving a significant portion of this development.

*In addition to transportation and emergency services management and operations functions, the TranStar partnership also plans and designs the region’s Intelligent Transportation System (ITS) program.*
III. The TranStar Facility

The TranStar facility operated through the earlier-described consortium partnership is a secure structure accessible to operations staff and visitors through a “dual-mode” (electronic & security staff) system. The 2-story structure houses the TranStar Operations Theatre, the Emergency Management Center, operations staff offices, and systems communications and server areas.

TranStar Control Center

The TranStar Control Center serves multi-agency, multifunction operations through an arrangement of 29 operator consoles arranged in functional clusters but in a fully open operations floor (Appendix B). The theatre accommodates TxDOT, City of Houston, Houston Metro, Houston PD, Harris County OEM, Houston’s Motorist Assistance Program (MAP) and Private Media outlets.

Private media outlets (Appendix C) operating inside the Operations Theatre receive data feeds from roadway devices including vehicle detection stations, AVI traffic speed stations, weather monitoring stations and CCTV cameras.

The MAP program, a partnership between the Harris County Sheriff’s Department, Houston Metro, TxDOT, the Houston Automobile Dealers Association and Cingular Wireless, is a traffic management service that employs 16 vehicles to provide direct assistance to motorists on Houston freeways.

TranStar also operates as a partnership through the Washington D.C. based Operation Respond Institute for the use of the Operation Respond Emergency Information System (OREIS). OREIS provides an opportunity to access information on hazardous loads utilizing Houston transportation facilities.

TranStar Emergency Operations Center

The TranStar Emergency Operations Center (EOC) is housed within the TranStar facility and is operated by the Harris County Office of Emergency Management. The TranStar EOC is activated to respond to any natural or man-made disaster or emergency within Harris County. Emergency management is the product of four distinct and interrelated actions, including:

- Mitigation
- Preparedness
- Response
- Recovery

This “systematic approach” treats each action as a phase of a comprehensive process, each building on the accomplishments of the previous one. The County Office of Emergency Services (OES) works in conjunction with federal state and local government agencies, including the County’s 29 cities and other municipalities within the surrounding 8-county region. The overall goal of the OES is to minimize the impact caused by emergencies within Harris County and the surrounding Houston metropolitan region.
IV. Project Team Findings & Observations

Houston Metro and Regional Communications Network

The Houston region's Regional Communications Network is supported through a backbone regional fiber optic "Sonet Ring" generally within TxDOT freeway rights-of-way. Fiber links to TranStar support centers and to field devices are continually under refinement and expansion, with key sub-systems including:

- Freeway and Toll-way Management Systems,
- Advanced Public Transportation Systems,
- Regional Computerized Traffic Signal System (RCTSS),
- Regional Advanced Traveler Information System,
- Regional Incident Management System,
- Center-To-Center communications links.

Voice communications are supported through two microwave towers, "Chase" and "Williams", linked to the OC-48 backbone SONET Ring via T1 lines. Radio communications are accessed through the SONET Ring. There are nine (9) terminals on the main ring and a sub-ring for the Metro Rail Operations Center (ROC). All bus garages, including the Metro Lift service (the Houston area demand service) which is contracted out, the warehouse facility and TranStar are all on the main ring.

TranStar Control Theatre

The JTOC Project Team toured the TranStar Control Theatre and was allowed full access to operators and support staff, and was able to discern valuable insights on key operations functions. The Control Theatre accommodates 29 full consoles on 4130 square feet (59 x 70 feet) of floor area. Console and operator positions (Appendix B) are distributed among core partners as follows:

- **Houston METRO** - Operates Bus (7), and Light Rail (2) Control Systems, plus Metro Police Dispatch (1) - occupying 10 Operator Positions, or 35% of the total 29 consoles.

- **City of Houston** - Houston PD (4), Houston FD (1), Motorist Assistance Program (1), and City Traffic Management (2), combined total 8 Operator Positions, or 28% of the total 29 consoles.

- **Texas Department of Transportation** - Freeway Management and related support systems occupy 5 Operator Positions, or 17% of the total 29 consoles.

- **Harris County** - Including Sheriff (1) and County Traffic Operations (2), occupy 3 Operator Positions, or 10% of the total 29 consoles.

- **Private Media Partnerships** - Include radio and TV travel-services providers (*Traffic Pulse & Metro Networks*), are assigned the remaining 3 Operator Positions, 10% of the total 29 consoles.

Each console is equipped with various surveillance and control equipment appropriate to the respective operator function and requirements. The Control Theatre is itself equipped with four large-screen video display systems positioned in the fore-wall and viewable from all consoles (see Appendix photos).
TranStar Emergency Management Center

The TranStar facility also houses the region’s Emergency Management Center (EMC). The EMC is located immediately above and behind the TranStar Control Theatre, where EMC operations personnel can view activity and Control Theatre wall display screens through glass partitions. The EMC provides operator consoles key emergency management services including:

- Emergency Road Closures
- City of Houston Office of Emergency Management
- Weather Surveillance
- Ozone Alert Services
- Harris County Office of Emergency Management
- Amber Alert Plan
- School Crossing Services
- Regional Emergency Operations

Mr. Rusty Cornelius, Community Liaison for Harris County Office of Emergency Management briefed the Team on the general operation and emergency management protocols. Emergency Management in the Harris County region is accomplished through the execution of four interrelated actions, including:

- Emergency Mitigation
- Emergency Preparedness
- Emergency Response
- Emergency Recovery

The Office of Emergency Management and the EOC work in conjunction with federal, state and local agencies, including the region’s 29 cities, Harris County, and other agencies within and surrounded by the 8 county metropolitan region.

TranStar “Inter-local Agreement” and Organization

The TranStar “inter-local agreement” is the driving force behind the partnership that has successfully deployed this multi-agency / multi-function control facility. The JTOC project team will study the agreement for identifying parallels to development of appropriate JTOC partnership agreements.

Houston TranStar is managed through a three-tiered management structure (Appendix A) with each of the partner agencies represented in each of three committees, including:

- **Executive Committee** - Plans and sets Policy and manages fiscal and personnel matters,

- **Leadership Team** - Administers Implementation of various ITS and related projects and activities and reviews funding commitments, and,

- **Agency Managers Committee** - Responsible for daily Operations, is comprised of managers representing partner agency transportation and emergency management groups.
### Executive Committee

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<thead>
<tr>
<th>Position</th>
<th>Organization</th>
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<tr>
<td>Director of Public Infrastructure</td>
<td>Harris County</td>
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<tr>
<td>District Engineer</td>
<td>TxDOT</td>
</tr>
<tr>
<td>President &amp; CEO</td>
<td>METRO District</td>
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<tr>
<td>Director of Public Works</td>
<td>City of Houston</td>
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### Leadership Team

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<tr>
<td>Manager Traffic &amp; Transportation Group</td>
<td>Harris County</td>
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<tr>
<td>Emergency Management Coordinator</td>
<td>Harris County</td>
</tr>
<tr>
<td>Executive Liaison</td>
<td>Harris County</td>
</tr>
<tr>
<td>Director of Transportation Operations</td>
<td>TxDOT</td>
</tr>
<tr>
<td>Chief of Police</td>
<td>METRO</td>
</tr>
<tr>
<td>Emergency Management Coordinator</td>
<td>City of Houston</td>
</tr>
<tr>
<td>Deputy Director of Public Works</td>
<td>City of Houston</td>
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### Agency Managers

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<td>Emergency Mgmt. Deputy Coordinator</td>
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<tr>
<td>Traffic Management &amp; Operations, PE</td>
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<tr>
<td>Manager, Transportation Mgmt. Systems</td>
<td>TxDOT</td>
</tr>
<tr>
<td>Manager, Priority Corridor Program</td>
<td>TxDOT</td>
</tr>
<tr>
<td>Captain, TranStar Division</td>
<td>METRO</td>
</tr>
<tr>
<td>Manager, Transportation Mgmt. Systems</td>
<td>METRO</td>
</tr>
<tr>
<td>Emergency Mgmt. Deputy Coordinator</td>
<td>City of Houston</td>
</tr>
<tr>
<td>Traffic, Deputy Assistant Director</td>
<td>City of Houston</td>
</tr>
<tr>
<td>Information Resources Administrator</td>
<td>TSIS</td>
</tr>
</tbody>
</table>

ITS Consensus/February 2004
Appendix B

*TranStar*
Control Room Layout & Console Functions
Appendix C

Media Partnerships

Houston TranStar has established multi-media partnerships with the major electronic and print outlets in Houston, Texas (the 11th largest media market in the country). Houston TranStar's Closed Circuit Television Images and Automated Vehicle Identification Speed Data can be seen locally on ABC, CBS, NBC, FOX, NEWS24 Houston and on the Houston Chronicles web site located at www.chron.com.

Houston TranStar also serves as the sole source of traffic and transportation information for radio stations in the Houston market. Via our partnerships with Traffic Pulse Networks and Metro Networks, we are able to provide real-time traffic reports and information to all radio stations regardless of format in the Houston area.

[Image: Logos of various media outlets and partnerships]
Appendix D

Trip Report Photos

TranStar Control Theatre

TranStar Control Theatre From Visitor Viewing Room

Metro Bus Dispatch Operator Console

Light Rail Operator Console

Emergency Management Center (EMC)

EMC View of Control Theatre