MODIFICATIONS ON LOCALIZED TRAFFIC MANAGEMENT PLANS OF EDSA-MRT PROJECT (PHASE 1) DURING CONSTRUCTION PERIOD

Orlando R. BELONTIDOS
Senior Traffic Engineer
Civil and Track Department, EDSA MRT Project
SYSTRA Philippines Branch
Suites 125-126, The Columbia Tower
Barangay Wack-Wack, Ortigas Avenue
Mandaluyong City
Tel: (63 2) 721-3746
Fax: (63 2) 724-4002
E-mail: systra03@pacific.net.ph

Nelson A. ALVAREZ
Junior Civil Engineer
Project Development
SYSTRA Philippines, Inc.
4/F, Dispophil Building,
Amber Ave., Ortigas Center
Pasig City
Tel: (63 2) 631-3075
Fax: (63 2) 633-7797
E-mail: systra03@pacific.net.ph

ABSTRACT: Major urban projects such as the EDSA Rail Project often encounter problems that cannot be foreseen by simple, straightforward volume-saturation traffic computations. Utility relocation, inter-agency coordination, other on-going construction works are just some of the unpredictable factors that continuously modify some of these carefully studied Traffic Management Plans (TMP) during the construction phase.

This paper attempts to present these problems and how these were resolved. Some of these difficulties are unique and can only be encountered in major urban projects. This presentation will provide a general overview on how to take into consideration some of these hidden parameters that are essential in coming up with a well-planned traffic management scheme.

1. INTRODUCTION

Most Traffic Management Plans (TMPs) for infrastructure projects in urban areas require modifications due to new conditions unearthed during its construction phase. Of course, traffic planners/engineers cannot take into account nor can foresee all these factors that influence the traffic conditions on the affected area. However, guidelines can be set to oversee these parameters and thus minimize the delays during construction.

Construction activities in urban areas are far more complicated than those implemented in rural areas. In urbanized localities, constructors often deal with utility problems, right-of-way issues, space limitations and other issues that cannot be found on rural settings. Most of the time these problems require coordination with different public and private agencies, thus causing further delays. These issues not only affect the overall schedule of the projects, but also require modifications on the original traffic management plans.

Traffic management plans are often compromised to accommodate changes in the layout of the structure or other major alignment changes. Compromising the plan are often preferred by the proponent/contractor because it transfers the burden to the commuters rather than the additional cost being at their expense.

2. DESCRIPTION OF THE ORIGINAL TRAFFIC MANAGEMENT STUDY (Study conducted by UPERDFI)

2.1 Studies Conducted

A baseline data was established to assess the overall road and traffic characteristics before construction. Several surveys have been conducted by the *UPERDFI (as commissioned by the EDSA LRT*) to establish such data. These include volume counts at various sections of EDSA and at different intersections on possible alternate roads, travel time and delay surveys. Included in the study conducted by the UPERDFI is a road inventory. This inventory was conducted to obtain a database of characteristics of links or highways forming the road network study.

The study also included collection of secondary data from different government agencies, such as road network data from DPWH, public transport data from DOTC, LTFRB, existing traffic management measures from MMDA and schedule of works on public utilities from PLDT, MERALCO and MWSS.

2.2 Traffic Management Measures

The traffic management measures adopted in the UPERDFI's study are based primarily on the before-construction level of congestion on EDSA and on its major alternate roads. The plan is also based on the reduction of the number of lanes by one lane per direction during construction. It is estimated that during construction stage the level of congestion increases by 20%. In order to maintain the level of service the traffic volume is recommended to be reduced by 10-20% and to improve the level of service the reduction must be increased to 30-40%.

Based on the above-mentioned circumstances, the primary suggestion is to implement a citywide traffic restriction measure such as the odd-even scheme to reduce the traffic volume along the corridor. Aside from that major traffic reduction scheme, several supporting traffic measures are also recommended. Provision of lane separators at critical sections, bus stop restriction/relocation, provision of advisory signs are just some of the suggestions on secondary traffic measures that must go hand in hand with the volume reduction measure. Assessment of the different vehicular modes, the effect of the measures on the modes as well as ban policies has been conducted. The participation of different government agencies, the information dissemination program and the responsibilities of traffic enforcers have also been looked into.

3. ISSUES THAT CONTRIBUTED TO CHANGES IN THE TMP DURING CONSTRUCTION

3.1 Utility Relocation Problems

Telephone companies' underground cables, drainage pipes, water supply pipes, Meralco electrical cables and other utilities pose as potential obstructions for road projects' construction activities. Most of the detailed drawings provided by the utility companies are unreliable. These drawings are outdated, with their more recent works not yet incorporated on the said drawings. Underground utilities affect the foundations of viaducts and retaining walls. While overhead utilities

such as electrical cables interfere with elevated guideways and station buildings. Traffic management depends heavily on the solution approach to these utility relocation problems.

EDSA Rail's Experience:

Several utilities interfered with the construction activities of the EDSA Rail Project. Some of which were relocated and some were retained. Relocation of underground utilities would sometimes require closure of several if not of all the lanes. The relocation of overhead utilities will require equipment that might block the roadway.

Solution(s) Adopted:

- For overhead facilities, to avoid traffic disruption during peak hours, its relocation works were scheduled in the evening wherein the traffic volume is at the minimum. For underground utilities, excavated portions were covered with steel decking during the day.
- We had circumstances where the relocation was removed as an option. Relocating the interfering underground utility would require removing it from its location that crosses EDSA roadway and replace it with a new one that will also cross EDSA's lanes. The solution adopted here is to embed the utility on the structure for construction. Precaution however must be exercised in doing such. The modification on the structure due to the embedment of the utility must not gravely affect its structural integrity. It is suggested that the modification be consulted with the designer. In this solution, the further reduction in the number of lanes allotted to utility relocation has been avoided.

3.2 Civil Works Procedures/Schedule

Knowledge of civil works procedures is essential in the preparation of a traffic management plan. The scheduling of works must be carefully scrutinized in order for it to fit the traffic pattern of peak hours and off-peak hours. In rural projects this might not be a factor since there is a not-so significant difference between the off-peak and peak hours.

EDSA Rail Experience:

The sequence of the construction works must be carefully scheduled to minimize time wastage. The voluminous work required for the project and its tight schedule often result to non-conformance with the planned schedule of the said works. Some pouring works have been conducted during daytime peak hours. Some have resulted in the delayed delivery of the concrete. This eventually resulted into premature setting of the concrete. Therefore, dilution to achieve the required slump standard has been done. This produced below standard concrete that is eventually rejected.

Solution(s) Adopted:

Civil works that require huge heavy equipment are often scheduled after 9:00 p.m. to take advantage of the light traffic volume. This includes delivery of materials, pouring of concrete, launching of girders and other works that will result into obstruction of the section.

3.3 Selection of Construction Equipment

The equipment selected for usage in the construction affects the traffic management plan. The length, height, width and weight of the equipment are just some of the factors that must be looked into to determine its suitability to the required work. The above mentioned parameters limit the TMP for the section where these equipment will be utilized.

EDSA Rail's Experience:

There are several circumstances in the project wherein the limit of the number of lanes for closure has been exceeded due to humongous heavy equipment being used by the contractor.

Solution(s) Adopted:

Selection of the appropriate equipment depends primarily on its availability and/or the willingness of the contractor to rent the equipment. The selection of the suitable equipment is complicated by the willingness of the constructor to spend more money to create less traffic. That normally does not happen. The contractors tend to utilize the cheapest equipment they can avail of even if it means that this particular equipment will create traffic congestion on the affected area. The inclination of the contractor is toward spending less rather than spending more to provide convenience for the commuters. To quantify the effect of utilizing the suitable equipment on the traffic/commuters is rather intricate but necessary in order to present the alternative as a viable one.

3.4 Structural Issues

Although structural issues that complicate a traffic management plan are minimal, its contribution must also be considered. These problems are magnified if other structures are involved, such as bridges or flyovers. These usually involve checking of the existing structures of its structural integrity to accommodate the construction equipment load in addition to its regular traffic loading.

EDSA Rail's Experience:

The experience on the launching of the 135-m. span Guadalupe Langer Arch Bridge is a noteworthy example of this case. The launching of the Arch Bridge required that its 770-ton components be placed over the existing bridge before it is assembled and launched on its piers. In addition to that, it was also required that the launching equipment should not be placed on the newly retrofitted Guadalupe

bridge. This condition required that the structural capacity of the existing bridge be checked for the additional load.

Similar type of problem has been encountered for the launching of girders adjacent to flyovers wherein the flyovers needed checking for the additional load due to the equipment and new girder loads.

Solution(s) Adopted:

This condition required that the lanes occupied by the Arch Bridge's components be checked along with the load contribution of the vehicles crossing the bridge with the equipment positioned at the abutments of the existing bridge. This condition has been established by coordination with the structural engineer and the concerned government agency. This shows that sometimes the limitation on the road traffic capacity depends also on other factors such as its structural capacity.

3.5 Right-of-Way Problems

Right-of-way acquisition in urban areas is much more complicated than acquisition in rural areas, where land is cheap and free of structures. In our case, right-of-way issues have to be considered especially in the construction of station's entrance structures located at the sidewalk portion of EDSA. Due to the limited space at the sidewalks, there is a need to utilize the outer lane of EDSA to provide accessibility of affected pedestrians, as well as, the space for the workers and equipment during construction of the entrances.

EDSA Rail's Experience:

The construction of station building at the EDSA median during the day will occupy a permanent closure on each side of EDSA by one (1) lane plus another lane (temporary closure) for the mobility of the workers and space for equipment. Thus, the remaining road space for the thoroughfare's traffic during construction will only be four (4) lanes.

Since the construction of station entrances need also to commence in order to continue with the installation of the concourse structures, another outer lane will have to be closed. This will further reduce the number of lanes available for traffic to just three (3). This has resulted into complaints from MMDA to DOTC and MRTC to minimize lane closures during the day.

Solution(s) Adopted:

Close coordination with MMDA was conducted. Bus stops were relocated. The contractors were required to maintain good housekeeping in the area to minimize unnecessary obstructions. In support to this measures, the DOTC and MMDA had initiated the creation of DOTC's EDSA-Watch Traffic Monitoring team, exclusively assigned at EDSA to oversee the contractor's performance in compliance to TMP and assist the MMDA in manning traffic, particularly at congested areas.

3.6 Coordination Problems

The issue of coordination with different agencies, for both public and private, is the single gargantuan task that contributes mainly to project delays. Since traffic management is not within the domain of the contractor, coordination with the implementing agency is imperative. The success of the traffic management plan is highly dependent on the capability of the concerned agency to execute the required traffic management measures.

EDSA Rail's Experience:

The project encountered multitude of problems during the coordination process. This procedure requires that all parties involved in the decision-making agree on the traffic measure to be adopted. The process involved several aspects of construction works, be it in utility relocation, right-of-way issue, permit acquisition and others.

The launching of pre-cast girders for the MRT guideway in between flyovers created coordination tasks with several government agencies. The contractor scheduled the activity at night wherein they are allowed to maximize lane closures to ensure safety during the maneuvering of equipment. This required coordination with DPWH to check whether the existing flyover can resist the applied equipment and girder loadings, which unfortunately was not prepared by the contractor. Due to this incident, DOTC took action and instructed MRTC and its contractor to provide first the procedure and conduct the necessary coordination with the concerned parties on how the existing flyovers will be protected from possible damage.

Solution(s) Adopted:

In order to avoid delays due to the above-mentioned problem, immediate coordination with the different agencies involved was conducted. Although this is just an offshoot of other issues stated in this section, its effect on the project schedule is substantial. In coordinating the problems, several options are normally devised ahead before presentation to the meeting for discussion. That way time is saved and decision is achieved right away.

3.7 Other On-Going Construction Projects

In urban areas, other on-going infrastructure projects interfere or affect other projects. Projects in arterial roads affect the traffic supply to the major thoroughfares due to the changes brought about by their own traffic management plans. Knowledge of their project's schedule is essential also in scheduling our own construction works. Schedule must be organized to minimize delays on both parties.

EDSA Rail's Experience:

LRT3 experienced several instances wherein the schedule of another project's work interfered or coincided with the LRT3's civil works. Although the equipment

and materials are already on the site, one of the parties cannot continue with their work for the reason that the other parties' equipment are blocking their workplace.

One example of this case is the simultaneous implementation of MRT-3 Project, Buendia-Kalayaan Flyover Project, EDSA-Pasay Road Ayala Interchange Project of the DPWH between Kalayaan and Magallanes. Traffic flow configuration on this area was reduced up to 2-lanes on each direction.

Solution(s) Adopted:

Aside from coordination with different government agencies, counterflow traffic scheme on the area was implemented along with identification of alternate route such as the temporary opening of access road at Makati villages.

Collection of information regarding these parallel projects before implementation of own construction works is needed to avoid any disruption in the works. Again, coordination with representatives from these currently on-going projects is necessary in the successful completion of the works.

4 CHECKLIST – Supplementary Guidelines

[1] This lists all significant traffic effects that have occurred in this project. The complexities of other projects have not been considered. As such, the effect on traffic as well as the measures recommended may depend on the case in question.
[2] This checklist complements the requirements stated in "Guidelines on Road Works Traffic Management for Metropolitan Manila".
[3] This checklist applies primarily on urban infrastructure projects.

Actions Affecting Traffic Management Plan	**Effect on Traffic**	**Recommended Measures**	**Significance Level of Effect (Small, Moderate, Major)**
A. Utility Relocation Problems			

	1. Interference of underground cables, ducts pipes, etc.	▪ Interferes with structures' foundation. ▪ Closure of additional lanes might be needed to relocate utilities.	▪ Careful planning and design ▪ Coordination with utility companies ▪ Consult Structural Designer ▪ Redesign of the structure	
	2. Interference of overhead utilities	▪ Interferes with elevated guideway, station buildings. ▪ Constricts overhead clearances for the facilities of the elevated structure. ▪ Removal or relocation of these facilities might require additional lane closure.	▪ Careful planning and design ▪ Ocular inspection of the site ▪ Coordination with utility companies	
B. Civil Works Procedure and Schedule Problems				
	1. Road space requirement of construction heavy equipment.	▪ Erection equipment require major lane closures ▪ This would greatly affect the traffic during daytime	▪ Launching of girders and other related works requiring heavy equipment must be scheduled during off-peak periods at night. ▪ Coordination with other concerned agencies and subcontractors regarding the scheduling of activities at night.	

	2. Delays in the delivery of expirable materials such as concrete.	▪ Delivery of these supplies during daytime contributes to traffic. ▪ Traffic might delay the delivery of these materials resulting into ‘expired’ product.	▪ Careful planning ▪ Schedule the delivery during off-peak hours during the day. ▪ Schedule the delivery at nighttime.	
C. Construction Equipment Selection ▪ Utilization and positioning of construction equipment		▪ Improper selection of equipment would eat up road space.	▪ Selection of smaller, more compact equipment to limit the number of lanes for closure. ▪ Check and review the equipment utilization and erection diagram for every type of activity ▪ Know ahead of time availability of the required equipment	
D. Structural Design Issues ▪ Structural integrity of existing structures that will be affected during construction works.		▪ Structures such as flyovers, bridges may be used by heavy equipment ▪ The lane closures will not only depend on the space occupied by the equipment but also on the structural integrity of the flyover, etc. ▪ Traffic safety issue	▪ Structural capacity of the concerned structures must be checked. ▪ Coordinate with structural engineers and concerned agencies of the required permits ▪ Monitoring of existing structure during the application of the load	

E. Right-of-Way Issues	▪ Closure of additional lane near the sidewalk, building accesses.	▪ Schedule works in such a way that it would not be conducted simultaneously with other construction works on the same area.	
F. Coordination Problems ▪ Requirements of other concerned agencies for the affected structures/facilities/utilities	▪ Confirmation of the availability of lane(s) required to be closed ▪ This results into delays in the approval of changes in the TMP	▪ Careful planning and design must include prior coordination with other agencies concerning structures/facilities and utilities ▪ Early preparation and presentation of procedural materials to the concerned parties	
G. Other on-going projects ▪ Schedule of lane closures	▪ Conflict with TMPs of other projects. ▪ Unorganized lane closures ▪ Impact on traffic not properly predicted	▪ Proper and close coordination with other related agencies of the traffic lane-occupancy requirement and scheduling of lane closures ▪ Coordinate with the authorized agency in-charged with control of traffic. This agency must be responsible for the integration of Traffic Management Plans of all projects. ▪ Monitor the effect or contribution of changes in traffic plans of other projects.	

References:

1. EDSA LRT Management Study - Final Report, 1996 , UPERDFI

2. EDSA LRT Project Traffic Management Plan, 1996, Sumitomo Corp.

3. EDSA LRT Project Construction Execution Plan, 1996, Sumitomo Corp.

4. EDSA LRT Project Ground Anchor Works at Cubao and Shaw Viaduct, Feb. 1999, VSL Phils., Inc.

5. EDSA LRT Project Erection Procedure for Guadalupe Bridge (Superstructure), Sept. 1997, Sumitomo Corp.

6. EDSA LRT Project Revised I-Girder Erection Study at Kamuning Flyover, Feb. 1997, Sumitomo Corp.

7. EDSA LRT Project Road Traffic Management Plan for Trackworks, Dec. 1997, Sumitomo Corp.

MODIFICATIONS

ON

LOCALIZED TRAFFIC MANAGEMENT PLANS

OF

EDSA-MRT PROJECT (PHASE 1)

DURING CONSTRUCTION PERIOD

By:

ORLANDO R. BELOTINDOS

NELSON A. ALVAREZ

SYSTRA PHILS. INC.

1) SAMPLE FORM – NOTICE OF LANE CLOSURE
2) LAUNCHING OF PRE-CAST GIRDERS IN-BETWEEN FLYOVERS
3) LAUNCHING OF GIRDERS AT UNDERPASS SECTION
4) LAUNCHING OF OF PRE-CAST GIRDERS IN-BETWEEN
5) LAUNCHING OF GIRDERS AT UNDERPASS SECTION
6) LAUNCHING OF PRE-CAST GIRDERS AT ELEVATED
7) DETAIL OF ERECTION YARD