

69

6311

Clarke Gazzard Yeomans Architects/Planners 117 Harrington Street, Sydney, N.S.W. 27 3633

October 10, 1963.

The Secretary
Department of Main Roads
Box 3903, G.P.O.
SYDNEY. N.S.W.

Dear Sir:

City of Orange and Shire of Canobolas Town Planning Schemes:
Planning of Highway, Main Road and Arterial Street Systems:
Your Reference E 3455314.

Herewith we transmit to you our Report and Recommendations on this complex and difficult subject. The essence of the Report is summarised under the headings STATEMENT OF THE PROBLEM and RECOMMENDATIONS.

Following your instructions, we defined the problem as one in the field of comprehensive city and regional planning, embracing many overlapping physical, social and economic issues. Some of these issues lend themselves to quantitative appraisal, but the majority do not. Decisions, therefore, depend upon judgement. In the lengthy body of the Report, we have analysed all the relevant facts and possibilities which should influence this judgement, so that they can be independently weighed by all authorities concerned in the matter.

We have, however, made our own judgement of these factors and have presented the system we recommend. Much work remains to be done in negotiating and designing the final details of this system. We trust, however, that this work will be guided by the principles laid down in our Report.

Part A deals with the Traffic Survey carried out by The Urban Planning & Research Centre (URBSEARCH). We trust that this Survey will have some relevance and value to your Department in your planning for rural systems generally, as well as in Orange itself.

Clarke Gazzard Yeomans

Part B deals with the overall problem of planning the highway system and the future development of the City and Shire. This has been carried out, under my supervision, by the staff of Clarke Gazzard Yeomans, Planners and Architects.

Personnel engaged on this Report have been Mr. G.W. Smith, B. Surveying (Qld), A.M.I.S. (Aust), M.A.P.I., Authorised Surveyor (Qld and N.S.W.), Certificated Town Planner (N.S.W.); Mr. B.L. Paine, A.R.A.I.A. Dip. T.C.P. (Syd.) and Mr. A.D. Winter, B.A. (Hons) (Syd) Geographer. The maps and diagrams have been drawn by Mr. Morris Rosenberg.

We could not have carried out our work without the excellent co-operation and generous assistance of your Commissioner, Assistant Chief Engineer, Traffic Service Engineer and Divisional Engineer. Similarly, we are grateful to all officers of other authorities listed in Appendix F to the Report.

Yours faithfully,
CLARKE GAZZARD YEOMANS



George Clarke
B. Arch. (Syd), Dip T.P. (London),
M.C.P. (M.I.T.), A.M.T.P.I.,
M.A.P.I., A.R.I.B.A., A.R.A.I.A.
Architect and City Planner.

WGC.js

CONTENTS

STATEMENT OF THE PROBLEM

(i)

RECOMMENDATIONS

(v)

PART A - ORIGIN & DESTINATION SURVEY - ORANGE, N. S. W., 1963

Section	1	Survey Purposes	1
Section	2	Survey Design & Procedure	2
	(a)	Design	
	(b)	Procedure	
Section	3	Survey Data Analysis	8
	(a)	Interview Data Analysis	
	(b)	Traffic Count Data Analysis	
Section	4	Proposed Systems - Problems of Current Traffic Assignment	35
	(a)	On Bypasses	
	(b)	On Entry Roads	
Section	5	Two Possible Traffic Assignments	47
	(a)	A South and West Bypass System	
	(b)	A North and East Bypass System	
Section	6	Comments on Survey Design & Procedure	55

PART B - THE PLANNING OF A ROAD SYSTEM AT ORANGE

Section	1	The Regional Context	60
	(a)	Local Rural-service Centre Traffic	
	(b)	East-west Long Distance Traffic	
	(c)	North-south Long Distance Traffic	
	(d)	Other Traffic	
Section	2	The City of Orange - Present and Future	70
Section	3	Possible Alternative Highway and Arterial Road Systems	74
	(a)	Routes to the North and East of Orange	
	(b)	Routes to the South and West of Orange	
Section	4	Criteria for Choice between Alternatives	80
Section	5	The Alternate Routes measured against the Criteria	83

APPENDICES

- A Typical Field Survey Sheet
- B Instructions for Interviewers
- C Traffic volumes which would have occurred along a south and west bypass had it been in operation on Tuesday June 5, 1963.
- D Traffic volumes which would have occurred along a north and east bypass had it been in operation on Tuesday June 5, 1963.
- E Correspondence
- F Authorities consulted in the preparation of this Report.

STATEMENT OF THE PROBLEM

The N.S.W. State Highway No. 7, between Sydney and Dubbo, runs along Summer Street, the central shopping and business street of Orange. On the East, or Sydney side of the City, the Highway co-incides with the original Bathurst Road, which has become lined with cottages and small shops, now gradually being replaced by a ribbon of service stations, motels and other commercial uses. The Bathurst Road and Summer Street sections of the Highway are joined at a level crossing on the Main Western Railway near the Orange Railway Station. On the West, or Dubbo side of the City, the Highway passes the new Orange High School before linking with a Trunk Road and two other Main Roads, at a series of awkward and confusing intersections.

Since 1945, discussions and negotiations concerning this route have proceeded between the Orange City Council, the Department of Main Roads and, at a later stage, the Department of Local Government, Town Planning Branch. A broad area of agreement has developed, which may be briefly put as follows.

The present Highway location, along local streets and across a railway level crossing, creates conflicts of street use between through and local road and rail traffic, between heavy vehicles, light vehicles, cyclists and pedestrians, particularly shoppers and school children, and between moving and parked cars and delivery vehicles in the shopping centre. These multiple uses of the same channel have been claimed to be both economically and psychologically essential during the establishment and basic growth of a rural service centre such as Orange.

There is, however, a consensus of agreement that if Orange continues to grow, then the social costs of conflict between multiple uses will ultimately become sufficient to warrant public investment in a completely new bypass. There is therefore a consensus of opinion that a bypass route should be planned and agreed immediately, and that land should be reserved for it in the City of Orange and Shire of Canobolas Planning Schemes.

Statement

The timing of its construction remains a matter for separate decision, as evidence accumulates regarding the social costs of impediments to through traffic, and of inconvenience, loss of amenity, and physical danger to local residents and road-users, and, further, as funds become available for this type of improvement.

In January 1956, the Department of Main Roads, in response to local demand, issued a plan for the relocation of State Highway 7 to form a partial bypass south of the City, linking to Woodward Street on the then Western edge of the built-up area. The existing intersections of the Highway, Trunk Road 61 and Main Road 573, at the Northern end of Woodward Street, were to be retained and enlarged. Since then, the new major Orange High School has been built on the Western side of Woodward Street and residential areas of Orange now straddle the bypass route.

In December, 1956, the Orange City Council suggested to the D.M.R. that the bypass should swing further West to Ploughman's Creek and bypass Woodward Street and further, that a distributor road should be planned along the East and North sides of the City, thus forming a city ring road system, linked to a system of local arterial streets. These suggestions were rejected by the D.M.R. at that time, because they seemed to demand investment beyond the proper responsibility of the Department. The Woodward Street bypass route was then incorporated by the City Council into its Draft Planning Scheme, which was sent to the Minister for Local Government for approval.

Early in 1963, with urban development firmly established on the Western side of Woodward Street, the Town and Country Planning Branch of the Department of Local Government requested the Department of Main Roads to review the bypass location. The Commissioner for Main Roads thereupon commissioned the Consultants to review previous bypass proposals and, after investigating the likely future trends of urban and regional development and of city planning policies, to recommend an optimum system of Highway and Main Road relocations to reduce or eliminate

Statement

conflicts between road users.

The Consultants' brief was based on the assumption that Orange would probably require a full bypass at some stage in the near or distant future, but that provision should, in any case, be made for it now. It has also been assumed that the problems of administration, responsibility for stage construction, and maintenance, can be dealt with subsequently.

The Consultants believe that no single highway bypass can be studied or planned in isolation, but that a total system of traffic facilities is required, encompassing specialised routes for traffic to enter and leave Orange as well as to bypass it, and further, providing for traffic movement between the various sectors of the city.

The Consultants have also acted in the belief that a system for major City roads, once laid down, forms a basic framework which can shape a town or city for centuries to come. They have therefore felt the need to indicate land reservations for road purposes which could anticipate the needs of, say, thirty to fifty years ahead.

Any reasonably rational choice of an optimum future Highway network in the Bathurst, Wellington, Parkes and Cowra region is severely hampered by the lack of positive regional planning. The future role of Orange, vis-a-vis this region, is not indicated by any such regional development plan or policy. It remains true, however, that decisions on highway and main road construction and improvements are, in themselves, prime forces which influence economic growth and urban development.

The only available indication of the future likely direction and character of urban growth in the area was a suggestion that, under the proposed Canobolas Shire Planning Scheme, Orange's future growth could reasonably, and should logically, be directed to the

Statement

North of the existing City, in the form of a new Northern city residential district. This suggestion, from the Canobolas Shire Consultant Planner and from the Department of Local Government Town Planning Branch, has been respected by the Consultants.

Not only was little information available as to the possible future traffic patterns of the district, but very little was known, at the beginning of this exercise, about the present character and volume of traffic in and around Orange. It was therefore necessary for the Consultants to conduct an Origin and Destination Survey of existing traffic movements.

This, then, has been the general context and nature of the problem found by the Consultants. The alternative solutions were, however, easily grouped in three main groups:-

- a. a Southern and Western Parkway bypass, close to the existing City limits, with a new main entry boulevard into the City from the South.
- b. an Eastern and Northern Parkway bypass with new main entry boulevards into the City from the North and East.
- c. Both (a) and (b) together in a ring system with one designed as a Parkway bypass, and the other acting as a complementary new distributor road.

The detail problem has been to plot specific alternative routes of these three types, establish criteria for judging these alternatives, to attempt to apply the criteria to the alternative routes, and finally to rank the alternatives in what appears to be a socially valid order of merit.

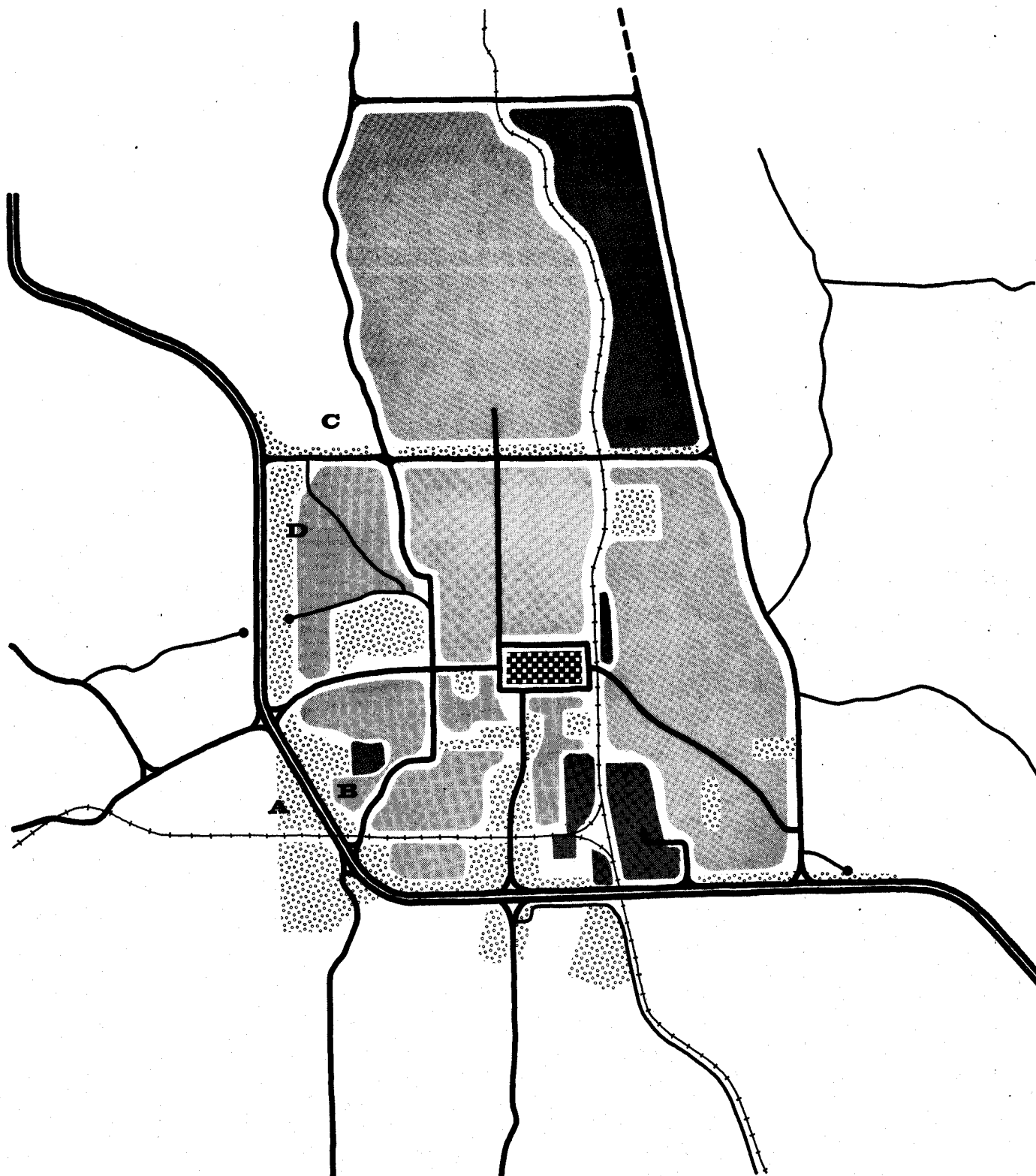
RECOMMENDATIONS

(a) THE RECOMMENDED HIGHWAY AND ARTERIAL ROAD SYSTEM

The most effective future highway and arterial road system which can be formulated, from present knowledge, to serve the City of Orange, its surroundings and the State Highway System, would consist of:-

1. A major State Highway bypass around the southern and western fringes of the present built-up area, designed for improvement to motorway standard if and when required. The most desirable route is shown on Map 3 as route S.W.1. If the detailed design of this route cannot be resolved vis-a-vis the proposed Golf Course in or near Wentworth Park, then route S.W.2 should be adopted.
2. An entry boulevard leading to the business centre of Orange from the bypass east of the Rifle Range linking to Sale Street.
3. An arterial road, designed to a lower standard than the bypass, running north from the existing State Highway 7, east of Orange, parallel to the Dubbo Railway line and forming the permanent eastern boundary of the built-up area. This road should run at least as far as the northern boundary of planned future urban expansion, and is intended solely to serve that expansion.
4. One or more east-west arterial streets connecting the above proposed north-south arterial road to M.R.573. These streets should be located where overbridging of the railway is readily possible and should be at least 40 chains apart. The southernmost such arterial street should be about 5-15 chains north of Phillip Street. These streets are also intended solely to serve future city growth.




(See map overleaf).



**RECOMMENDED HIGHWAY, MAIN
ROAD AND ARTERIAL STREET
SYSTEM TO SERVE A SUGGESTED
LAND USE PATTERN FOR ORANGE.**

80 60 40 20 0 80 160 chains.

LEGEND

-  OPEN SPACE
-  INDUSTRIAL
-  OTHER URBAN

A,B,C,D,E. POSSIBLE ALTERNATE GOLF COURSE
SITES.

Clarke Gazzard Yeomans

Architects/Planners
117 Harrington Street, Sydney, N.S.W. 27-3833

OCTOBER 1963.

Recommendations

(b) THE FUTURE LAND USE PATTERN OF ORANGE

Road planning, design and construction must be tightly co-ordinated with land use control, city planning and economic development policies. The recommended bypass should form the permanent boundary of urban expansion.

The future expansion of Orange should be towards the north. Industrial growth should occur along the east side of the Dubbo Railway line. This area would have direct road access to Sydney by the proposed north-south arterial road. Residential development should take place between M.R. 573 and the Dubbo Railway. Thus the general form of the city would be linear.

Access to the bypass should be provided at not more than the following points:-

1. East of the Stock Saleyards, a four-way intersection or preferably a T-junction;
2. (a) Main Road 245, the Blayney Road, a T-junction;
(b) The new entry boulevarde a T-junction;
} These should preferably be combined in a single four way intersection. See note below.
3. Main Road 526, near the Racecourse, a four-way intersection;
4. (a) Main Road 237, the Cargo Road;
(b) Trunk Road 61, the Parkes Road;
} These should preferably be combined in a single four-way intersection. T.R. 61 should be diverted into M.R. 237, west of Orange. See note below.

The combination of the junctions of the bypass, the Blayney Road and the new entry boulevarde is most desirable. The short distance that

Recommendations

would exist between independent junctions would seriously interfere with the speed and safety of bypass traffic.

M.R. 245 should be diverted to a new location approximately along the eastern boundary of the Rifle Range and the Agricultural Research Station, to continue the alignment of the new entry boulevard.

The existence of two distinct junctions on the bypass to connect to M.R. 237 and T.R. 61 would also interfere with the speed and safety of bypass traffic. It would also perpetuate the unsatisfactory road junctions north of Dundryleague. It is therefore recommended that T.R. 61 be deviated, from a point about $1\frac{1}{2}$ miles west of Orange, to link up with M.R. 237 before reaching the City boundary.

(d) THE ROUTE OF A NORTH-SOUTH ARTERIAL ROAD, EAST OF THE RAILWAY

Generally, the route described previously as N.E. 2 is recommended. This should, however, be amended so that it passes to the east of, or close to the eastern edge of, the land under offer to the Housing Commission. It is recommended that the route should remain about half a mile east of the Dubbo Railway and that the land in between be developed industrially as required, possibly as an Industrial Estate. Access should be controlled throughout the length of this road and should not be allowed at points less than 10 chains apart.

(e) ROUTE OF A NEW ENTRY BOULEVARDE TO THE CENTRE OF ORANGE

The recommended route runs almost north-south from the corner of Sale and Warrendine Streets, along the tributary gully of Blackman's Swamp Creek, under the railway, and between the ovals, to connect to the south and west bypass near the eastern boundary of the Rifle Range. No access should be allowed between the entry and exit to this boulevard.

Recommendations

(f) RESERVATION WIDTHS

Irrespective of location, reservations should be as follows:-

- (i) The bypass should preferably be 300 feet wide with an absolute minimum of 200 ft. Where any major earth-works are required, the reservation should be increased accordingly;
- (ii) The new entry road should preferably be 150 feet wide with an absolute minimum of 110 feet;
- (iii) The new arterial road should preferably be 200 feet wide with an absolute minimum of 110 feet; and
- (iv) new arterial streets should preferably be 110 feet with an absolute minimum of 80 feet.

(g) INTERSECTIONS

Initially, all intersections could be provided at-grade. Ultimately, if the bypass is to be built to motorway standard, all intersections along it will presumably be grade separated. In any case, land should be reserved for possible future grade separated interchanges.

(h) OTHER ROAD RELOCATIONS AND CLOSURES

To ensure the efficient operation of a new highway and arterial road system at Orange, certain alterations to the less important roads leading into that City are recommended. These are as follows:-

Bathurst Road. The new entry boulevard from the bypass will replace the existing ribbon-developed Bathurst Road as the main entrance to Orange. This will reduce traffic across the Summer Street level crossing and protect the residents of East Orange from the disruption of through traffic. Bathurst Road will then serve over the major part of its length as the local arterial spine connecting East and West Orange.

Recommendations

It is essential that the North-South Arterial to the bypass be designed so that traffic moving to and from the business centre finds the new entry boulevard the better route.

Bloomfield Road. If the Blayney Road is not relocated as previously recommended, the Bloomfield Road should be relocated to eliminate the awkward three-way intersection between it, the Blayney Road and the bypass.

If the Blayney Road is relocated, then Bloomfield Road should become part of the service road along the bypass from the northern end of the old landing field to the new four-way junction of the bypass, the new entry boulevard and the new Blayney Road.

Woodward & Cecil Streets. Both these streets should be closed on either side of the bypass.

M.R. 526, Pinnacle Road. Topographic conditions near the Racecourse will probably require the relocation of this Road to allow a suitable intersection with the bypass. All local roads south-west of Orange should lead to this intersection. The unnamed street which forms the western boundary of the City along Wentworth Park should be closed and its function replaced by service roads if and where necessary.

T.R. 61, Parkes Road. When the recommended relocation of T.R. 61 is carried out, the present Parkes Road should terminate in culs-de-sac on either side of the bypass.

Molong Road. The new arterial street, north of Phillip Street should be produced westwards to join the bypass - State Highway route, at right angles, near the present

Recommendations

bridge over Ploughman's Creek on the Molong Road. Molong Road should then be relocated to join this arterial street, at right angles, about 10 or 15 chains east of Ploughman's Creek. Molong Road would thus remain the main entry road for local traffic from the northwest of Orange.

M.R. 573, March Road. M.R. 573 should be diverted so that it runs from the State Highway, across Ploughman's Creek along the extension of the new arterial street, to join the existing alignment at the March Road.

March Road should be relocated near its intersection with the Molong Road, north of Duntryleague, so that the present unsatisfactory junction is eliminated. The junction of the Molong and Parkes Roads should also be rationalized by a minor relocation of the latter road.

These relocations should be designed to increase the rectangularity of the intersections.

(i) PROVISION OF SERVICE FACILITIES

It is recommended that one widening, at least, of the bypass reservation be made so that service facilities could be provided for travellers, if and when required. The minimum additional width required would be 250 feet for a distance of about 400 or 500 feet. The facilities provided could include a cafe, service station, parking area, scenic lookout, fireplace and rest area. Obviously these should be located at one of the vantage points along the route.

On the recommended south and west route three possible sites are:-

About 10 chains west of Lone Pine Avenue; Towards the western end of Sharpes Lane; and On the rise towards the eastern boundary of the Racecourse.

Recommendations

The facilities provided could be located on a widening of the median so that access would be available without the need for conflicting traffic movements.

The actual need for these facilities will depend on future volumes of traffic and whether or not competing facilities are permitted on private land fronting State Highway 7.

(j) LANDSCAPING OF THE ROUTE

Comprehensive landscaping should be undertaken but the natural scenic beauty of the area should not be marred by over-formalized planting. The views towards the City, district, and the surrounding mountains should be enhanced by the planting design.

The entry boulevard could be extremely attractive and add to the tourist attraction of Orange if properly landscaped and planted.

It is recommended that a comprehensive treeplanting design should be prepared at the appropriate time.

(k) OTHER RESERVATIONS ALONG THE ROUTE

To ensure the control of access to the various sections of the road system, to improve the aesthetic appearance of the routes and to provide more public recreation areas for the people of Orange and district, it is recommended that certain areas along the routes be reserved for public open space. In particular, on the recommended system, a strip between the bypass and a line approximately 5 chains east of Ploughman's Creek from Wentworth Park to the Molong Road should be so reserved.

Similarly, a generous strip on both sides of the new entry boulevard should also be reserved and tree planted.

Recommendations

Every effort should be made to give parkway character to the entire bypass and arterial road and street system.

PART A

ORIGIN & DESTINATION SURVEY ORANGE, N. S. W., 1963.

SECTION 1 SURVEY PURPOSES

On Tuesday and Wednesday, June 5 and 6, 1963, an Origin and Destination Survey was made of road traffic leaving Orange along the six major outlets. The Survey was conducted by roadside interviews of every second vehicle, and ran from 7.00 a.m. to 7.00 p.m. on the first day, but due to rain, for a slightly shorter period on the second.

The Survey was designed and executed on behalf of the Department of Main Roads by the Urban Planning & Research Centre Pty. Ltd., under the supervision of the Consultants, and with the collaboration of the Orange City Council and the Canobolas Shire Council. Traffic control was exercised by the D.M.R. Divisional Engineer, Parkes.

The purposes of the Survey were:-

- a. to ascertain the origin, destination, volume, percentages and character of medium to long distance traffic outward bound from Orange.
- b. to estimate the entry points and routes through Orange now taken by this traffic.
- c. to ascertain the purposes for which this traffic now stops in Orange.
- d. to ascertain whether, on the days of the Survey, a North or South bypass or distributor road would be the more used, and to assign current volumes to those alternative routes.
- e. to assist in the design of intersections and/or interchanges on any selected bypass route, particularly on the North West of the City.

A. 1/2a

- f. to assist in the location of a new "main entrance" boulevard leading from the bypass to the business and shopping centre.
- g. to assist in determining the possible need for, and the character of, a possible lay-by on the bypass, containing a service station, restaurant, tourist information Kiosk and/or a motel.
- h. to institute a simple origin and destination survey procedure which could be repeated annually in Orange, to serve as a continuing guide to the staging of construction and design standard improvements along the bypass and other main roads in the area.

SECTION 2 SURVEY DESIGN & PROCEDURE

a. Design

The choice of the efficient and potentially comprehensive Roadside Interview technique was made possible by the low rural volumes of traffic to be encountered, compared to the high and impatient volumes on typical metropolitan main roads. This method would eliminate the time delay and uncertain sampling of a postal card survey. It was also the only simple technique for establishing the purposes for which traffic stopped within the cordon area of the City.

The interviews were to be of every second vehicle, a strict 50% sample, thus eliminating any problem of sampling bias. Only Outbound traffic was to be interviewed, so that every question except one would deal with a past event.

The Survey had to be as inexpensive as was consistent with reasonable comprehensiveness and accuracy. A two day period was felt to be all that could be reasonably afforded. The limit of 7.00 a.m. to 7.00 p.m. was felt to be a reasonable one in order to restrict costs. Six Checkpoints were to be set up to interview traffic on the six

A. 2a

major roads and several minor routes were excluded from consideration.

Because the Survey was to focus upon medium to long distance trips which might use a bypass or distributor road, the check-points were to be set up just outside the built-up area of the City, on the outbound side of major City institutions such as the Hospital and Television Station.

Approximate 1961 figures for Annual Average Daily Traffic Volumes were available for the Main Roads around Orange. From these figures, it was deduced that approximately 2,000 vehicles could be expected to be outward bound from Orange between 7.00 a.m. and 7.00 p.m. on an average day, of which a 50% sample would yield 1,000 interviews per day. This was considered to be a reasonable number for inexpensive manual analysis.

The questionnaire design was simplified so as to minimize the time required for each interview. Fears were expressed that interview time might try the patience of drivers and might cause queues of drivers awaiting interview. Further fears were that drivers would resent being asked the purpose of their stop in Orange. Experience, however, showed that more, and more detailed, questions could easily have been included. This is discussed in Part A, Section 6 of this Report.

The information to be gathered at each interview was as follows:

- (i) date, day of week, weather, interviewer's initials, Checkpoint number.
- (ii) time to nearest 5 minute division.
- (iii) type of vehicle; number of axles if over two.
- (iv) number of persons in vehicle.

A. 2a

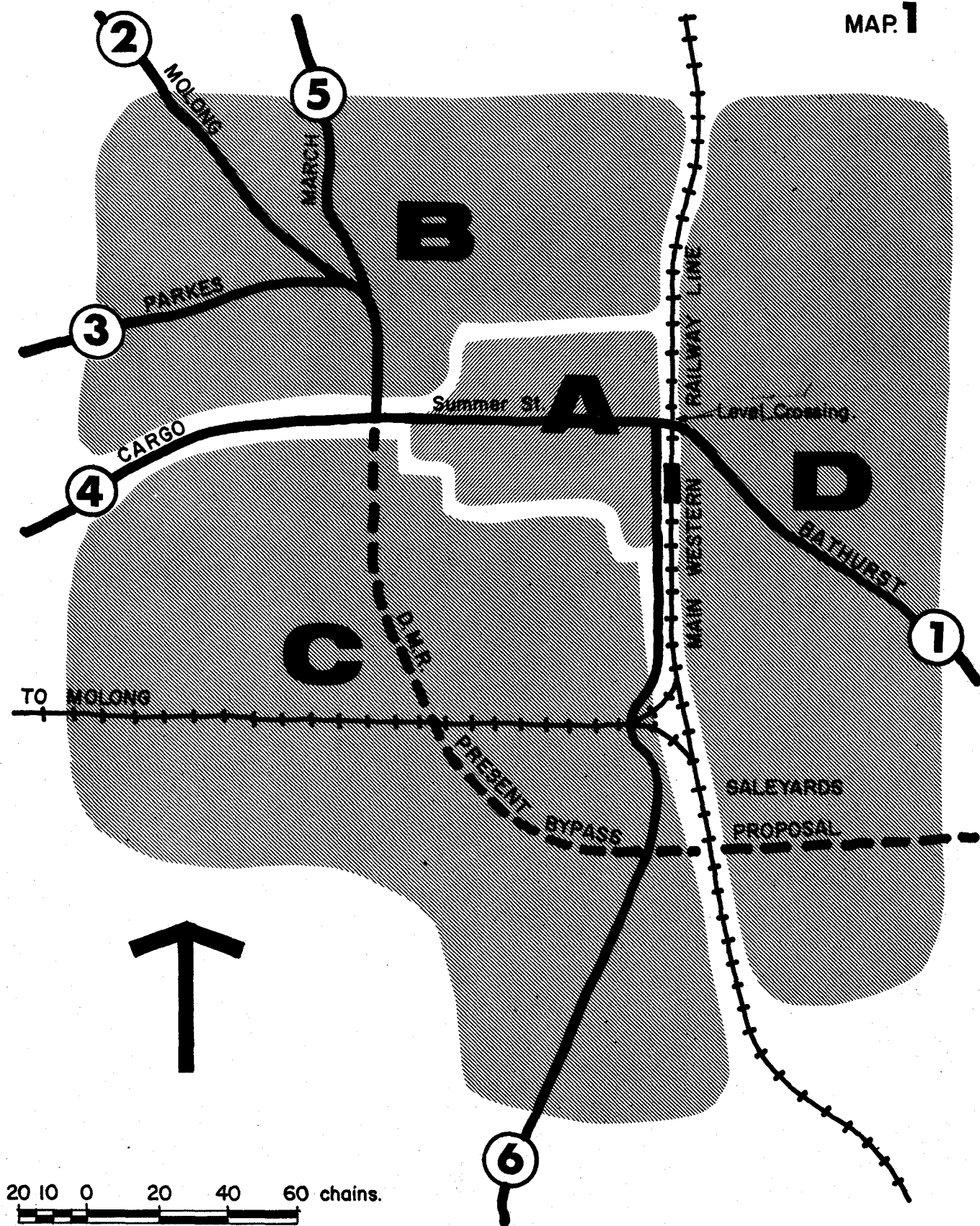
- (v) if the trip origin was in Orange, then which part of Orange.
- (vi) if trip origin was elsewhere, then the nearest large town, centre, locality, or number of miles from Orange.
- (vii) if trip was interrupted in Orange, then purpose of stop.
- (viii) destination to nearest large town etc.

Appendix A to this Report shows the pro-forma interview recording sheet designed by Urbsearch for this type of survey. These sheets were spirally bound in books of 50 sheets. Each book and sheet was individually machine numbered. Each sheet could record ten interviews. Each book had a hard cardboard back cover which facilitated writing on the sheets.

Appendix B consists of the "Instructions for Interviewers" which were used in interviewer training. A copy was also left at each Checkpoint. These instructions clearly set out the definitions and abbreviations adopted for the Survey and also cover Interview procedure.

Map 1 shows the City Zones A, B, C, & D, into which Orange was divided for the purpose of recording origins within the cordon. This Map also shows the positions and numbering of Checkpoints. This numbering system is used throughout this Report in referring to Checkpoints.

In addition to the Interview Survey, traffic counts were made over a fortnight spanning the interview days. A non-recording traffic counter was installed on the outward side of each Checkpoint, except at Checkpoint 1, where the counter was installed on the City side. These counters checked each axle passing over them, in both directions.



ORIGIN AND DESTINATION SURVEY:
ORANGE, N.S.W., 1963.

A 2a/2b.

The counters were installed at 7.00 a.m. on Monday, June 3, 1963 and were read at 12 hourly intervals thereafter until 7.00 p.m. on Sunday, June 16, 1963. This work was carried out by the Canobolas Shire Council using counters supplied by the Department of Main Roads.

b. Survey Procedure

The details of survey procedure are given in Appendix B. "Instructions to Interviewers", which deals with such items as:

- (i) Purpose of Survey.
- (ii) Location of Checkpoints.
- (iii) Staff allocations.
- (iv) Responsibilities of Supervising Officers.
- (v) Sampling, and the use of Fieldbooks and Interview sheets.
- (vi) Standards of Courtesy.
- (vii) Procedure as a Vehicle approaches.
- (viii) Definitions of Vehicle types.
- (ix) Procedure as a Vehicle stops, and wording of questions.
- (x) Definitions of purposes of stops within cordon.
- (xi) Descriptions of Destinations.

The staff used in the interviewing and its supervision were drawn from the following sources:-

A. 2b.

8 from the D.M.R. Divisional Office, Parkes

3 from the Canobolas Shire Council

4 from the Orange City Council

4 from the Consultants.

The staff was allocated to the Checkpoints as follows:-

Checkpoint	1	..	..	5	Checkpoint	4	..	..	2
"	2	..	..	3	"	5	..	..	2
"	3	..	..	3	"	6	..	..	2

In addition, two senior members of the team acted as supervisors and arranged relief periods, refreshments, heating, weather protection and lighting for the staff.

The interviewing staff were assembled for two hours on the Monday evening and were instructed in interview procedure. Copies of the Instructions were issued and staff was allocated to each Checkpoint.

The interviewing was carried out on Tuesday and Wednesday, June 5 & 6, 1963. On the first day, interviewing was carried out from 7. 00 a.m. to 7. 00 p.m., despite the cold and intermittent light rain. Rain on the Wednesday delayed the start of interviewing until 8.00 a.m. The cold, combined with poor lighting facilities, forced the abandonment of the second day's interviewing at 5.00 p.m.

Thus, throughout the ensuing analysis, the data for Tuesday is used as a basis for estimates and conclusions, and that for Wednesday only

A. 2b/3a.

as a check on the Tuesday figures.

The weather for the previous few weeks had been unsettled and wet. There is no evidence that weather on the survey days had any significant effect on travel patterns.

SECTION 3 SURVEY DATA ANALYSIS

a. Interview Data Analysis

A total of 2,103 interviews were conducted during the two survey days -- 1,114 interviews on the Tuesday and 989 on the Wednesday.

Seventy-two percent of the interviews were obtained at Checkpoints 1, 2 & 3, on State Highway 7 and on Trunk Road 61. The following table sets out the numbers of interviews obtained by day, by Checkpoint, and gives the hours during which interviews were taken.

<u>Check- points</u>	<u>Hours of Interviewing</u>	<u>No. of I'views</u>	<u>Hours of Interviewing</u>	<u>No. of I'views</u>
1	7.00am - 7.00pm	344	8.00am - 5.30pm	361
2	7.00am - 7.00pm	245	8.00am - 5.00pm	230
3	7.00am - 7.00pm	199	8.00am - 5.00pm	145
4	7.00am - 7.00pm	115	8.45am - 4.45pm	71
5	7.00am - 7.00pm	74	8.30am - 5.00pm	47
6	7.00am - 7.00pm	<u>137</u>	8.45am - 5.00pm	<u>135</u>
Total		1114		989

A. 3a.

It should be noted that on Tuesday, Checkpoint 6 on M.R. 245, the Blayney Road, was located south or outbound of the main gates of Bloomfield Hospital. On Wednesday, this Checkpoint was placed inbound of the Hospital gates, and 28 of the 135 interviewed vehicles passing through that Checkpoint were bound for the hospital. The automatic traffic counter did not record trips from Orange to the Hospital, being outbound of the gates for the entire period.

Various cross-classifications were extracted from the results of the interviews. Some of these are shown in full in this Report, whilst others are shown in summarised form only. In addition to the Tables, which follow, other cross-classifications were made to investigate the possibility of there being any significance in the relationship of vehicle type to purpose, time of day, etc. No trends, significant to the problem in hand, were evident.

Comment on Table A

From this Table, it is evident that on days similar to those in the survey, maximum peak hour volumes would be about 100 vehicles per hour, i.e. twice the greatest number of interviews recorded in any one hour. This peak flow would occur eastwards from Orange on S.H.7. Flows outbound on the other roads at peak hours would be considerably less.

There is evidence of an outbound afternoon peak - on Tuesday between 4 and 6.00 p.m. and on Wednesday somewhat later. This is a reflection of Wednesday being stock sale day in Orange.

It is doubtful if the total volume of traffic in both directions on S.H.7, east of Orange, would exceed 200 vehicles per hour at the afternoon peak, on days typified by those in the survey. As the outbound peak occurs late in the afternoon, it is unlikely that, simultaneously, there would be a heavy inbound flow as well. In fact, a total peak hour volume of 150 vehicles would probably be a better estimate of the true flow both ways on State Highway 7.

Volumes recorded outbound through Checkpoints 4, 5 and 6 rarely exceed 50 vehicles per hour. That is, peak hour volumes are likely to be of the order of 60 vehicles per hour through Checkpoint 6, and 30-40 through Checkpoints 4 and 5. On these main roads, off peak traffic flows are extremely light.

TABLE A**NUMBER OF INTERVIEWS BY CHECKPOINT AND HOUR OF DAY**

Hour of Day	Checkpoint of Interview											
	Tuesday						Wednesday					
	1	2	3	4	5	6	1	2	3	4	5	6
7 - 8 am	16	13	12	17	8	24	-	-	-	-	-	-
8 - 9 am	29	22	16	9	7	13	21	11	8	2*	3*	4*
9 - 10 am	31	18	14	10	6	11	36	21	18	8	7	20
10 - 11 am	22	21	14	6	5	5	37	23	13	12	5	10
11 - 12 noon	25	18	12	8	2	8	38	25	15	5	3	12
12 - 1 pm	32	21	16	12	4	7	34	27	10	10	6	17
1 - 2 pm	34	19	16	3	7	5	42	25	13	6	4	13
2 - 3 pm	28	19	21	7	3	10	36	29	22	6	7	17
3 - 4 pm	27	26	17	10	8	7	41	32	24	11	7	14
4 - 5 pm	40	28	25	11	9	21	49	37	22	11*	5	28
5 - 6 pm	43	28	22	14	11	21	27*	-	-	-	-	-
6 - 7 pm	17	12	14	8	4	5	-	-	-	-	-	-
Totals:	344	245	199	115	74	137	361	230	145	71	47	135

* Interviews were taken for part of hour only.

Comment on Table B

The traffic passing through Orange is mostly in light vehicles - that is, cars, utilities and light trucks. A light truck was defined as having a single rear axle and a single rear wheel on each side. On the first day of the survey, 89% of the traffic was classified as light, and on the Wednesday, 83%. The lower figure in the second day reflects the use of motor trucks to carry stock to the saleyards in Orange. At individual Checkpoints, the percentage of light traffic varied from 75% to 90% of the total daily flow.

The composition of the traffic did not vary greatly with the time of day. The car was always the most common vehicle type with the utility and the heavy truck, in that order, the next common types.

TABLE B**NUMBER OF INTERVIEWS BY TYPE OF VEHICLE AND HOUR OF DAY**

Hour of Day	Type of Vehicle											
	Tuesday						Wednesday					
	Car	Ute.	L. T.	H. T.	Semi.	Other	Car	Ute.	L. T.	H. T.	Semi.	Other
7 - 8 am	53	27	1	5	1	3	-	-	-	-	-	-
8 - 9 am	51	24	6	14	-	1	30*	9*	4*	6*	-*	-*
9 - 10 am	57	15	4	11	1	2	69	20	7	10	2	2
10 - 11 am	50	10	3	5	1	4	64	13	5	17	1	-
11 - 12 noon	43	19	2	6	1	2	57	18	5	16	-	2
12 - 1 pm	64	18	2	5	-	3	61	22	5	13	1	2
1 - 2 pm	61	11	1	10	-	1	63	19	1	12	4	4
2 - 3 pm	55	20	4	6	1	2	69	24	2	18	1	4
3 - 4 pm	63	18	2	7	1	4	78	22	4	16	3	5
4 - 5 pm	98	16	6	8	4	2	113*	18*	8*	8*	2*	3*
5 - 6 pm	109	19	5	4	1	1	21*	4*	-*	1*	-*	1*
6 - 7 pm	40	11	2	7	-	-	-	-	-	-	-	-
Total	744	208	38	88	11	25	625	169	41	117	14	23

* Interviews were taken for part of hour only.

Comment on Table C

Approximately 38% of all trips recorded were described as originating in Orange. This percentage showed little variation on the two days of the survey. The heaviest flows of locally originating trips were recorded at Checkpoints 1 and 6. Flows through the other Checkpoints were remarkably constant -- about 50 vehicles per day on each. Checkpoint 5 recorded the least number of locally originating trips, although they comprised over 50% of the total outbound traffic flows at that Checkpoint.

Town Zone A, the shopping and business centre, was the main generator of local trips, accounting for 46% of those recorded on Tuesday and 43% on Wednesday. Zone D, which contains the saleyards and industrial area, was the next greatest generator accounting for 20% on Tuesday and 23% on Wednesday. Zone B generated a greater percentage of local trips on Tuesday than Zone C, but on Wednesday the situation reversed. Figs. 1a and b illustrate the pattern of these flows on each day.

TABLE C
FIG. 1

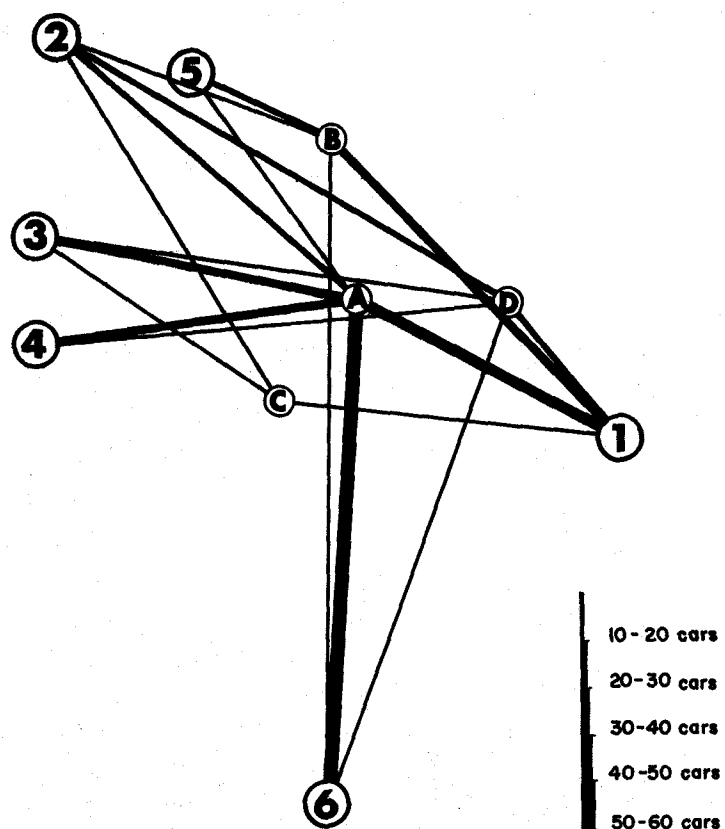


Fig 1a.

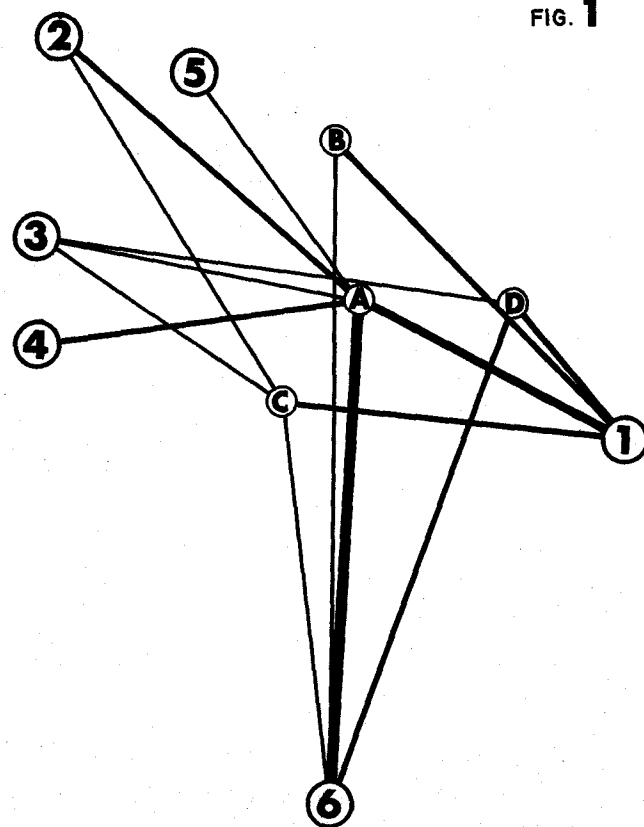


Fig 1b.

TABLE C: TRIPS ORIGINATING IN ORANGE CLASSIFIED BY TOWN ZONE OF ORIGIN AND CHECKPOINT OF INTERVIEW

TOWN ZONES IN WHICH TRIPS ORIGINATE	CHECKPOINT OF INTERVIEW													
	TUESDAY							WEDNESDAY						
	1	2	3	4	5	6	TOTAL	1	2	3	4	5	6	TOTAL
A	46	21	30	33	14	54	198	34	22	11	23	14	49	153
B	31	11	7	6	12	15	82	22	7	8	4	6	10	57
C	10	18	12	4	9	4	57	23	14	11	3	3	14	68
D	25	10	15	14	8	17	99	27	6	16	7	5	20	81
Total	112	60	64	57	43	90	436	106	49	46	37	28	93	359

ORIGIN AND DESTINATION SURVEY:
ORANGE N.S.W. 1963.

Comment on Table D

If all the surveyed outbound trips which did not originate in Orange are considered to be through trips, regardless of whether or not they were broken by a stop in Orange, the importance of State Highway 7 as a through route is apparent. Traffic entering Orange, either from the east or west by State Highway 7, accounted for 53% of all through traffic recorded on Tuesday, and 69% on Wednesday.

With one exception, the major movement recorded at each Checkpoint was of trips originating from a point outbound of the Checkpoint, entering Orange at that Checkpoint, and then returning to their origin. (Some comments are made on the validity of these assignments in later sections of the report -- see Part A, Section 6). The exception was Checkpoint 2, on the S.H. 7 west of Orange. Here, S.H. 7, east of Orange, was the main entry point of trips recorded.

Figs. 2a and b illustrate the apparent pattern of these flows for each day. These diagrams ignore, of course, deviations within the City boundaries and are based also upon assumptions regarding entry points.

TABLE D
FIG. 2

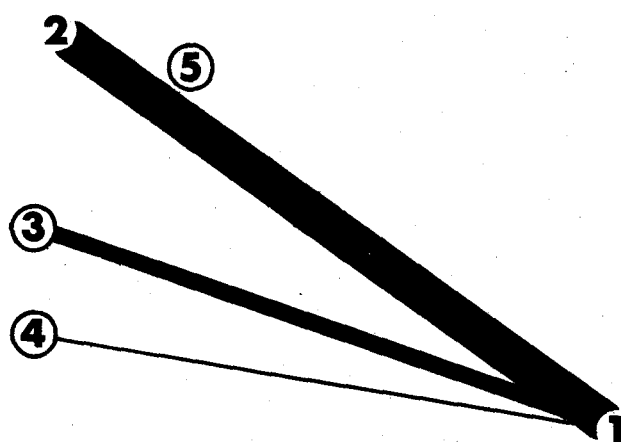


Fig 2a.

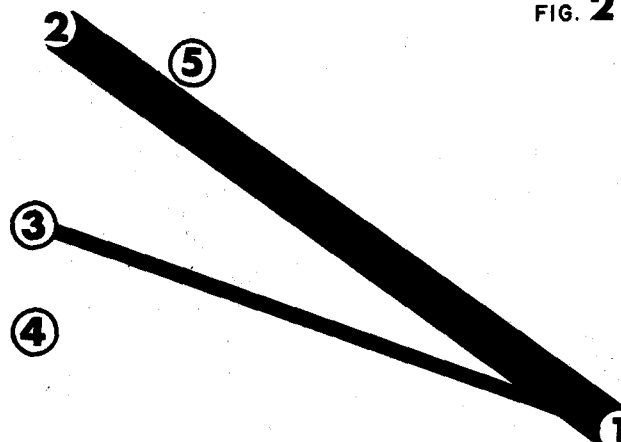
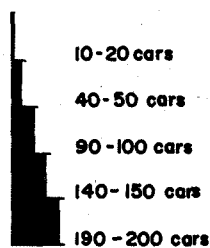


Fig 2b.

TABLE D: TRIPS ORIGINATING OUTSIDE ORANGE BY CHECKPOINT OF ENTRY AND CHECKPOINT OF INTERVIEW

CHECKPOINT OF ENTRY	CHECKPOINT OF INTERVIEW													
	TUESDAY							WEDNESDAY						
	1	2	3	4	5	6	TOTAL	1	2	3	4	5	6	TOTAL
1	127	113	46	9	4	3	302	127	105	29	1	5	6	273
2	52	62	3	1	1	3	122	80	72	5	-	2	4	163
3	39	4	81	-	-	-	124	34	1	62	-	-	-	97
4	5	2	-	45	1	-	53	5	3	1	32	1	2	45
5	4	-	1	1	21	3	30	1	-	-	-	10	3	14
6	3	2	3	1	-	37	46	-	-	2	1	-	26	29
Other	2	2	1	1	4	1	11	8	-	-	-	1	2	11
Total	232	185	135	58	31	47	688	255	181	99	34	19	43	632

ORIGIN AND DESTINATION SURVEY
ORANGE. N.S.W. 1963.

Comment on Tables E (1) - (6)

These Tables, which analyse the through trips recorded in the survey, allow an estimate to be prepared of the trips which would not use a bypass, which might use a bypass and which could use a bypass.

Through trips which were interrupted in Orange for the purpose of deliveries, work, business, shopping, tourist sightseeing, or personal reasons, could not be expected to make use of a bypass. These trips were broken for functions which could only be performed in Orange. There is no likelihood of a bypass causing any breakage of loyalties, e. g. in shopping, to Orange, because of the distance to comparable centres.

On the other hand, trips which were interrupted in Orange for purposes of purchasing refreshments, petrol or accommodation might be attracted to using a bypass if facilities for those purposes were provided on that road.

Trips which did not stop in Orange, could be expected to use a bypass road as soon as it was provided.

TABLE E (I)

TRIPS ORIGINATING OUTSIDE ORANGE CLASSIFIED BY PURPOSE
OF STOP IN ORANGE AND CHECK POINT OF ENTRY.

FOR INTERVIEWS AT CHECKPOINT 1.

Purpose of Stop in Orange	Checkpoint of Entry to Orange													
	Tuesday							Wednesday						
	1	2	3	4	5	6	Other	1	2	3	4	5	6	Other
Delivery	13	1	-	-	-	-	-	22	-	1	-	-	-	-
Job	16	-	-	-	-	-	-	10	-	-	-	-	-	-
Business	50	6	5	-	-	-	1	67	11	6	1	-	-	-
Shopping	32	4	2	2	-	-	-	19	6	1	-	-	-	-
See	2	-	-	-	-	-	-	5	1	-	-	-	-	-
Personal	11	2	1	-	-	1	-	2	3	2	-	-	-	-
Total trips which would <u>not</u> use a bypass	124	13	8	2	-	1	1	125	21	10	1	-	-	-
Refreshment	1	10	6	-	-	-	-	-	8	5	-	1	-	-
Petrol	-	3	3	1	-	-	-	-	7	3	-	-	-	-
Accommodation	2	2	2	-	-	-	-	2	6	2	1	-	-	-
Total trips which <u>might</u> use a bypass	3	15	11	1	-	-	-	2	21	10	1	1	-	-
Trips which did not stop in Orange & which <u>could</u> use a bypass	-	24	20	2	4	2	1	-	38	14	3	-	-	8
Total through trips	127	52	39	5	4	3	2	127	80	34	5	1	-	8

TABLE E (2)

FOR INTERVIEWS AT CHECKPOINT 2

Checkpoint of Entry to Orange

Purpose of Stop in Orange	Tuesday							Wednesday						
	1	2	3	4	5	6	Other	1	2	3	4	5	6	Other
Delivery	-	-	-	-	-	-	-	1	16	-	-	-	-	-
Job	1	7	-	-	-	-	-	1	4	-	-	-	-	-
Business	12	29	1	1	-	-	-	12	20	-	-	-	-	-
Shopping	-	17	-	-	-	-	-	3	30	1	-	-	-	-
See	1	1	-	-	-	-	-	4	-	-	-	-	-	-
Personal	2	8	-	-	-	-	-	5	2	-	-	-	-	-
Total trips which would <u>not</u> use a bypass	16	62	1	1	-	-	-	26	72	1	-	-	-	-
Refreshment	25	-	-	-	-	-	-	23	-	-	1	-	-	-
Petrol	4	-	-	-	-	-	-	5	-	-	-	-	-	-
Accommodation	14	-	1	-	-	-	-	11	-	-	-	-	-	-
Total trips which <u>might</u> use a bypass	43	-	1	-	-	-	-	39	-	-	1	-	-	-
Trips which did not stop in Orange & which <u>could</u> use a bypass	54	-	2	1	-	2	2	40	-	-	2	-	-	-
Total through trips	113	62	4	2	-	2	2	105	72	1	3	-	-	-

TABLE E (3)**FOR INTERVIEWS AT CHECKPOINT 3.**

Purpose of Stop in Orange	Checkpoint of Entry to Orange													
	Tuesday							Wednesday						
	1	2	3	4	5	6	Other	1	2	3	4	5	6	Other
Delivery	1	-	3	-	-	-	-	-	-	3	-	-	-	-
Job	3	-	7	-	-	1	-	-	-	-	-	-	-	-
Business	5	-	39	-	-	1	-	7	4	37	-	-	-	-
Shopping	4	2	30	-	-	-	-	1	-	15	-	-	1	-
See	1	1	-	-	-	-	-	1	-	-	-	-	-	-
Personal	1	-	1	-	-	-	-	1	-	6	-	-	-	-
Total trips which would <u>not</u> use a bypass	15	3	80	-	-	2	-	9	4	62	-	-	1	-
Refreshment	10	-	-	-	-	-	-	6	-	-	-	-	-	-
Petrol	2	-	-	-	-	-	-	4	-	-	-	-	-	-
Accommodation	1	-	1	-	-	-	-	2	-	1	-	-	-	-
Total trips that <u>might</u> use a bypass	13	-	1	-	-	-	-	12	-	1	-	-	-	-
Trips which did not stop in Orange & which <u>could</u> use a bypass	18	-	-	-	1	1	1	7	1	-	1	-	1	-
Total through trips	46	3	81	-	1	3	1	29	5	62	1	-	2	-

TABLE E (4)

FOR INTERVIEWS OF CHECKPOINT 4.

Purpose of Stop in Orange	Checkpoint of Entry to Orange															
	Tuesday								Wednesday							
	1	2	3	4	5	6	Other		1	2	3	4	5	6	Other	
Delivery	-	-	-	10	-	-	-		-	-	-	-	-	-	-	
Job	-	-	-	11	-	-	-		-	-	-	7	-	-	-	
Business	2	-	-	11	-	-	-		1	-	-	14	-	-	-	
Shopping	-	-	-	11	-	-	-		-	-	-	10	-	-	-	
See	1	-	-	-	-	-	-		-	-	-	-	-	-	-	
Personal	-	-	-	2	-	-	-		-	-	-	1	-	-	-	
Total trips which would <u>not</u> use a bypass	3	-	-	45	-	-	-		1	-	-	32	-	-	-	
Refreshment	1	-	-	-	-	1	-		-	-	-	-	-	-	-	
Petrol	-	-	-	-	-	-	-		-	-	-	-	-	-	-	
Accommodation	-	-	-	-	-	-	-		-	-	-	-	-	-	-	
Total trips which <u>might</u> use a bypass	1	-	-	-	-	1	-		-	-	-	-	-	-	-	
Trips which did not stop in Orange & which <u>could</u> use a bypass	5	1	-	-	1	-	1		-	-	-	-	-	1	-	
Total through trips	9	1	-	45	1	1	1		1	-	-	32	-	1	-	

TABLE E (5)FOR INTERVIEWS AT CHECKPOINT 5.

Checkpoint of Entry to Orange

Purpose of Stop in Orange	Tuesday							Wednesday						
	1	2	3	4	5	6	Other	1	2	3	4	5	6	Other
Delivery	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Job	-	-	-	-	4	-	-	-	-	-	-	1	-	-
Business	-	-	-	-	10	-	1	-	-	-	1	7	-	-
Shopping	-	-	-	-	5	-	-	-	-	-	-	2	-	-
See	-	-	-	-	-	-	-	1	1	-	-	-	-	-
Personal	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Total trips which would <u>not</u> use a bypass	-	-	-	-	20	-	1	2	1	-	1	10	-	-
Refreshment	-	-	-	-	1	-	-	1	-	-	-	-	-	-
Petrol	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accommodation	1	-	-	-	-	-	-	1	-	-	-	-	-	-
Total trips which <u>might</u> use a bypass	1	-	-	-	1	-	-	2	-	-	-	-	-	-
Trips which did not stop in Orange & which <u>could</u> use a bypass	3	1	-	1	-	-	3	2	1	-	-	-	-	1
Total through trips	4	1	-	1	21	-	4	5	2	-	1	10	-	1

TABLE E (6)

FOR INTERVIEWS AT CHECKPOINT 6.

Purpose of Stop in Orange	Checkpoint of Entry to Orange															
	Tuesday								Wednesday							
	1	2	3	4	5	6	Other		1	2	3	4	5	6	Other	
Delivery	-	-	-	-	-	1	-		-	-	-	-	-	1	-	
Job	1	-	-	-	-	4	-		-	-	-	-	-	4	-	
Business	-	-	-	-	1	18	-		-	-	-	-	-	13	-	
Shopping	1	-	-	-	-	14	-		-	-	-	-	-	7	-	
See	-	-	-	-	-	-	-		-	-	-	-	-	-	-	
Personal	-	-	-	-	-	-	-		1	-	-	-	-	-	-	
Total trips which would <u>not</u> use a bypass	2	-	-	-	1	37	-		1	-	-	-	-	25	-	
Refreshment	-	-	-	-	-	-	-		1	-	-	-	-	-	-	
Petrol	-	-	-	-	-	-	-		-	-	-	-	-	-	-	
Accommodation	-	-	-	-	-	-	-		2	3	-	-	-	-	-	
Total trips which <u>might</u> use a bypass	-	-	-	-	-	-	-		3	3	-	-	-	-	-	
Trips which did not stop in Orange & which <u>could</u> use a bypass	1	3	-	-	2	-	1		2	1	-	2	3	-	2	
Total through trips	3	3	-	-	3	37	1		6	4	-	2	3	25	2	

Comment on Tables F, G and H.

These tables have been extracted to enable some appreciation of Orange's regional role to be gained. They further illustrate the significance of State Highway 7 and Trunk Road 61 in the extension of Orange's regional influence.

From Table F, it becomes evident that one third of all trips with origins over 75 miles from Orange, do not stop in Orange. Of the trips that do not stop in Orange, more than half have origins exceeding 75 miles from Orange. These long trips are concentrated along State Highway 7.

Table G again illustrates the fact that a third of all through trips which were travelling to destinations over 75 miles from Orange did not stop in Orange. Less than 10% of these trips were recorded at Checkpoints 3, 4, 5 and 6.

These three Tables confirm the fact that the Main Roads and the Trunk Road leading from Orange, on the days of the survey, largely carried local traffic. The heavy through traffic movement, particularly of long distance traffic, is along State Highway 7.

TABLE F

TRIPS ORIGINATING OUTSIDE ORANGE CLASSIFIED BY DISTANCE
FROM ORANGE TO THE ORIGIN AND THE PROBABILITY OF THE
VEHICLE USING A BYPASS - EXPRESSED AS PERCENTAGES.

Probability of the vehicle using a bypass.	Distance from Orange to Origin of trip (in miles).									
	Tuesday					Wednesday				
	0-24	25-49	50-74	75+	Total	0-24	25-49	50-74	75+	Total
<u>For Interviews at Checkpoint 1</u>										
would not	10	4	2	5	21	14	3	2	6	25
might	-	-	2	3	5	1	-	1	4	6
could	1	1	2	4	8	3	-	1	6	10
Total	11	5	6	12	34	18	3	4	16	41
<u>For Interviews at Checkpoint 2</u>										
would not	6	2	2	2	12	9	4	1	3	17
might	-	1	1	5	7	-	-	-	6	6
could	-	2	1	6	9	-	-	-	7	7
Total	6	5	4	13	28	9	4	1	16	30
<u>For Interviews at Checkpoint 3</u>										
would not	9	2	1	2	14	5	2	1	3	11
might	-	-	-	2	2	-	-	-	2	2
could	-	1	-	2	3	-	-	-	1	1
Total	9	3	1	6	19	5	2	1	6	14
<u>For Interviews at Checkpoint 4</u>										
would not	7	-	-	-	7	5	-	-	-	5
might	-	-	-	-	-	-	-	-	-	-
could	-	-	-	1	1	-	-	-	-	-
Total	7	-	-	1	8	5	-	-	-	5
<u>For Interviews at Checkpoint 5</u>										
would not	3	-	-	-	3	2	-	-	-	2
might	-	-	-	-	-	-	-	-	-	-
could	1	-	-	-	1	-	-	-	1	1
Total	4	-	-	-	4	2	-	-	1	3
<u>For Interviews at Checkpoint 6</u>										
would not	6	-	-	-	6	4	-	-	-	4
might	-	-	-	-	-	-	-	-	1	1
could	1	-	-	-	1	2	-	-	-	2
Total	7	-	-	-	7	6	-	-	1	7
Grand Total	44	13	11	32	100	45	9	6	40	100

TABLE G

TRIPS ORIGINATING OUTSIDE ORANGE CLASSIFIED BY DISTANCE
FROM ORANGE TO THE DESTINATION AND THE PROBABILITY OF
THE VEHICLE USING A BYPASS - EXPRESSED AS PERCENTAGES.

Probability of the vehicle using a bypass	Distance from Orange to Destination of Trip (in miles).									
	Tuesday					Wednesday				
	0-24	25-49	50-74	75+	T	0-24	25-49	50-74	75+	T
<u>For Interviews at Checkpoint 1</u>										
would not	10	5	1	5	21	14	3	1	7	25
might	-	1	-	4	5	-	1	-	5	6
could	1	2	-	5	8	2	2	-	6	10
Total	11	8	1	14	34	16	6	1	18	41
<u>For Interviews at Checkpoint 2</u>										
would not	7	1	2	2	12	10	2	2	3	17
might	1	-	1	5	7	-	-	1	5	6
could	1	-	2	6	9	1	-	1	5	7
Total	9	1	5	13	28	11	2	4	13	30
<u>For Interviews at Checkpoint 3</u>										
would not	8	3	1	2	14	5	3	1	2	11
might	-	-	1	1	2	-	-	-	2	2
could	-	1	1	1	3	-	-	1	-	1
Total	8	4	3	4	19	5	3	2	4	14
<u>For Interviews at Checkpoint 4</u>										
would not	7	-	-	-	7	5	-	-	-	5
might	-	-	-	-	-	-	-	-	-	-
could	1	-	-	-	1	-	-	-	-	-
Total	8	-	-	-	8	5	-	-	-	5
<u>For Interviews at Checkpoint 5</u>										
would not	3	-	-	-	3	2	-	-	-	2
might	-	-	-	-	-	-	-	-	-	-
could	1	-	-	-	1	1	-	-	-	1
Total	4	-	-	-	4	3	-	-	-	3
<u>For Interviews at Checkpoint 6</u>										
would not	6	-	-	-	6	4	-	-	-	4
might	-	-	-	-	-	1	-	-	-	1
could	1	-	-	-	1	2	-	-	-	2
Total	7	-	-	-	7	7	-	-	-	7
TOTAL	47	13	9	31	100	47	11	7	35	100

TABLE H

**TRIPS ORIGINATING IN ORANGE CLASSIFIED BY DISTANCE
TO DESTINATION - EXPRESSED AS PERCENTAGES.**

Checkpoint of Interview	Distance from Orange to Destination of Trip (in miles).									
	Tuesday					Wednesday				
	0-24	25-49	50-74	75+	Total	0-24	25-49	50-74	75+	Total
1	18	6	-	2	26	17	6	2	5	30
2	8	1	1	4	14	10	-	1	1	12
3	9	3	2	1	15	8	2	1	2	13
4	14	-	-	-	14	10	-	-	-	10
5	8	2	-	-	10	7	1	-	-	8
6	20	1	-	-	21	26	1	-	-	27
Total	77	13	3	7	100	78	10	4	8	100

A. 3b

b. Traffic Count Data Analysis

From the readings obtained from the automatic traffic counters at each Checkpoint, estimates of average daily traffic flows can be obtained. Graphs (1) - (6) illustrate the pattern of flows recorded.

It was unfortunate that the recorded period included the Queen's Birthday long weekend. This naturally resulted in increased traffic flows on all roads leading from Orange. It is considered that these should be regarded as abnormal flows and should be disregarded in estimating average daily traffic.

The long weekend flows seriously inflate the average daily traffic calculated from the results of the traffic count. There are only about 8 weekends during the year when volumes of this order could be expected. If the traffic counts had been taken over a larger period, these abnormal flows would not have had so great an effect. A further reason for disregarding these flows arises from their occurrence in time and location. On the March Road, on the Sunday night of the long weekend, an increase of about 1,000% occurred. Enquiries have failed to reveal any apparent reason for this increase. It seems likely that vandals, tampering with the counters, were responsible for a large part of this increase. Increases at other Checkpoints could have been caused in part, at least, by similar actions; although no other quite so blatant example is evident.

The number of axles on vehicles with more than two axles was noted during interviews. It was found that, on the average, every 203 axles crossing the counters would be the equivalent of 100 vehicles.

The following table illustrates the results obtained:

A. 3b

<u>Checkpoint</u>	<u>Av. No. of Axles per Day</u>	<u>Av. No. of Vehicles per Day</u>	<u>Av. No. of Vehicles per Day (modified, excluding long weekend)</u>
1	5431	2675	2194
2	2744	1352	1120
3	2155	1062	914
4	1390	685	656
5	1021	503	432
6	1780	877	869

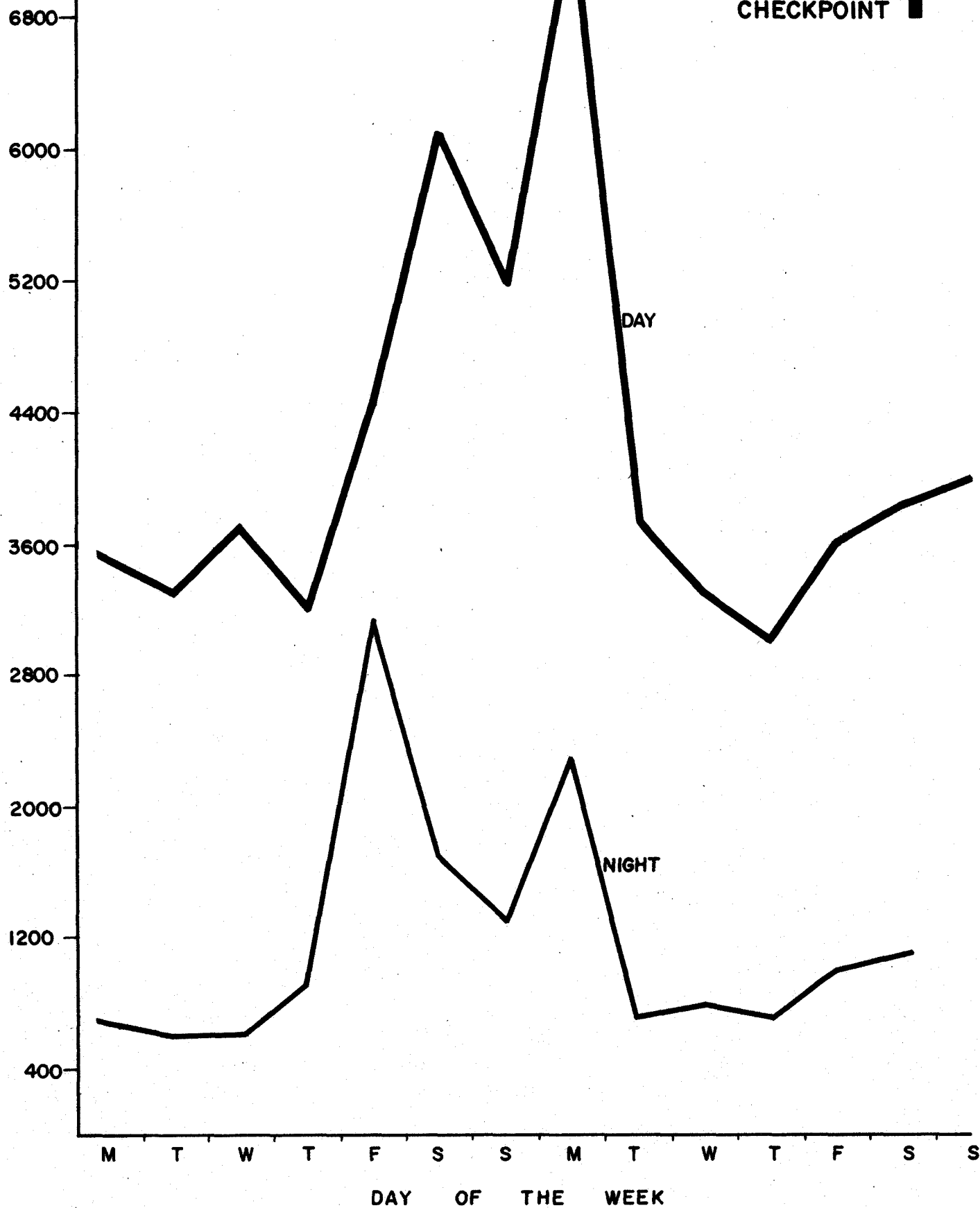
Graphs 1 - 6

The following graphs illustrate the daily pattern of traffic flows recorded at each of the six Checkpoints over the fortnight survey period. Two graphs have been prepared for each Checkpoint -- the heavier line illustrates the pattern of flows in the daylight hours (7.00 a.m. to 7.00 p.m.) of each day, and the lighter line the night time flows.

The results are here expressed as unmodified axle counts but the resultant pattern is identical with that obtained using estimated actual traffic flows -- a slight change in scale being the only alteration.

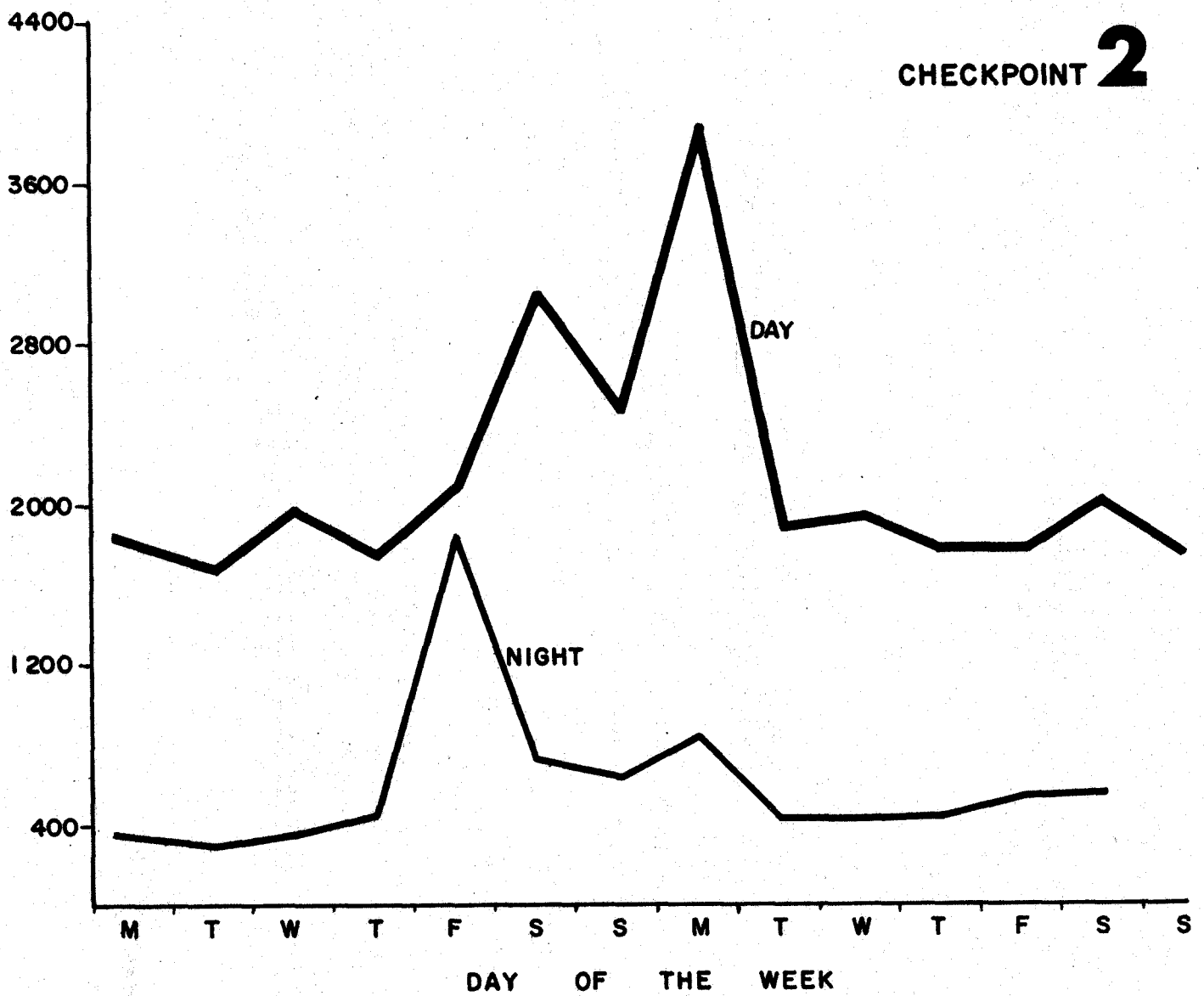
NUMBER OF AXLES

CHECKPOINT 1



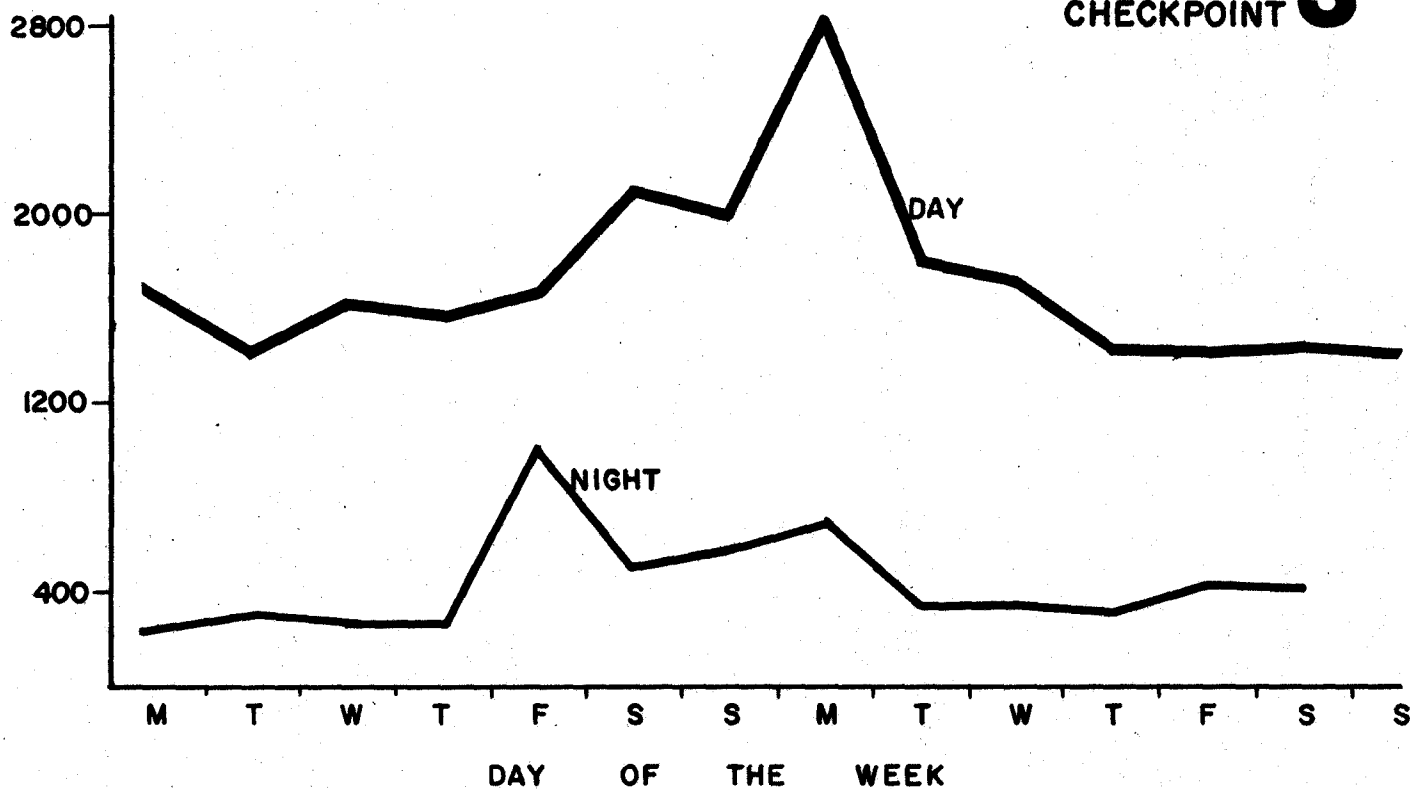
URBSEARCH

NUMBER OF AXLES



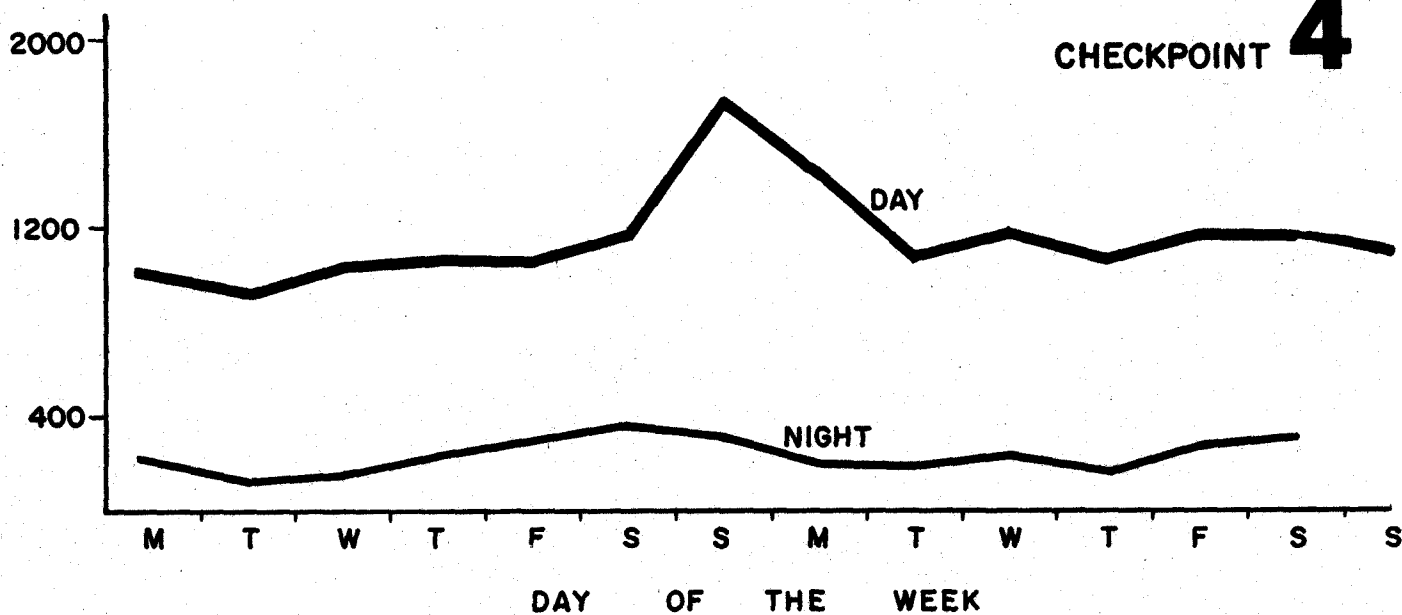
NUMBER OF AXLES

CHECKPOINT **3**



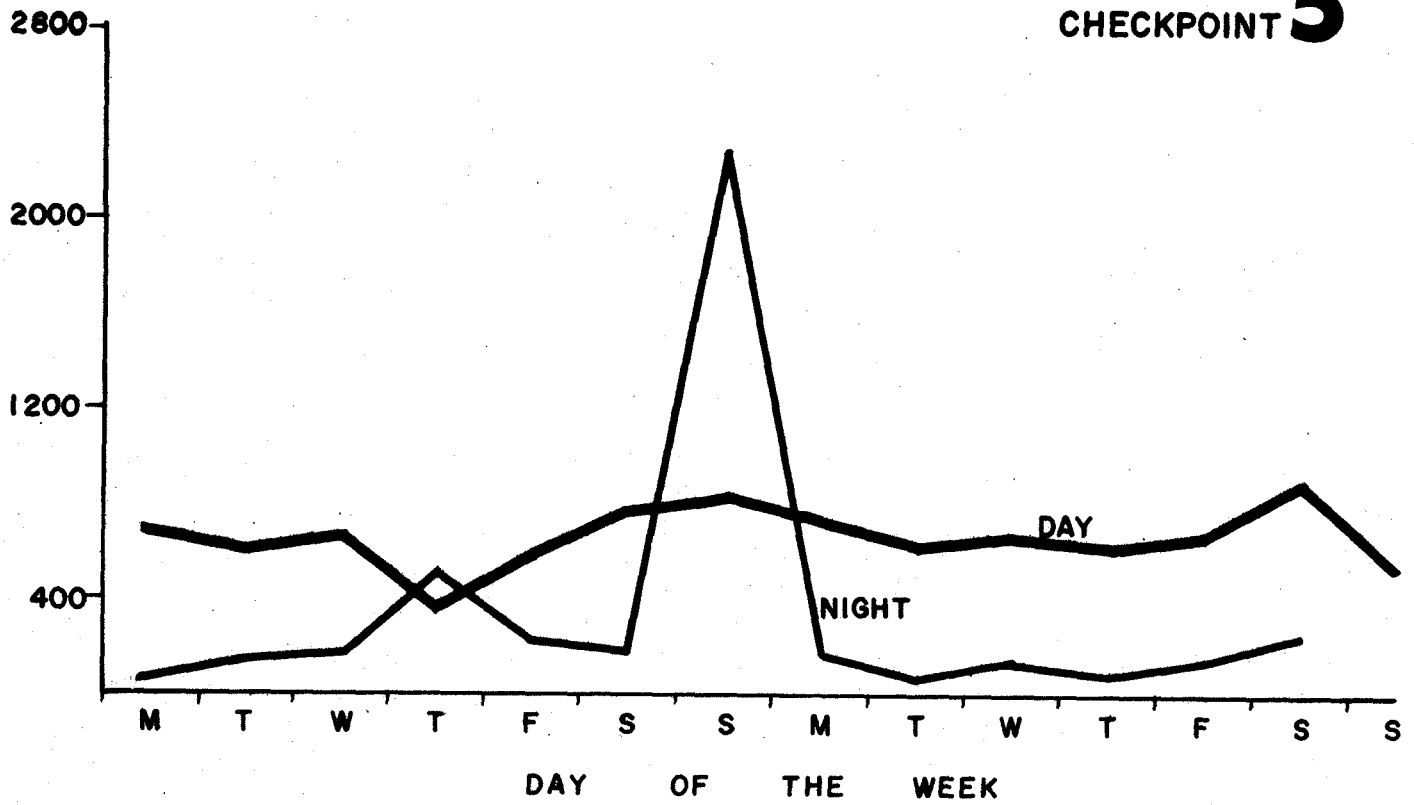
NUMBER OF AXLES

CHECKPOINT **4**



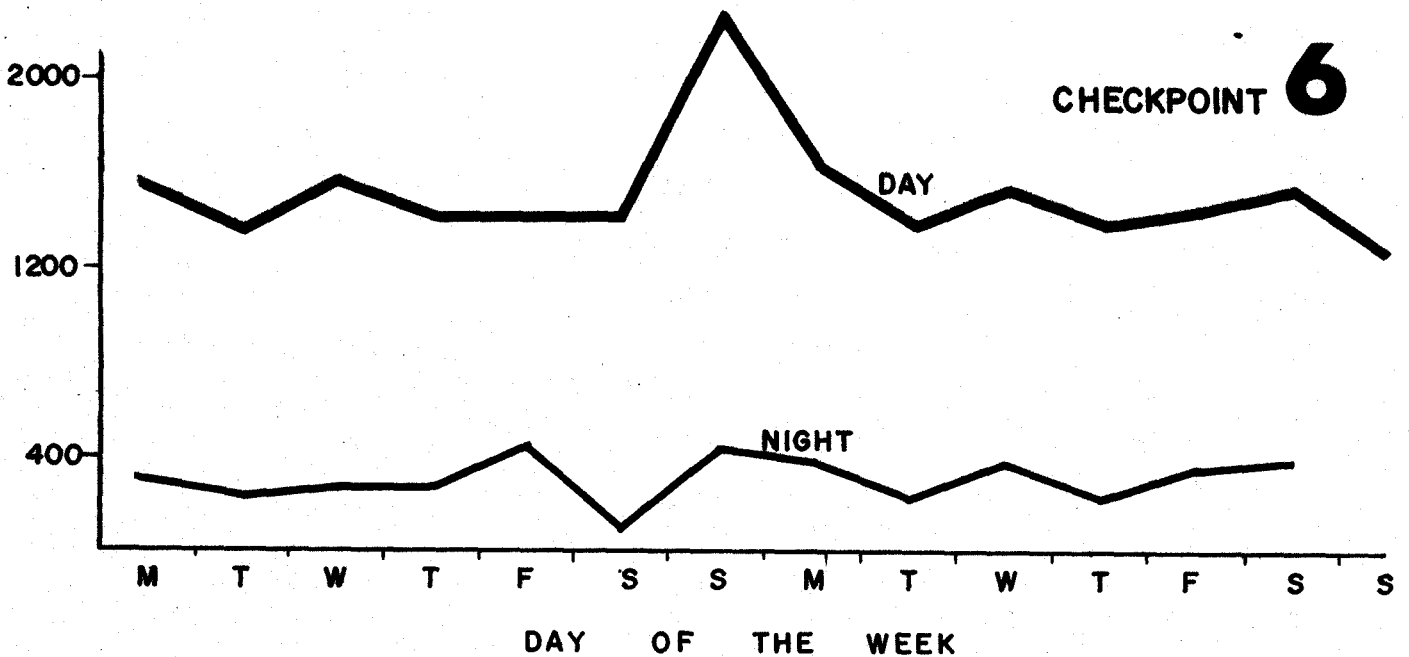
NUMBER OF AXLES

CHECKPOINT **5**



NUMBER OF AXLES

CHECKPOINT **6**



SECTION 4 PROPOSED SYSTEMS - PROBLEMS OF CURRENT TRAFFIC ASSIGNMENT

The relevant characteristics of the present traffic situation in Orange are set out in the foregoing tables. The next step is to examine the likely impact of a new road system within the context of the present pattern of traffic movements. Before this can be done, it is essential that certain basic elements of any new system be described.

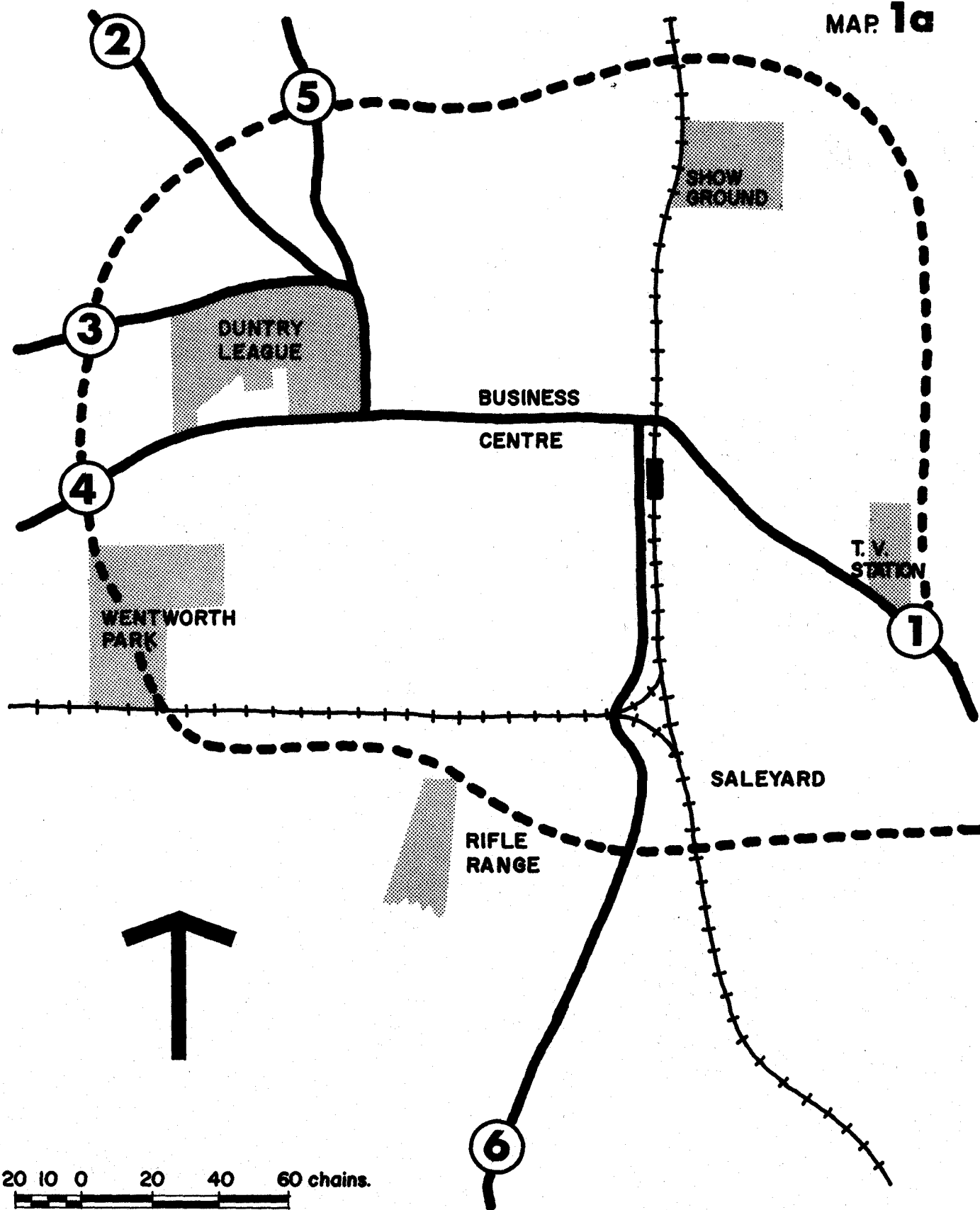
First, there is the definition of the generalised route of the bypass of Orange - the major element in any new road system. The location of the bypass, as has been noted in the introductory "Statement of the Problem", can be envisaged either to the north and east, or to the south and west, of Orange. For purpose of considering the problems of assignment in the ensuing parts of this Report, the particular locations of possible bypass routes, shown on Map 1a, have been accepted.

Second, there is a need to define the performance standards of the bypasses envisaged. These have been accepted as being those of a limited access or controlled access highway ultimately designed for operation at speeds of 60 m.p.h.

Again, to enable some simplification of the problem, it is desirable that the new system of roads be examined from two viewpoints - first, that of providing a bypass system and second, that of providing new entry routes into the built-up area from that bypass system.

(a) On Bypasses

In Part A, Section 4 of this Report, reference has been made to the classification of traffic into that which would not use a bypass, which might use a bypass and which could use a bypass. In this section of the Report, in an endeavour to compensate for the unknown behaviour of traffic which might use a bypass, it has been



BYPASS ROUTES ASSUMED
FOR ASSIGNMENT

ORIGIN AND DESTINATION SURVEY:
ORANGE, N.S.W., 1963.

A. 4a

assumed that 50% of the present traffic in this classification would use a bypass.

The following paragraphs are therefore applicable only to traffic which would, or which might, use a bypass if one were provided.

The simplest assignment of traffic is possible if it is assumed that a motorist, not interested in stopping in Orange, were, upon his arrival at Orange, to be presented with a simple choice between the existing route through the City, or a bypass route around the City.

The factors likely to influence his decision are:-

1. Driving conditions
2. Travel time
3. Extra distance involved, and
4. In the case of traffic which might wish to stop for petrol or refreshments, the facilities provided.

It can only be assumed that long distance travellers, i. e. the bulk of the through traffic, will seek the better driving conditions of a bypass. This is not necessarily true and will depend on the individual driver's preference. For example, driving in urban conditions may well represent a welcome change from the monotony of driving in rural Australia. The fourth factor, the facilities provided, will obviously influence patronage. The extreme case emerges where the road is lined with ribbon development and patronage is intense to the point of causing congestion. This factor depends upon land-use control policy towards allowing development along these routes. Consequently, the governing measurable factors are travel time and extra distance involved. Obviously,

A. 4a

the bypass must be considered as catering primarily for the heaviest through traffic movement, that is, along S.H. 7. Thus S.H. 7, east and west of Orange, should be considered the primary terminal roads for any bypass. However, because of the additional volumes of traffic which could be diverted to the bypass, because of the relatively short additional lengths of road construction involved, and because of the benefits to the entire system which might arise, it seems desirable to consider the alternative bypasses as follows:-

- (i) that to the north and east, commencing from S.H. 7, east of Orange, and ending at T.R. 61, west of Orange; and
- (ii) that to the south and west, commencing at S.H. 7, east of Orange, and ending at M.R. 573, north of Orange.

Given these basic factors, the relative merits of the two routes can be examined by comparing the travel time and extra distance involved on each, in comparison with the existing route.

(i) The route to the North and East of Orange

In all, there are fifteen possible distinct through traffic movements between the Checkpoints in the Survey. This route would cater for six of these movements of which only two are significant.

Table 1, below, sets out the estimated number of trips, recorded from interviews, between Checkpoints that could and might be expected to use a bypass.

TABLE I

ESTIMATION OF THE NUMBER OF TRIPS BETWEEN CHECKPOINTS WHICH WOULD BE EXPECTED TO USE A BYPASS, BASED ON TRIPS MADE BY VEHICLES IN THE SURVEY SAMPLE.

Trips between Checkpoints	Bypass likely to provide shortest route	Traffic which <u>might</u> be induced to use a bypass	Tuesday		Total traffic <u>expected</u> to use a bypass	Wednesday		Total traffic <u>expected</u> to use a bypass
			Traffic which <u>could</u> use a bypass			Traffic which <u>could</u> use a bypass		
1 - 1	-	3	-	-	2	-	-	-
1 - 2	2 - 1	E & N	58	78	107	60	78	108
1 - 3	3 - 1	S & W	24	38	50	22	21	32
1 - 4	4 - 1	S & W	2	7	9	1	3	4
1 - 5	5 - 1	E & N	1	7	8	3	2	3
1 - 6	6 - 1	S & W	-	3	3	3	2	3
1 - other	-	-	1	1	-	8	8	-
2 - 2	-	-	-	-	-	-	-	-
2 - 3	3 - 2	-	1	2	3	-	1	1
2 - 4	4 - 2	-	-	2	2	1	2	2
2 - 5	5 - 2	-	-	1	1	-	1	1
2 - 6	6 - 2	S & W	-	5	5	3	1	2
2 - other	-	-	2	2	-	-	-	-
3 - 3	-	1	-	-	1	-	-	-
3 - 4	4 - 3	-	-	-	-	1	1	-
3 - 5	5 - 3	-	-	1	1	-	-	-
3 - 6	6 - 3	S & W	-	1	1	-	1	1
3 - other	-	-	1	1	-	-	-	-
4 - 4	-	-	-	-	-	-	-	-
4 - 5	5 - 4	-	-	2	2	-	-	-
4 - 6	6 - 4	S & W	1	-	1	-	3	3
4 - other	-	-	1	1	-	-	-	-
5 - 5	-	1	-	-	-	-	-	-
5 - 6	6 - 5	S & W	-	2	2	-	3	3
5 - other	-	-	3	3	-	1	1	-
6 - 6	-	-	-	-	-	-	-	-
6 - other	-	-	1	1	-	2	2	-

A. 4a

Table J below, sets out the distances, in miles, from Checkpoint 1 to all the other Checkpoints by the routes examined.

TABLE J

Distance travelled between Checkpoints by route (in miles) - see Map 1a.

Terminal Checkpoints	Present Route	North & East Bypass	South & West Bypass
1 and 2	4.4	5.0	5.9
1 and 3	4.4	5.8	5.0
1 and 4	3.4	6.5	4.4
1 and 5	3.8	4.6	6.4
1 and 6	4.1	9.5	1.4

The north and east route connects only Checkpoints 1, 2, 3 and 5. Thus, a motorist travelling along this route would have to travel the following additional mileages because of his route selection:-

Checkpoint 1 to 5 or 5 to 1	0.8 miles more than present route
" 1 to 2 or 2 to 1	0.6 " " " " "
" 1 to 3 or 3 to 1	1.4 " " " " "

Now, the times for the journeys can be calculated for the two routes on the following basis:-

- (i) On the bypass, an average speed of 40 miles per hour throughout; and
- (ii) On the present route through Orange, on the basis of 20 miles per hour throughout.

A.4a

Then, in terms of the journey from:-

- Checkpoint 1 to 5 or 5 to 1 - the bypass route would save about $4\frac{1}{2}$ minutes
- Checkpoint 1 to 2 or 2 to 1 - the bypass route would save about $5\frac{1}{2}$ minutes
- Checkpoint 1 to 3 or 3 to 1 - the bypass route would save about 4 minutes.

Thus, while the bypass route would involve additional mileage, it would result in an overall saving in time. Also, the figures above tend to minimise the probable time difference on the two routes.

Further, in terms of vehicle miles travelled between Checkpoints 1, 2 and 3, the use of the bypass route would add an average of less than 1 vehicle mile per trip to the vehicle miles travelled between the various Checkpoints by vehicles in one day as typified by those in the Survey.

(ii) The route to the South and West

This route caters for ten of the possible fifteen through traffic movements between the Checkpoints. Once again, however, only two of the movements are really significant. Using the same criteria as for (i) above, the bypass route is found to involve travelling further in most cases - e.g. from

- Checkpoint 1 to 2 or 2 to 1 - 1.5 miles extra
- " 1 to 3 or 3 to 1 - 0.6 " "
- " 1 to 4 or 4 to 1 - 1.0 " "
- " 1 to 6 or 6 to 1 - 2.7 " less

Similarly, it is found that time saving would occur as below:

- From Checkpoint 1 to 2, $4\frac{1}{2}$ minutes
- 1 to 3, $5\frac{1}{2}$ "
- 1 to 4, $3\frac{1}{2}$ "
- 1 to 5, 10 "

A. 4a

Finally, considering traffic between Checkpoints 1, 2 and 3, it is evident that the bypass route would involve travelling slightly more than one vehicle mile per trip, over and above that recorded on the present route, when considered in relation to the total traffic likely to use the route as evidenced by interviews on the days of the Survey.

It is evident that a motorist, not interested in stopping in Orange, would find either a north and east or a south and west bypass route acceptable to him because, although he would be forced to travel approximately one mile further, he would make a saving of about 25 to 50% in the time he required to pass through Orange.

Unfortunately, although the analysis shows that a bypass should be acceptable to motorists travelling through Orange without stopping, it does not show either of the possible routes as being the more acceptable.

In fact, on this basis alone, without details of resumption costs, construction costs, and other social costs, it is not possible to recommend one bypass route more favourably than the other.

(b) On Entry Roads

The second very significant factor which must be considered in designing a road system for Orange is local traffic - more particularly, that which passes in and out of Orange along the various entry ways, either originating from Orange or having business in Orange. The heaviest flows of this traffic occur along S.H. 7 to the east of Orange, but, at every Checkpoint, this local traffic comprised the major part of the total traffic flow. The largest generator of this local traffic appears to be Town Zone A - the business centre of Orange.

What are conditions encountered by this local traffic on the routes from the boundaries of Orange to Town Zone A? From Check-

A. 4b

point 1 to Town Zone A, the route is certainly the shortest possible, but it crosses the Summer Street railway level crossing which must always be likely to cause major delays and danger. From Check-points 2, 3, 4 and 5 the routes are well defined and are about the shortest possible. Unfortunately, they tend to dissect Orange, but there seems to be little which can be done to reduce this. From Checkpoint 6, the route is poor, having to negotiate a very badly aligned railway overbridge.

Ideally, the entry roads to Orange should be able to discharge traffic onto the local street system very close to their main destination, behind the shops in Town Zone A, without the traffic having to pass through a built-up area with direct access to the entry road. Also, the route should be as direct as possible.

Any new entry road from the north, east or west of Orange, to Town Zone A, does not appear possible without traversing the existing residentially developed street system. It is, however, possible to reach within a very short distance of the town centre from the south without following the existing street system and without interfering with intensely developed property.

It would seem that first consideration should be given to a new entry road from the south linking with a south and west bypass. Usage of this road would be by those vehicles travelling to or from the south of Orange and by vehicles travelling along S.H.7 to the east of Orange. This latter assumption is based on the fact that, whilst the route would be longer than that now in use, it would be designed for higher speeds and should not involve a railway level crossing and, consequently, would be the more acceptable route.

If a south and west bypass were envisaged, entry from the west would best be achieved along Coronation Drive, the shortest possible route. The Parkes Road, T.R.61, could be deviated to enter Orange at this same point as the Cargo Road, M.R.237. One of the problems of any bypass would be to design the entry to the bypass

A. 4b

from the Molong Road, S.H. 7, in such a fashion that the easier transition would be from S.H. 7 to the bypass rather than to the entry road. It is therefore suggested that the entry way from the northwest be by way of the March Road, M.R. 573, rather than along S.H. 7. At the eastern end, the junction of the bypass and Bathurst Road would also need careful planning to either compel or encourage traffic to use the new route.

Now, if the bypass envisaged ran to the north and east of Orange, the entry roads system would not be as simple or as attractive. First, a new entry from the east, i.e. S.H. 7, would probably be along an existing street and would almost certainly involve a level crossing of the railway line, either at Summer Street or at some point further north. If this crossing was at Summer Street, the new road would not have a great deal of advantage over the existing Bathurst Road. If it were at a point further north, it would be even less attractive as it would involve a considerable increase in mileage for no real increase in driving comfort or in time, or any decrease in the probability of delays and danger.

Entry from the north-west could remain along the Molong Road but this would result in the prolongation of the completely unsatisfactory complex road junctions north of Dundry League. Alternatively, M.R. 573 could be used, or a new entry road opened along one of the existing north-south residential streets.

Entry from the west, i.e. from T.R. 61, would have to remain as at present, because a deviation to the northwest or northern entry would be completely unjustified. In fact, it would appear that there would be little justification for extending the bypass beyond S.H. 7 to T.R. 61.

Thus, from the point of view of any entry roads leading into the centre of Orange, the only really good route is that from the south and this would operate best in conjunction with a south and west bypass route.

A. 4b

Reverting to a general consideration of the possible systems suggested in "The Statement of the Problem" at the beginning of this Report, it becomes evident that a bypass route around Orange would find acceptance with through traffic. Second, that the preferable route from the points of view of the through traffic and the local traffic would be one to the south and west of Orange.

There are some other considerations which should be mentioned at this stage. The south and west bypass as described earlier in this Section would connect to all the major roads radiating from Orange and would appear to act as a better collector and distributor road to the region than would a north and east bypass. The latter, however, would serve the better if the only function of the bypass were to handle through traffic on S.H.7. To envisage this as the major role of the bypass, considering present traffic volumes and likely future volumes, seems unwarranted.

The south and west route could present difficulties in design for 60 m.p.h. operation because of the number of roads which it intersects and which would have to be provided with access to it. However, this seems unlikely, because, if and when these intersections become the limiting factor on speeds or volumes, the offending road junctions could be eliminated either by grade separation or by service roads paralleling the bypass. This route, however, also presents greater difficulties from an engineering viewpoint.

Despite these factors, unless the route has to be extensively changed from that shown in Map 1a, in particular, if it has to be deviated around the racecourse, then the south and west route appears the better of the two. Should large scale deviation be necessary, then the north and east route may become clearly more acceptable from the point of view of through traffic.

On the suggestion that a ring road system should be developed,

A. 4b

the Survey results can be of little assistance. Traffic volumes are very low at present and appear likely to remain within the capacity of a single 2-lane highway for many years. Thus, it is difficult to foresee the need for a ring road. Any development of a ring road would have to be in the context that one arm of the ring would be a purely local road for many years. In the distant future, it could serve as a useful local arterial road.

SECTION 5 TWO POSSIBLE TRAFFIC ASSIGNMENTS

Detailed assignments of the traffic flows along the possible bypass routes can only be carried out for the trips, including those defined by interviews, between 7.00 a.m. and 7.00 p.m. on the Tuesday of the Survey.

The Table below sets out the relevant information about the traffic flows and the number of vehicles in the sample in that period.

Checkpoint	No. of Vehicles in Sample	No. of Vehicles passing through Checkpoint between 7 a.m. & 7 p.m. on Tuesday	Modified Average Daily Traffic
1	344	1,620	2,194
2	245	822	1,120
3	199	689	914
4	115	458	656
5	74	305	432
6	137	670	869

Theoretically, the number of vehicles in the sample should be 25% of all the traffic recorded, regardless of the direction of flow, between 7.00 a.m. and 7.00 p.m. Obviously, traffic flows between 7.00 a.m. and 7.00 p.m. on the Tuesday are lower than the average daily traffic even when these are modified for the effects of the long weekend. A great deal of this difference would be due to traffic in the 7.00 p.m. to 7.00 a.m. period. The daylight traffic on an average day should not vary from that recorded on the Tuesday of the Survey by more than $\pm 25\%$. As volumes recorded throughout are very light, any fluctuation in the flows should not require additional capacity in any facilities designed to handle the volumes recorded in the following assignments.

Night-time traffic will almost certainly have a different pattern from that during daytime but as the volumes are so much lower, facilities

A. 5

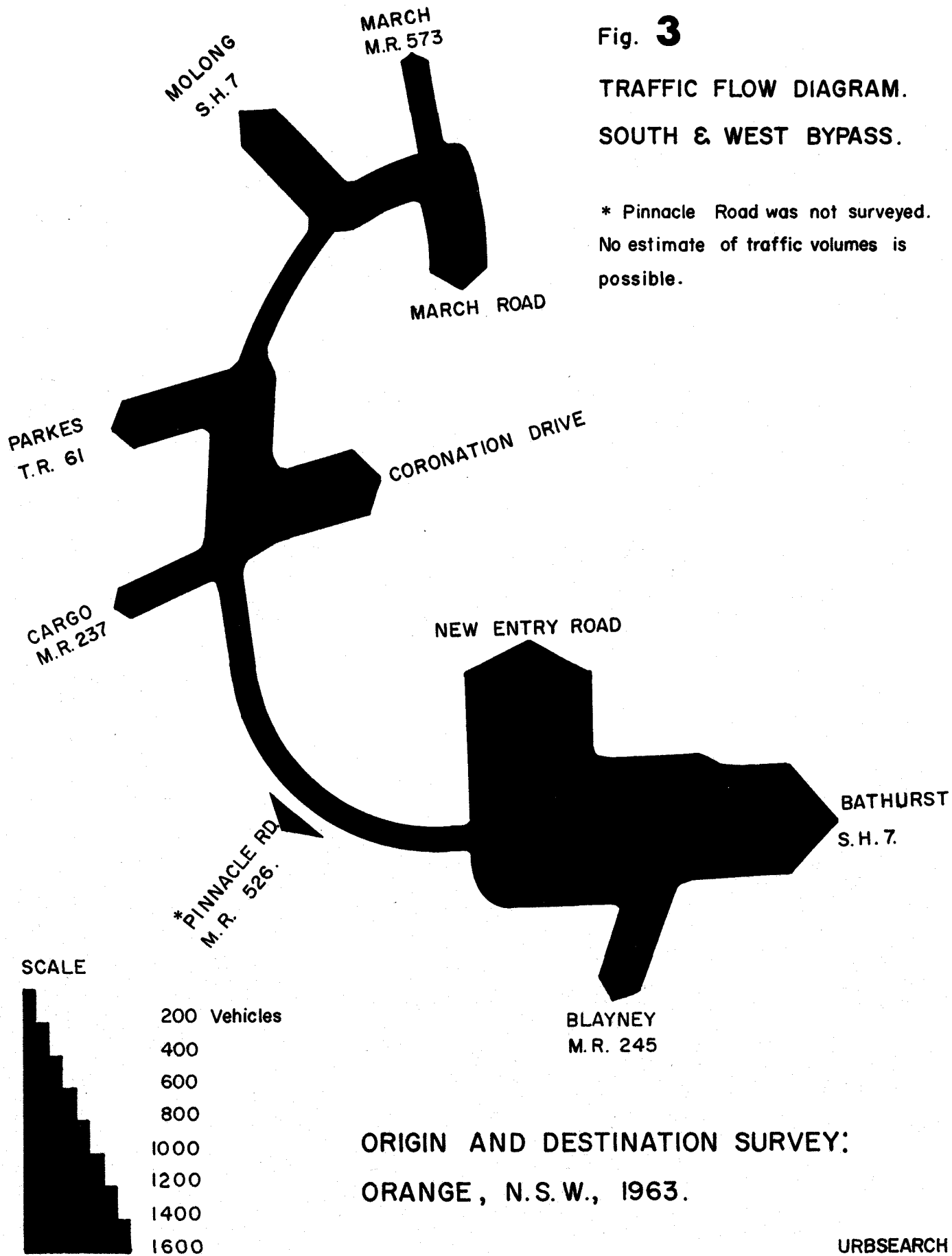
designed to cope with daylight traffic would certainly cope with night-time flows.

Admittedly, there is a possibility that on a limited number of days of the year - about 30 - even at present volumes, the capacity of the facilities could be subjected to strain for short periods. To design for free flow at these peak periods, would seem to be uneconomical.

(a) A South and West Bypass System

Figure 3 indicates the volumes expected along a south and west bypass planned as follows:-

- i. It would depart from the present route of S.H. 7 about one and one half miles east of the City boundary;
- ii. Access from the bypass to the present Bathurst Road and the Saleyards could be provided for by an intersection midway between the existing route of S.H. 7 and the railway line. (Note: this access point has not been incorporated in the assignment shown in Fig. 3);
- iii. After crossing the railway line by an overbridge, it would intersect and terminate M.R. 245 in a T-junction;
- iv. Westward of this junction, a further T-junction should be provided to allow access to the town centre of Orange along the new southern entry road;
- v. The bypass would then proceed westwards roughly paralleling the railway line either intersecting with or terminating the Pinnacle Road (M.R. 526), passing over or under the railway at the southwestern corner of Orange, close to or into Wentworth Park, and then northwards to intersect with the Cargo Road (M.R. 237) and Coronation Drive on the City boundary.
- vi. The bypass would continue northwards to intersect with the Parkes Road (T.R. 61) on the City boundary, and would terminate it in a T-junction. Traffic from T.R. 61 would enter Orange by way of Coronation Drive;



A. 5a

- vii. Continuing northeastwards the bypass would intersect with the Molong Road, S.H.7 and terminate it at a T-junction; and
- viii. The bypass would then continue on eastwards and terminate at the March Road M.R. 573 at a T-junction.

Appendix C sets out the traffic flows, as revealed by the O & D Survey, which would have occurred between 7.00 a.m. and 7.00 p.m. along this bypass, had it been in existence and in operation on the Tuesday of that Survey.

It is noteworthy that that section of the bypass west of the new southern entry into Orange, would have carried only 380 vehicles in this twelve hour period. From this it seems obvious that considerable time must elapse before through traffic volumes become sufficient to warrant the construction of even a 2-lane bypass. On the other hand, flows between S.H.7, east of Orange, and the new entry road could already be in excess of 2,000 vehicles per day and this probable usage could be sufficient to warrant immediate action on this section of the route.

(b) A North & East Bypass System

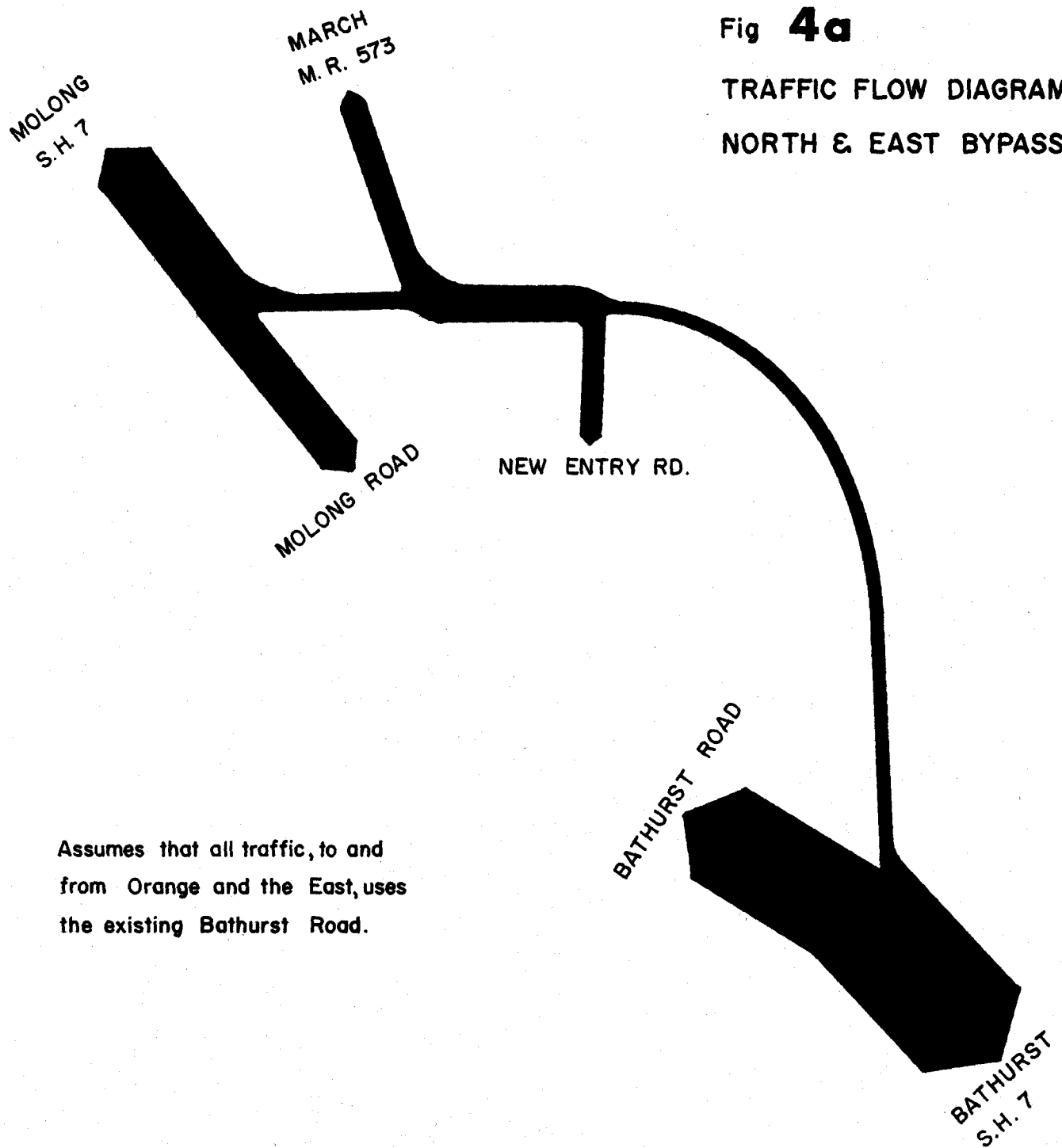
Figures 4a, 4b & 4c illustrate the traffic flows which might have occurred along a north and east bypass route, had it been in operation on the 5th June, 1963.

Basically, the bypass route is envisaged as follows:-

- i. It departs from S.H.7 and Bathurst Road just east of the television station; it then proceeds northwards, skirting the built-up area, and swings to the west across the railway, north of the Showground;

Fig 4a

TRAFFIC FLOW DIAGRAM.
NORTH & EAST BYPASS.



Assumes that all traffic, to and from Orange and the East, uses the existing Bathurst Road.

SCALE

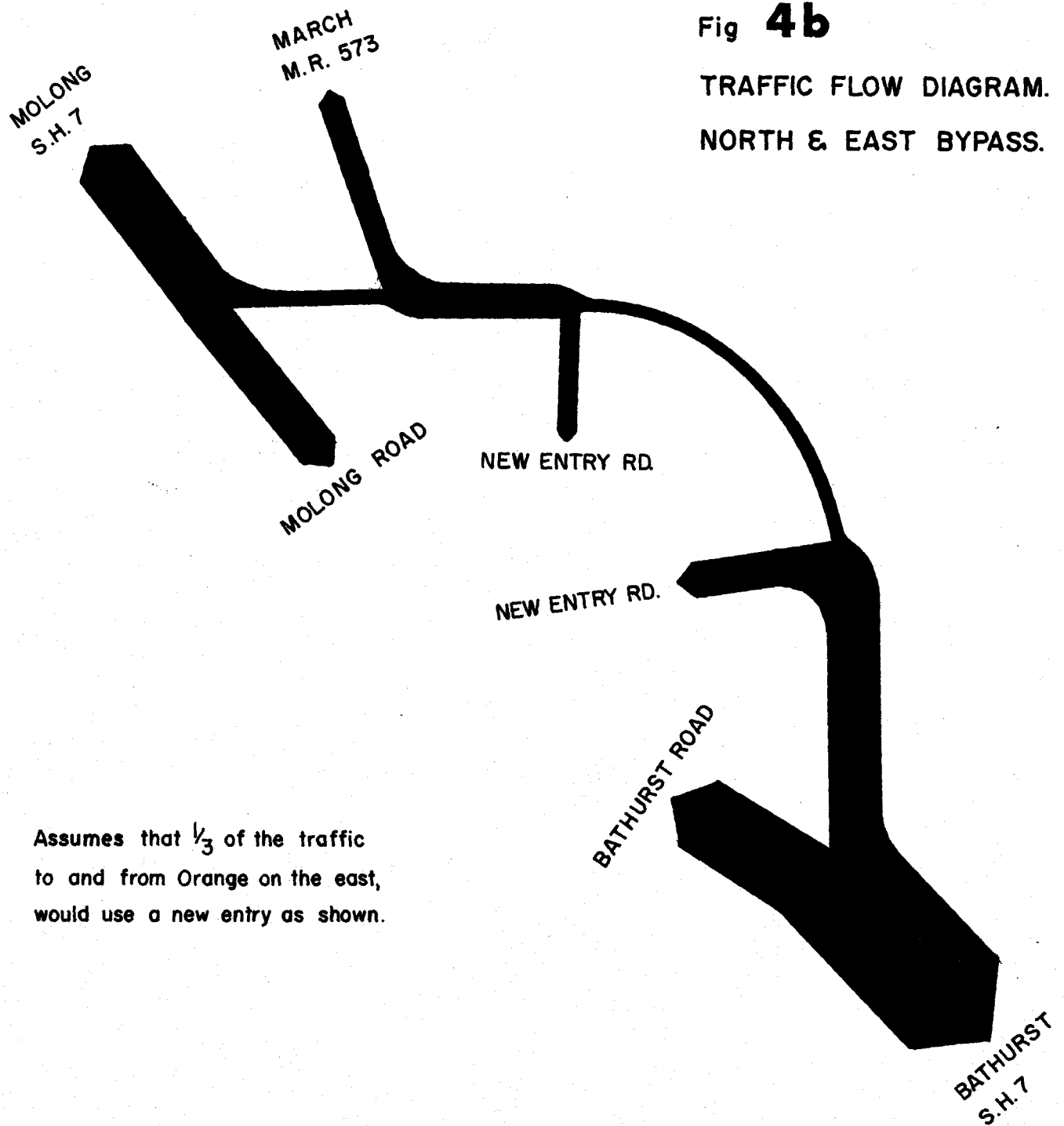


200 Vehicles
400
600
800
1000
1200
1400
1600

ORIGIN AND DESTINATION SURVEY:
ORANGE, N.S.W., 1963.

Fig 4b

TRAFFIC FLOW DIAGRAM.
NORTH & EAST BYPASS.



Assumes that $\frac{1}{3}$ of the traffic
to and from Orange on the east,
would use a new entry as shown.

SCALE

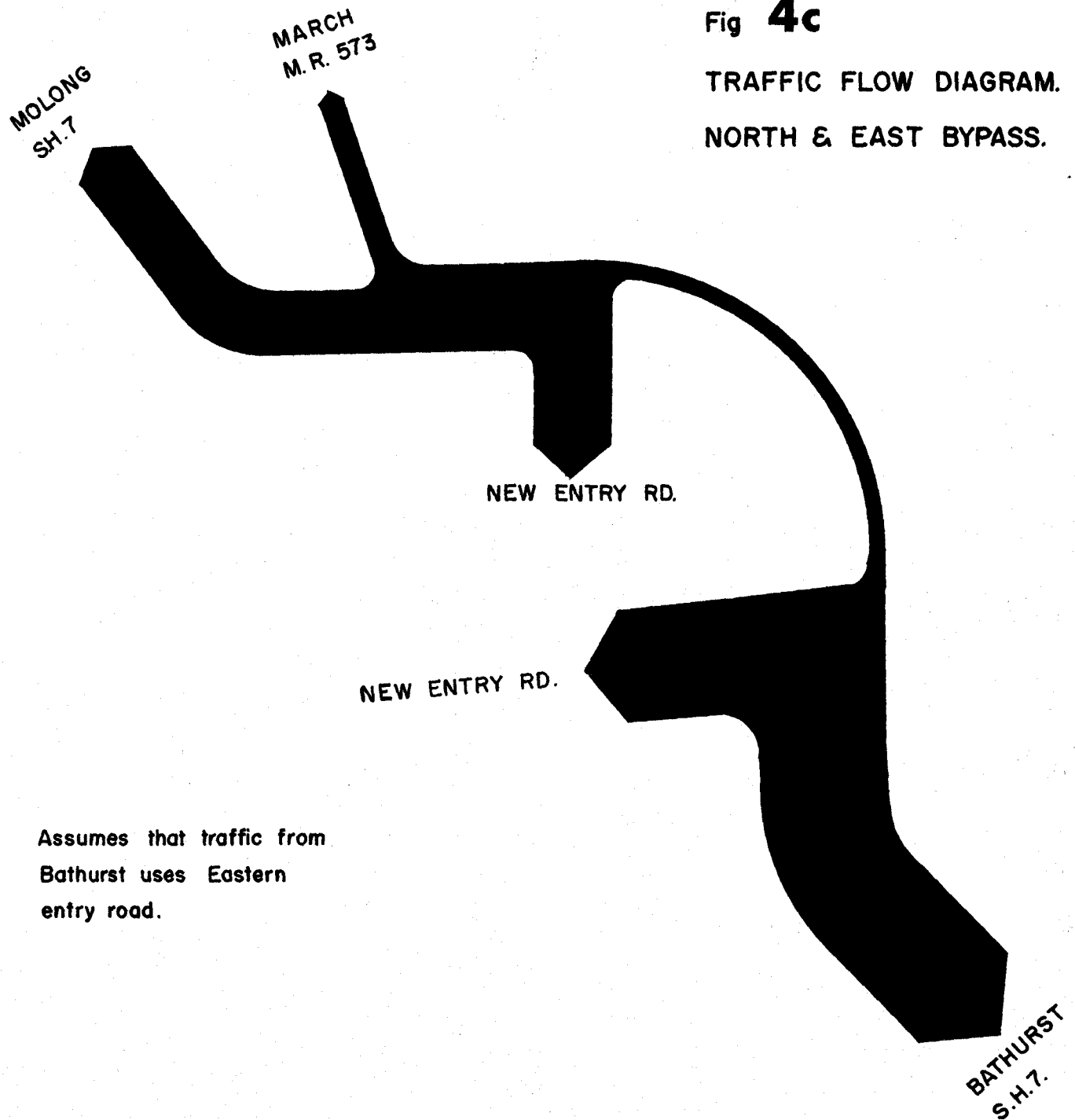


200 Vehicles
400
600
800
1000
1200
1400
1600

ORIGIN AND DESTINATION SURVEY:
ORANGE, N. S. W., 1963.

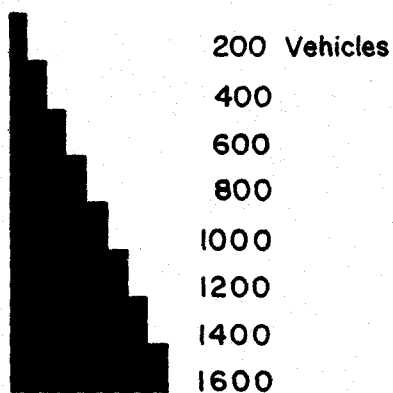
Fig 4c

TRAFFIC FLOW DIAGRAM.
NORTH & EAST BYPASS.



Assumes that traffic from
Bathurst uses Eastern
entry road.

SCALE



ORIGIN AND DESTINATION SURVEY:
ORANGE, N.S.W. 1963.

A. 5b

- ii. West of the railway, the route runs westwards and a new northern entry road to Orange is provided connecting with the city centre along Hill or Anson Streets; and
- iii. The bypass terminates M.R. 573, the March Road, in a T-junction and is itself terminated at S.H.7, the Molong Road, once again in a T-junction.

In Figure 4a, both the Molong Road and Bathurst Road are envisaged as remaining open to traffic and, consequently, as handling all the present local traffic.

In Figure 4b, an additional entry road from the east is envisaged leading to the city centre by way of a railway level crossing and along a route composed mainly of existing residential streets. The proportion of local traffic entering or leaving by way of Bathurst Road which would use this route has been arbitrarily assumed as a third. This is probably excessive in terms of present day traffic conditions but should volumes increase significantly in the future, it could become a more realistic division of the traffic flow.

Figure 4c, envisages both the Bathurst and Molong Roads being closed to local traffic. Consequently, all local traffic from the east would enter by way of the new entry road and traffic from the northwest by way of the new northern entry road.

The traffic flow conditions on this bypass in any of its variations are far simpler than those on a south and west bypass route. Traffic flow over the greatest part of the bypass would have been about 240 vehicles per day. Because of the greater length of road carrying less traffic, the economic justification for this route would recede even further into the future than was the case of the south and west bypass route.

SECTION 6 COMMENTS ON SURVEY DESIGN & PROCEDURE

The Survey carried out at Orange was, in many ways an experiment. Its prime objective was to reveal a clearer understanding of the traffic patterns and travel desires of motorists travelling in the environs of Orange. In this, it was successful. At the same time, it had its limitations and its shortcomings.

The Survey was not, and was not intended to be, a comprehensive origin and destination study. It was designed to point up trends in travel desires sufficiently to enable a reasonably accurate assessment of a road system to be made. The fact that the Survey was restricted to two days duration rules out the possibility of its being a comprehensive O & D Study which must be balanced over at least 6 months of the year to eliminate seasonal variations. However, about the rural city, traffic flows are so light that even major seasonal fluctuations would not be so great as to negate the trends indicated by a study such as that conducted at Orange.

To ensure that the experimental value of this Survey is not overlooked, the following comments are made on the Survey Design & Procedure:-

i. There were fears, when the Survey was being designed, that rural motorists would not co-operate in a survey of this nature. It was found that, on the contrary, people interviewed in the Survey were most co-operative and, in fact, volunteered, in many cases, more information than was actually sought. Extensive prior local publicity of the Survey may have been responsible for this, but it was found that motorists from more distant places, including Sydney and other States, were just as willing to co-operate. As an outcome of this, questionnaires in any future surveys could be broadened and more detailed information sought without incurring the likelihood of even a low refusal rate.

ii. The concept of a survey, where interviewing was carried out only of outbound traffic, was found to be quite satisfactory.

A. 6ii

Collection of factual data about past events is greatly preferable to questions based on probable future events. In this case, only one question - that as to where the trip would end - was about a future event. There is one weakness in this type of survey. No information is gained about trips which enter the cordoned area and do not emerge, i.e. trips which terminated in Orange. Theoretically, these trips are balanced by those trips which leave the cordoned area and do not return. There are cases where these inbound trips could be significant. For instance, in the present Survey, there was evidence that on the Wednesday, many motorists from outside Orange were still in Orange when the Survey was forced to end.

There does not appear to be any simple procedure whereby this shortcoming can be overcome, except, where conditions permit to extend the hours of the Survey.

iii. There does not appear to be much value collecting information about the number of persons in each vehicle. If school buses are excluded, the figures from the present Survey on vehicle occupancy are in line with those generally quoted. They ranged, at each Checkpoint, from 1.6 to 2.0 persons per vehicle when taken over each day, and, over the whole Survey, the average was 1.8 persons per vehicle. It would appear that this question could be replaced by another if required.

iv. One essential point, which should be clearly evident about every trip in a survey such as this, is the route of entry to the cordoned area. In this Survey, this was not so. Whilst it is true that in the majority of cases it is evident, there is a definite need to incorporate a question specifically designed to indicate the route travelled when entering the cordoned area.

v. The single question, "where did this trip start?", is unsatisfactory. It has little value from the point of traffic assignment. In a survey at Orange, knowing that a trip started in

A. 6v

Melbourne and was going to Brisbane, does not help assignment. If a specific question as described in (iv) above, is not asked, then it would be better to rephrase this question to discover the place where the vehicle was parked the previous night. This would enable a more accurate assessment of the route used to enter the cordoned area.

The question as it stands does have value from the viewpoint of determining the real nature of the traffic flow in terms of its initial origin and ultimate destination.

vi. To remove the possibility of confusion in the analysis of the data, it seems desirable that only the main purpose of the stop inside the cordoned area be recorded. A multiplicity of reasons leads to confusion.

vii. The assignment of locally originating trips, i.e. those which originate within the cordon, could be carried out more effectively if the actual address of the origin were recorded. This applies equally to stops incurred on through trips. The broad zonings adopted in the present Survey are not of a great deal of value in defining the travel desire pattern within the cordon.

viii. Following on from (vii) above, consideration should be given to the size of the town zone selected. The splitting up of the urban area into numerous small zones would seem to be a pre-requisite for future surveys. These zones could be defined by similar land uses within each and should be limited to a fairly small area. If these smaller zones proved to be statistically insignificant, it would be possible to add them in some rational order until statistically significant generation figures were obtained. The use of smaller zones would allow a far better picture of the local traffic movements to be built up. It would also enable a better determination to be made of such things as the likely usage by local traffic of a ring road distribution system.

A. 6

ix. There should be some clarification of the definition of a "trip". For example, a trip was recorded, in some instances, as being from Town Zone A to Milthorpe, and, in other instances, what could be the same type of trip, as being from Milthorpe to Milthorpe, stopping in Orange for the purpose of shopping. The latter yields more information than the former. In fact, it would seem the preferable way of recording the trip particularly if a question about the actual address where the trip was interrupted was recorded also. Where a trip was given by the motorist interviewed as starting from within the cordon, it seems desirable to follow this up with a question along the lines of "Is that your home address?" or "Do you work there?". That is, the purpose at the origin of the trip should be discovered. This would ensure uniformity in the method of recording similar trips.

x. In future surveys, it seems desirable that more intensive interviewer training and supervision should be carried out. There were cases in this Survey where information, e.g. the type of vehicle, had been omitted, or where conflicting information was recorded. There were also cases where, had the interviewer understood the objects of the Survey more clearly, then the information given by the motorist would have been queried further, to remove obvious inconsistencies:- for example, a motorist on S.H.7 west of Orange, whose trip was recorded as starting from Sydney, not stopping in Orange, and ending in Sydney. In cases like this, there must be some intermediate destination of the trip, or purpose for it, and this is the information that should be recorded.

xi The use of recording traffic counters would, of course, be of considerable help, not only in defining peak volumes, but also because it would allow for greater flexibility in the hours of survey, thereby enabling adverse weather conditions and previously unnoticed peculiarities in the traffic flows to be overcome. Furthermore, it is possible that the direction of traffic flows could be significant. For instance, there seems to be some signs that at Orange on the days of the Survey, there was a greater movement westwards than eastwards along S.H.7. This could be reversed later in the week.

A. 6xi

Such flows could reveal some characteristics of the weekly traffic pattern which could be of value. It seems that the installation of two counters at each Checkpoint, to count vehicles in either direction, would be an advance to be incorporated in future surveys. This could possibly be done regardless of the type of counter used.

xii. If surveys of this nature are to be carried out outside the hours of strong daylight, it is most essential that the Checkpoints be properly lit. Floodlighting is desirable, particularly where flows are relatively heavy, if only in the interests of the safety of interviewers. The minimum standard of lighting acceptable should be equal to good street lighting, e.g. as from mercury vapour lamps.

xiii. The Survey at Orange was not a complete cordon count. At least one Main Road and one local road, which carried small volumes of traffic, were not covered by the checkpoints established. Of the six checkpoints in the Survey, in all probability, Nos. 4 and 5 could have been omitted without greatly altering the outcome.

Such minor roads could probably be omitted from future surveys.

If a series of surveys were completed, it may then be possible to describe performance standards, whereby, in future surveys, roads would be included or excluded as the case may be. Present experience seems insufficient to enable such a determination to be made and in the next few surveys of this type, it would appear better to include these minor roads, to learn more about them, than to exclude them and risk overlooking an important trend.

xiv. The time of the year selected for the survey should be carefully chosen so as to avoid any abnormal traffic conditions, e.g. long weekends, which could distort the typical traffic pattern.

PART B

THE PLANNING OF A ROAD SYSTEM FOR ORANGE

SECTION 1 THE REGIONAL CONTEXT

Orange lies 166 miles west of Sydney, on the western edge of the plateaus of the Great Dividing Range. Its population was estimated at 19,120, on June 1, 1962. It is thus the seventh largest provincial city in New South Wales omitting the Sydney, Newcastle, Port Kembla conurbation.

Over the last two decades, Orange has grown to be the largest city in Central New South Wales. Its regional importance is, however, somewhat diminished by the close proximity of surrounding cities of slightly less population e.g. Bathurst, Dubbo and Parkes.

Holmes, in his "The Geographical Basis of Government" (1944) suggested that Orange's sphere of influence extended over the eastern half of the Molong Shire, and the Canobolas and Lyndhurst Shires.

The surveys carried out in 1959 to determine the spheres of influence for the City of Orange Town Planning Scheme indicated that the limits of Orange's spheres of strong influence lay within a 25 miles radius of Orange except on the east, where this distance was considerably reduced. It was pointed out in those studies that Orange had a sphere of influence from the administrative sector of its functions which spreads widely over Western and North Western New South Wales.

It is not unexpected, therefore, that the results of the 1963 Orange O. & D. Survey support these results. Over 50% of all vehicles interviewed were travelling to destinations less than 25 miles from Orange. Similarly, of the "through" trips recorded, over 40% started from origins within 25 miles of Orange.

B. 1

Generation from the area lying 25 to 50 miles from Orange, was far less significant. Only 13% of destinations, and a similar percentage of the origins of "through" trips, lay in this area.

It is significant, however, that 32% of the origins of "through" trips lay more than 75 miles from Orange and that 31% of the destinations of these trips were over 75 miles from Orange. This is in sharp contrast to the very small percentage (7%) of trips originating in Orange which were travelling to destinations more than 75 miles from Orange.

These figures reflect Orange's position as an important road junction. The relative importance of the various roads in this respect can be seen from Tables F & G in Part A of this Report. Over 75% of the long distance traffic, i.e. having origins or destinations (or both), over 75 miles from Orange, was recorded at Checkpoints 1 and 2, on State Highway 7. Trunk Road 61 was the only other road where any appreciable amount of this traffic was recorded.

From these same Tables, it is obvious that only a quarter of this long distance traffic had reasons for stopping in Orange which could be described as adding to Orange's regional influence.

The picture of Orange that emerges from the Survey is primarily that of a rural service centre, which, being located on a major highway, has some influence along that highway, but which acts mainly as a stopping place for refreshments, petrol or accommodation for 'through' travellers on the highway.

Although not set forth in any specific table, the long distance traffic which passes through Orange can be divided into two distinct types. First, there is that moving from Sydney to the Central West, Far West and Far North West of the State or

B. 1(a)

vice versa - primarily an east-west movement. Second, there is that traffic moving in a generally north-south direction, made up of interstate tourist traffic from Victoria and Queensland, and of intra-state traffic movements between areas west of the Great Dividing Range.

In planning a road system for Orange, consideration should be given to the likely requirements and growth of the traffic patterns and travel desires of each facet of the total traffic movement revealed by the survey. The facets can be listed as:-

- (a) The local rural-service centre traffic
- (b) The east-west long distance traffic
- (c) The north-south " " "
- (d) Other traffic.

(a) The local rural-service centre traffic

The requirements of this traffic have already stabilized and are unlikely to change. The surrounding population looks to Orange for the majority of the central place functions which they require, and this allegiance is unlikely to be broken. Urban growth in the region is relatively slow and now that Orange has established a clear lead in population growth it seems unlikely that any other centre will arise to challenge this leadership. Even in the event of another city supplanting Orange as the largest centre of population in the Central West, Orange would still retain the allegiance of the local rural population simply because of the long distances to any other competing or dominating centre.

The distribution of Orange's local sphere of influence has already been remarked upon. It is governed by the topographical features

B.1(a)

of the area. There is a marked absence of rural villages and rural development to the east and north-east of Orange. Consequently, the sphere of influence is roughly semi-circular in shape, with the diameter running north-south, slightly east of Orange.

Map 2 shows the distribution of population densities by Local Government Areas around Orange.

This distribution of population and Orange's sphere of influence are already reflected in the location of the Main Roads radiating from Orange - all run to the north, the west, or the south of Orange.

The economic activities within this sphere of influence are mainly agricultural and pastoral. There is a great deal of mixed farming in the area. The predominating agricultural pursuit close to Orange is non-citrus fruit growing whilst wheat and other grains become more important to the west, in the Molong Shire, but sheep, mainly for meat, are raised throughout the area. Dairying, poultry farming and other agricultural pursuits are carried on but are much less important.

In the past, the now sparsely inhabited areas to the east of Orange have yielded valuable gold and other mineral ores, but mining activity in the whole area is now almost at a standstill.

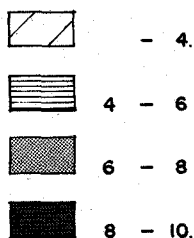
Table K sets out the changes in the population of Local Government Areas around Orange over the 1947-1961 intercensal periods. As evidenced throughout Australia, there was an absolute decline in the rural population in the last intercensal period. Present indications are that this will continue because of increasing farm mechanization and falling farm profitability. There must, however, be a lower limit to this decline.



20 15 10 5 0 20 40 miles



AVERAGE DENSITY
Persons per sq. mile.



MAP 2

POPULATION DENSITY
OF SHIRES: 1961

TABLE K

POPULATION STATISTICS OF THE CENTRAL WESTERN AREA

L. G. Area	Population*		Increase		Population*		1954 - 1961	Density per square mile
	1947	1954	1947 No.*	1954 %	1961	1954 No.*		
<u>Municipalities:</u>								
Orange	15.7	18.3	2.6	16.6	19.0	.7	3.9	-
Bathurst	13.6	16.1	2.5	18.0	16.9	.8	5.3	-
Lithgow	14.5	15.1	.6	4.0	14.2	(-).9	(-)6	-
Dubbo	10.2	12.0	1.8	17.6	14.1	2.1	17.7	-
Parkes	6.9	8.0	1.1	16.0	8.2	.25	3.2	-
Forbes	5.9	6.5	.6	9.9	6.8	.3	4.8	-
Cowra	5.5	6.1	.6	10.9	6.3	.2	3.2	-
Mudgee	5.0	5.3	.3	6	5.3	-	(-) .4	-
Grenfell	2.4	2.6	.2	8.3	2.4	(-).2	(-)8.6	-
Peak Hill	1.1	1.4	.3	27.3	1.5	.1	3.8	-
<u>Non-Municipal Towns:</u> (these populations are included in their respective shires)								
Wellington	4.7	5.2	.5	10.6	5.9(a)	.7	13.5	-
Blayney	1.6	1.7	.1	6.3	1.9	.2	12.1	-
Molong	1.7	1.8	.1	6	1.7	(-).1	(-)6	-
<u>Shires:</u>								
Abercrombie	2.9	3.0	.1	3.5	2.9	(-).1	(-)3.6	3.2
Blaxland	9.3	9.0	(-).3	(-)3.1	8.3	(-).7	(-)57.5	6.4
Boree	6.2	6.4	.2	3.2	5.9	(-).5	(-)8.4	6.4
Canobolas	5.7	6.1	.4	7	6.0	(-).1	(-)1.4	10
Cudgegong	6.5	6.5	-	-	5.6	(-).9	(-)13.8	2.8
Goobang	5.0	5.5	.5	10	5.3	(-).2	(-)4.0	2.4
Jemalong	3.4	4.0	.6	17.2	3.6	(-).4	(-)9.4	2
Lyndhurst	6.1	6.1	-	-	5.9	(-).2	(-)3.8	9.8
Molong	4.1	4.7	.6	14.6	4.4	(-).3	(-)6.7	4.9
Oberon	3.2	3.5	.3	9.4	3.7	.2	7.3	3.4
Rylstone	4.3	5.0	.7	16.3	5.0	-	(-).1	3.3
Talbragar	2.7	2.9	.2	7.4	3.0	.1	2.0	2.3
Turon	2.7	2.8	.1	3.7	2.5	(-).3	(-)11.9	2.8
Waugoola	4.1	4.8	.7	17.1	3.9	(-).9	(-)19.4	3.9
Wellington	9.8	10.6	.8	8.2	11.4	.8	7.5	7.1
Weddin	3.0	3.4	.4	13.3	3.2	(-).2	(-)6.6	2.3

* in thousands (a) Boundary changed since 1954.

B. 1(a)

There are also a number of towns and cities lying between 25 and 75 miles from Orange which limit to some extent Orange's role as a rural service centre. Generally, the population of these areas is increasing - balancing the decline in the rural population.

Bathurst, Dubbo and Parkes are the largest of these centres.

Bathurst, with a population of some 17,000, is growing at practically the same rate as Orange but Dubbo, with an estimated population, at June 1, 1962, of 14,500, is growing over five times more rapidly than Orange.

It seems likely that Orange and Bathurst have passed the point where growth of population in their local service areas will stimulate further population growth within the Cities themselves. Dubbo, on the other hand, is probably still growing because of the growth of population and/or rural wealth in its regional area and because of its position as an early interceptor on the trade route from inland New South Wales to Sydney.

It seems likely therefore, that the growth of Bathurst and Orange will be largely determined by factors from within the Cities themselves - primarily, the growth of secondary industry. On the other hand, Dubbo's growth from external factors seems likely to proceed for some time and it could then begin to benefit from the same factors operating in Orange and Bathurst. Furthermore, its position as a trade interceptor will be to its benefit and to Orange's detriment.

Consequently, looking to the distant future, it seems likely that regardless of the growth of Orange, it and Bathurst will tend to be twin cities, competing in size and in function. Because of Dubbo's location and other facilities, it will probably become the

B. 1(a) / (b)

dominant regional centre for the Central West. In the absence of a State wide plan, or a regional development plan, these forecasts can only be, at best, tentative.

It appears likely that the existing pattern of traffic between Orange and its immediate rural areas will remain largely unchanged. Rural population could undergo a further decline. In terms of traffic generation, this may mean a greater movement between Orange and the orchards at certain seasons because more use will be made of casual town labour instead of resident farm labour. No major changes in land use, which will result in heavier traffic movements, can be foreseen.

Vehicle ownership on farms is already fairly high and whilst there is room for increased usage of these vehicles, this is unlikely to result in a marked change in traffic volumes.

There is also likely to be an increase in service traffic originating in Orange travelling to these rural areas.

(b) The east-west long distance traffic

At present this traffic can be classified into three types -

- (i) That with definite purposes for stopping in Orange,
- (ii) That which stops in Orange for refreshments, petrol and accommodation, etc., and
- (iii) That which does not stop in Orange.

State Highway 7, the Mitchell Highway, will remain the main route connecting Sydney with the Far West, the Far North West

B. 1(b)/(c)/(d)

and the Central West. Its traffic falls largely into the (ii) and (iii) types above. With the increasing use of the motor vehicle, particularly as a result of the extension of the bitumen sealing of roads into the outlying areas of the State, through traffic along S.H.7 appears likely to increase fairly rapidly. Better highways will also reduce the number of stops made for refreshments etc. because they will cause a reduction in overall travel time.

However, the likely changes in the regional roles of Orange and Dubbo could result in a reduction in the volume of traffic entering Orange with definite business in that City.

(c) The north-south long distance traffic

At present there is no completely fully sealed road from Victoria to Queensland through inland New South Wales. The most completely sealed route leads through Orange. It seems that this could be responsible for a large part of the interstate tourist traffic which passes through Orange. On the other hand, the Orange district itself has a definite attraction to tourists. It seems probable that the development of the Newell Highway, further west, as the main inland interstate route, will probably reduce the number of tourists passing through Orange.

Intra-state traffic seems likely to intensify and Orange will continue to receive its share of this increase.

(d) Other traffic

Because Orange is beginning to become a centre of secondary industry, there will be an increasing amount of traffic between Sydney, Bathurst and Orange generated as a result of industrial expansion. If Dubbo becomes an industrial centre in its own right, then an increasing amount of non-stop traffic from Sydney to Dubbo is likely.

B. 1(d)

Other factors likely to influence the traffic patterns of the area include functions such as the Mt. Canobolas Motor and Cycle Races, horse-racing at Orange and other social and recreational events. These will affect the pattern of traffic for short periods only and these effects can probably be disregarded. A road system which enabled these effects to be incorporated would, of course, be more efficient.

Traffic requirements and growth in the regional context thus appear to be:-

- (a) An increased usage of local roads linking farming areas with Orange, but no great change in the general pattern of this usage;
- (b) A much more rapid increase in the amount of east-west long distance traffic, particularly in traffic which has no definite business for stopping in Orange;
- (c) An increasing amount of north-south long distance traffic made up mainly of intra-state traffic. A falling off in interstate tourist "through" traffic accompanied by a possible growth in local tourist traffic which will result in increased usage of local roads; and
- (d) An increasing amount of traffic between Sydney and Orange as a result of the development of secondary industry in Orange, with a possible long term development of "through" traffic between Sydney and, if industrialized, Dubbo.

SECTION 2 THE CITY OF ORANGE - PRESENT & FUTURE

Economically, Orange differs from the average provincial city in Australia. Since World War II, there has been a sporadic but sustained growth of secondary industry in the City. At the moment, the major industries are the Email electrical appliance factory and the Macquarie Worsteds woollen mill. Other plants depend upon these for their markets and are mainly subsidiary and service industries. At present, assisted by Governmental policies on the decentralization of industry, Email is planning a major expansion at Orange. This will stimulate the local economy and probably lead to an increase in the resident population.

Orange, however, urgently requires diversification of industry before it can free itself of the inherent dangers of having its economy dependant on one plant or industry. It seems, therefore, that before any real upsurge in the population occurs, this diversification must take place.

Orange, as can be seen from Table K, is increasing in population at an annual rate of about 0.6%. This is less than the rate of natural increase of the population. That is, there is actually a net emigration from Orange despite the population increase.

In these circumstances, it is hard to visualize Orange developing into a very large city. Left to its own resources, it will not. Governmental policy on the location of, and assistance to, industry could provide the necessary impetus.

If Orange were to expand, the areas zoned under the present planning proposals are claimed to be sufficient to accommodate at least 25-27,000 persons. At the rate of increase evident in the last intercensal period, it would be about 50 years before this area was fully utilized.

B. 2

If, however, it is assumed that, as a result of factors not yet evident in the development of Orange, its population did expand more rapidly, then there arises the problem of urban expansion beyond the City boundaries. The road system now being planned will be a permanent part of the physical setting of Orange. It must not, therefore, inhibit expansion of the City.

There are already a great number of factors which limit expansion. To the east, the new Suma Park water supply project will limit expansion to the watershed formed by the hills immediately to the east of the present built-up area. Southwards, a multiplicity of land uses including the Bloomfield Mental Hospital, a large recreation area, the stock sale yards, the Orange School Farm, the City's garbage and night soil depot, an Agricultural Experimental Farm, the Rifle Range, the Racecourse and Wentworth Park all tend to limit expansion. The Forbes railway line also forms a barrier to development. Continuous urban expansion would only be possible, southwards, through a gap between the Rifle Range and the Racecourse. A serious problem would arise from the expense of sewerage any expansion in this direction.

To the north-east, the sewerage treatment works limit the expansion of the urban area.

There remains the area to the west and north and here there are no great obstacles in the path of expansion. The City has already expanded out of the watershed of Blackman's Swamp Creek into that of Ploughman's Creek. The City's new sewerage treatment facilities could be provided on Ploughman's Creek on an economical scale if further expansion were undertaken.

The land immediately to the west of Orange is fairly intensively developed with orchards. This type of development is not so intense to the north except for a short distance along the railway line. Furthermore, there seems to be a desire amongst the

B. 2

residents of Orange to live in the northern sector where views are obtained towards Mt. Canobolas.

It seems likely that urban expansion, if it occurs in Orange, will be directed northwards probably between Ploughman's Creek and the Dubbo railway line.

Physically, Orange is a typical Australian provincial city. The original street system was laid down as a grid. Latterly, new subdivisions have taken place around the edges on other road patterns. It is most unfortunate that only two of the original 99' wide grid streets have been extended to what is now the limit of the built-up area. Hill Street extends to the north and Summer Street extends on Coronation Drive to the west. No major streets extend directly east or south. This makes the planning of a simple arterial street system, for an expanded city, very difficult indeed.

Along Bathurst Road, S.H.7 in East Orange, ribbon development is becoming intense and is beginning to limit its capacity.

The major restriction on traffic movements between the two sections of Orange is the railway line dividing them. The chief link across this is Summer Street railway level crossing. Besides restricting the capacity of S.H.7, this level crossing also causes traffic delays at various times of the day, and adds to the dangers of movement between the two sections of the City.

Traffic

Not a great deal is known about traffic movements within Orange but the Survey has revealed certain patterns about movement of traffic out of and through Orange.

B. 2

The Central Business District appears to be the largest generator of this traffic, followed by the industrial area. The Central Business District lies close to the Railway Station and straddles Summer Street which is the route of the main through road - S.H. 7.

Congestion in Summer Street is becoming acute, mainly because of the multiplicity of traffic uses. The Report on the Town Planning Scheme for the City states that the worst traffic conditions are in Summer Street between the Railway and Sale Street; that Summer Street has the worst accident record; and that the Summer Street-Woodward Street and Summer Street-Peasley Street intersections are the busiest in the City.

The removal of through traffic from Summer Street must result in an improvement in these conditions. The elimination of the Summer Street railway level crossing would also remove a source of delay and danger from the situation. Grade separation at this point is not economically possible as the approach ramps would disrupt and ruin a large part of business frontage.

It seems desirable, therefore, from the point of view of the City, i.e. of its inhabitants, and its economic and social welfare, that a road system should be devised to enable through traffic, which has no reason to pass through Orange, to bypass it and, at the same time, to reduce traffic across the Summer Street railway level crossing.

The question of new access roads to the Town Centre was discussed in Part A, Section 4, of this Report and the route suggested there would enable the Summer Street level crossing to be bypassed and the central shops and businesses to be reached more quickly than at present.

This route, which would approach the Central Business District from the south, roughly following a tributary gully of Blackman's

B. 2/3

Swamp Creek, would enable vehicles destined for the centre to reach off-street parking areas located at the rear of the main business frontage in Summer Street, without having to pass through multi-purpose roadways.

The second largest generator of traffic in Orange is the industrial area and saleyard complex near the East Fork Railway Junction. Access to this area at present is available only along streets developed residentially. The present route, particularly for vehicles coming from the east, is circuitous. It would seem desirable that the area be given greater accessibility. This could best be done by providing a new entry road to the area from a bypass route to the south and west of Orange.

SECTION 3 POSSIBLE ALTERNATIVE HIGHWAY AND ARTERIAL ROAD SYSTEMS

Broadly, there are two physical factors which limit the choice of the location of a highway system around Orange. These are topography and land use. Within the limitations imposed by these conditions, a number of routes can be selected. In Section 4 of this Part of the Report, criteria will be established against which the routes can be judged and in Section 5, a comparison is undertaken of the various routes in terms of the criteria established.

It should be noted that the ensuing description of the routes is intended as a guide rather than as an exact description. Any centre-line proposed in this Report has not been surveyed and its final feasibility and detailed location could only be established after the necessary engineering studies.

As the road system under consideration will have to serve for some considerable period, and as over that period the standard of highways is likely to be vastly increased, ample reservations should be available along any route selected to enable it to be

B. 3(a)

developed to motorway standard if and when required. An absolute minimum reservation in rural areas of 200 feet is essential. A minimum of 300 ft. would be desirable and where earthworks are envisaged this would need to be increased. A 300 ft. reservation would allow for a four lane highway with a 50 ft. median strip, service roads on either side with ample separation between the service road and the highway.

As pointed out earlier in this Report, the bypass routes fall into two general types - those to the North and East of Orange and those to the South and West.

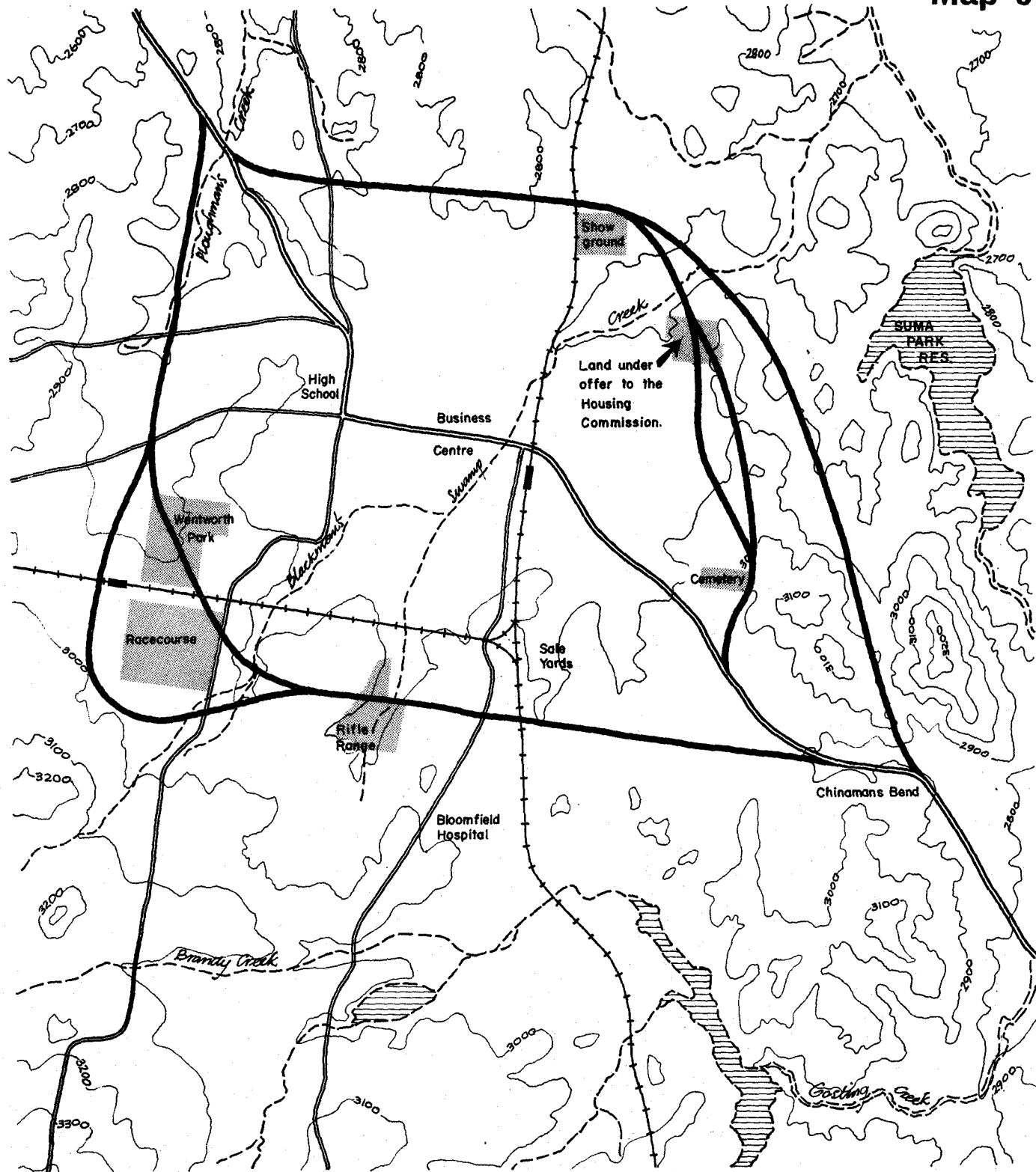
(a) Routes to the North and East of Orange

There are three possible distinct routes on the north and east of Orange which all appear quite feasible from an engineering viewpoint. Obviously various combinations of parts of these routes are possible also.

All the routes follow approximately the same location on the north of Orange. It is suggested that the point of departure from the Mitchell Highway, north of Orange, should be just south of the bridge over Ploughman's Creek. The routes then run due east to the railway line, parallel to and about 5-15 chains north of Phillip Street. There are no physical difficulties along this section and disturbance to property would probably be the limiting factor in the detailed location.

East of the railway, the routes all swing southwards across Blackman's Swamp Creek and traverse the land now under offer to the Housing Commission.

From this point onwards the routes differ.



THE APPROXIMATE LOCATIONS OF SELECTED BYPASS ROUTES AROUND ORANGE N.S.W.

LEGEND

- SELECTED BYPASS ROUTES
- EXISTING ROADS.



Clarke Gazzard Yeomans

Architects/Planners
117 Harrington Street, Sydney, N.S.W. 27-3633

OCTOBER 1963

B. 3(a)/(b)

The most westerly of the routes would skirt the built-up area and the ridge to the east of the City. It would run south along Wolsely Street, swing eastwards across Wakeford Street, south of Byng Street, then proceed around the eastern end of the cemetery and then generally southwards, along a small spur, to connect to the Mitchell Highway about half a mile east of the City boundary - see route labelled N.E. 1 on Map 3.

The centre route of the three, would run along the eastern edge of the crest of the line of hills immediately to the east of Orange. It would run along the western edges of the quarries in Lindsay Street and just to the west of the service reservoir. It would connect with the previously described route east of the cemetery - see route labelled N.E. 2 on Map 3.

The third, and most easterly, route would run along the valleys to the east of the line of hills and would be an almost straight route from the Housing Commission land to Chinaman's Bend on the Mitchell Highway some 2 miles east of Orange - see route labelled N.E. 3 on Map 3.

(b) Routes to the South and West of Orange

The Department of Main Roads has already selected a bypass route on the south of Orange which links up with Woodward Street. The major objection to this route is that it bypasses only part of Orange and, in particular, that it concentrates a great deal of traffic on the Woodward Street - Summer Street intersection. The new Orange High School adjoins this intersection and it is considered undesirable that children going to and from school should be exposed to any more than the minimum of traffic hazards and certainly, not fast moving through traffic.

Two alternate bypass routes have been selected around the southern and western sides of Orange.

B. 3(b)

The eastern and northern sections of these routes would be identical. At the eastern end, they would depart from the existing route of S.H.7 about 70 chains east of its intersection with the City boundary and they would proceed due westwards, crossing the railway line to the south of East Fork Junction and generally along the alignment, produced, of Sharpes Lane. The route would traverse the length of the Lane, and proceed due westward to intersect the southern extension of Woodward Street. From this point the two route locations differ. The most acceptable route from the point of view of alignment and length runs to the north-west across the northeastern corner of the Racecourse, over the Railway and through Wentworth Park, passing just to the east of the dam in the Park, and then on to rejoin the common location about the Cargo Road. The less acceptable route of the two, swings southwest from the Woodward Street alignment and runs to the south and west of the Racecourse, crosses over the Railway west of Canobolas Station, and runs down a valley to the Cargo Road.

From this point northwards to State Highway 7, the routes follow Ploughman's Creek, preferably on the western bank, to link up with S.H.7 just west of the Ploughman's Creek Bridge.

These routes are labelled S.W.1 and 2, respectively, on Map 3. There is some division of opinion on the best location of a road of this standard at the southwestern corner of the City. This is given further consideration in later sections of this Report. (See Section 5)

The location of the new entry road to Orange is, as previously mentioned, fairly limited unless heavy resumption costs for developed land are expended. The standards of this road could be somewhat lower than those for the bypass. A maximum reservation of 150 ft. should be ample, with a minimum reservation of 110 ft. The recommended route is along the branch of Blackman's Swamp Creek which joins the Creek proper at National Park. The more direct route would follow the gully right to the new South and West Bypass, passing under the Railway and between the two new school ovals. A less direct route would swing east-

B. 3(b)

wards to the south of the Housing Commission Estate, across the rear of the new School site and cross the Railway, via an over-bridge just west of Anson Street and then proceed southwards parallel to, and west of, Anson Street to join the bypass. This route would thus skirt the school ovals, and avoid an underpass, but would otherwise be less direct.

SECTION 4 CRITERIA FOR CHOICE BETWEEN ALTERNATIVES

The following criteria are those upon which the various routes can be compared and judged. They may be broadly classified into two types - those associated with the first costs and those associated with continuing costs to the community.

(a) Criteria associated mainly with first costs:-

(i) Length of construction:- Obviously, the shorter the route, the less it is likely to cost to construct and maintain.

(ii) The relative difficulties of construction:- If standards are fixed for the grading and alignment of the proposed route, together with desirable standards for median and carriageway widths and possible service road specifications for the ultimate development of the road to motorway standard, then the relative difficulties of construction to these standards become measures of the initial cost of construction.

In particular, the following physical factors should be considered:-

- Earthworks involved either as excavation or fill;
- Bridging of streams;
- Problems of flooding;
- Difficulty in working rock;
- Intersection with railways;
- Intersection with roads;
- Relocation of stock routes; and
- Electricity transmission easements.

(iii) Costs of resumption including disturbance and severance:-
If the road is to be ultimately constructed to motorway standard, access across it will be allowed only at a limited number of

B. 4(a)/(b)

points and then, only for pedestrian or vehicular traffic. It is unlikely that livestock would be allowed cross the road at grade. One effect of this could be that resumptions will be fairly high because of the need to avoid severing units which could not be economically farmed.

(b) Criteria associated with the continuing costs and benefits to the community:-

(i) Standard of the route provided:- It may be that a high standard of alignment and grading on the route, while reducing the costs to the community in so far as through traffic is concerned, would result in high social costs to the local population. A better balance may be desirable and the lowering of the standards by a small amount could in some cases do this effectively.

(ii) The effectiveness of the route:- The road system here envisaged must be multi-purpose and its effectiveness must be measured in terms of the benefits to the various potential users. Broadly, these users fall into two groups - local traffic and long distance traffic.

The local traffic at present makes far greater use of the roads leading to and from the City of Orange. This situation appears likely to continue. Therefore, the demands that this traffic makes upon the future road system around and into Orange cannot be overlooked. The local motorist will be interested primarily in being able to travel by a direct, fast and safe route into the City, and in being able to use the facilities of the City without being impeded by facilities designed specifically for non-local traffic. At the same time, as a local resident of Orange or its district, he will be keen to see that the aesthetic value of the countryside is not marred but rather enhanced, and displayed to a better advantage, by the new road system. In this, his requirements will resemble those of the long distance traveller who is also a tourist. However, the majority of motorists on

B. 4(b)

long trips will demand vastly different qualities of the road system around Orange. Primarily they will be interested in a system which offers them a speedy and safe route around the built-up area.

(iii) The enticements to traffic:- Traffic approaching Orange, and not having specific business in that City, will always be presented with the choice of using the bypass or travelling through the City. It must be assumed that the design of the road junctions at the entry to the bypass will be such that the motorist will feel that the bypass is the best route for his journey. In addition to this, it must be assumed that these motorists will be interested in saving time by avoiding the built-up area and this then forms an economic enticement to use the bypass. However, there are certain factors which mitigate against this usage. Driving in rural Australia can be rather monotonous. Towns are regarded as milestones to be passed, as welcome breaks in concentration and in driving conditions. Thus some drivers will prefer to travel through the built-up area to experience this feeling of change. It seems essential, therefore, that the bypass should be so located that motorists using it will be aware of Orange as an urban entity from at least some sections of the route. Furthermore, unless the presence on the bypass of facilities, such as service station and cafe, are announced to the motorist before his entrance to the bypass, many motorists will detour through Orange for refreshments or to purchase petrol. Yet another factor which will add to the usage of the bypass will be its scenic value. If interesting views of Orange and the surrounding countryside can be gained from the bypass, they would enhance its popularity.

(iv) The costs of disturbance:- In all probability, a bypass route will adversely effect some of the fringe land uses around the town. These effects will extend beyond the actual costs of resumption and, possibly, of relocation. The additional social costs could include the necessity to travel longer distances on local trips. The loss of facilities such as a rifle range or golf course could also be important.

B. 4(b)/5

(v) The effects on city growth, and limitations on functional land use design with the system:- As stated earlier in this Report, a road system, as ultimately envisaged in this instance, becomes a permanent part of the town. It will form just as great a barrier to social development within a community as does a railway line. In addition, it will be a physical barrier which will tend to act as a limit to urban development. Finally, it will be a psychological barrier - people will be reluctant to move across the bypass - the equivalent of moving "out of town".

At the same time, the City of Orange must grow and as there is a distinct shortage of land available for "tract" development of housing within the present City limits, before long the urban area will expand beyond those limits. If the bypass is close to those limits, particularly on the northern side of Orange, then this urban expansion must take place beyond the bypass.

SECTION 5 THE ALTERNATE ROUTES MEASURED AGAINST THE CRITERIA

There are five routes referred to in Section 3 of this Report and these will be referred to in this Section in accordance with the identification system used on Map 3, i.e. N.E.1, N.E.2, N.E.3, S.W.1 and S.W.2. The two routes for the new entry way are dealt with at the end of this Section.

The first costs vary from route to route. The continuing costs and benefits in general apply only to comparisons between routes on one side of Orange with those on the other.

Criterion (a)

(i) Length of construction:- The routes involving the shortest length of new construction are N.E.1 and N.E.2.

B. 5(a)

In terms of the length of the journey using the bypass, from Chinaman's Bend to Ploughman's Creek Bridge, N.E.3 is the shortest route.

<u>Route</u>	<u>Approx. length of new construction involved</u>	<u>Distance by route from Chinaman's Bend to Ploughman's Creek Bridge</u>
N.E.1	5.6	6.2
N.E.2	5.5	6.1
N.E.3	5.8	5.8
S.W.1	6.0	6.6
S.W.2	6.4	7.0

Criterion (a)

(ii) Relative difficulties of construction:- Because no detailed engineering studies of the routes have yet been undertaken by the D.M.R., the opinions expressed under this heading are based on inspection and on incomplete data only, and should, therefore, not be considered final judgments.

Earthworks involved:- All the routes involve earthworks of a fairly major nature, particularly if construction to motorway standard is envisaged.

Taking the routes to the North and East of Orange, where they follow a common location, i.e. north of Orange, there are no great engineering difficulties. To the east of Orange, N.E.1 and N.E.2 would require some sizeable earthworks almost throughout their length whilst N.E.3 would not require any major earthworks except for about

B. 5(a)

3/4 mile immediately north of the existing highway where major work appears inevitable. The routes to the South and West traverse land of lower elevation. S.W.1 would appear to involve heavy earthworks in Wentworth Park but S.W.2 seems to have a minimal amount of heavy earthworks. The preferable routes from the earthworks point of view appear to be S.W.2 or N.E.3.

Bridging of streams:- Without details of the runoff in the various catchments, bridge sizes and other considerations can only be very roughly estimated. All the routes cross streams or gullies which appear to warrant bridge or large box culvert construction. Bridgeworks in descending order of the size of works are set out below, together with the various routes affected.

Blackman's Swamp Crk. near the Showground	- N.E.1, N.E.2, & N.E.3.
" " " near the Rifle Range	- S.W.1 & S.W.2
Unnamed Gully near Chinaman's Bend	- N.E.3
Ploughman's Creek near Cargo Road	- S.W.1 & S.W.2
Unnamed Gully near Rifle Range	- S.W.1 & S.W.2

From the point of view of the bridging of natural watercourses, N.E.1 and N.E.2 appear preferable.

Problems of flooding:- With motorway standards of construction, these should not be great problems. The only low-lying land likely to be inundated is along Blackman's Swamp Creek, near the Showground, and to overcome this would not involve any major earthworks.

B. 5(a)

Difficulties in working rock:- The geology around Orange varies. To the east and north, there is a mixture of andesites, cherts, shales, tuffs and other rocks apparently considerably intermingled, with the shales tending to become more prevalent towards the north. South and west of Orange, trachytes predominate close to the City boundary. It seems likely that major excavations on the South and West routes would encounter the harder rock.

Intersection with railway:- All the routes involve railway crossings. Those to the North and East involve one crossing whilst those to the South and West involve two. All crossings suggested are by way of road overbridges. The majority of the crossings are at right angles but that on S.W.1 is skewed.

Intersection with roads:- Future improvement to motorway standard would require higher road intersection standards than are initially required.

The following table sets out the local, main and trunk roads intersected on the various routes and indicates the adaptability of the intersection to interim and ultimate development.

Routes in the North & East

- | | | |
|----|---|--|
| 1. | Departure from S.H. 7,
North of Orange | N.E.1 } All routes are in the same
N.E.2 } location. Topography
N.E.3 } adaptable to intersection
} at grade or by grade
} separation. |
| 2. | M.R. 573, March Road | ditto |
| 3. | Local roads entering
Orange from north | ditto. It seems desirable that these
three roads be combined to reduce
the number of intersections to one. |

B. 5(a)

- | | | |
|----|---|---|
| 4. | Road immediately to the east of the Railway | On all routes, grade separated in conjunction with the railway overbridge, but no interchange required. |
| 5. | Ophir Road | N.E. 1 Suitable for an intersection at grade only.
N.E. 2 Grade separation necessary because of topography.
N.E. 3 Suitable for an intersection at grade only. |
| 6. | Lewis Ponds Road | N.E. 1 Adaptable to either an at-grade or a grade separated intersection.
N.E. 2 Adaptable to either type but possibly presenting visibility problems when at grade.
N.E. 3 At grade. Grade separation would require extensive ramping. |
| 7. | Junction with S.H. 7, east of Orange | N.E. 1 ditto
N.E. 2 ditto
N.E. 3 Suitable for grade separation. |

Routes to the South and West

- | | | |
|----|---------------------------------------|---|
| 1. | Junction with S.H. 7, north of Orange | S.W. 1 } Suitable for an at-grade
S.W. 2 } or a grade separated junction. |
| 2. | T.R. 61, Parkes Road | T.R. 61 should be deviated, outside Orange, to form a single entry into Orange with M.R. 237. |
| 3. | M.R. 237, Cargo Road | S.W. 1 } Intersection at grade or by
S.W. 2 } grade separation is possible here. |

B. 5(a)

- | | |
|--|---|
| 4. Unnamed road along northern boundary of Racecourse | S.W.1 Road would require relocation to join with the Pinnacle Road before crossing new route. Intersections at grade or with grade separation could be provided. |
| | S.W.2 Adaptable to either types of intersection although grade separation would require ramping. |
| 5. M.R. 526, Pinnacle Road | S.W.1 Existing route to be re-located but with relocation either type of intersection could be used. |
| | S.W.2 Ditto |
| 6. M.R. 245, Blayney Road | S.W.1 & S.W.2 A grade separation is possible here with extensive ramping. Bloomfield Road should be deviated to reduce the complexity of the intersection. |
| 7. Junction with S.H. 7, east of Orange | S.W.1 and S.W.2 Grade separation would require extensive ramping. At-grade intersection readily developed. |

Relocation of stock routes:- Any route cutting across the southern boundary of Orange would interfere with existing stock routes. The problem of stock movements across the high standard roadways of the future is a matter for a State-wide policy decision. With the increased use of motor trucks to transport livestock, stock routes in the more intensively developed areas may become redundant. Almost certainly, any bypass location will interfere with some stock route. It is impossible to suggest which route is likely to cause the greatest disruption to stock movements without details of the frequency of use and number of stock using each route.

B. 5(a)/(b)

Electricity transmission easements:- There are more major electricity transmission easements, existing and proposed, on the north and east of Orange than in the south and west. Consequently, there is greater likelihood of conflict of usage on a north and east route.

Criterion (a)

(iii) Cost of resumption:- Without detailed figures on land values at Orange, only an opinion of these costs can be given. It is assumed that the routes will be located to avoid houses and out buildings, although with motorway standards, this may not be possible. Route N.E.3 runs through the least developed area and consequently is likely to have the lowest overall costs of resumption. Even this route cuts through fairly intensely developed areas to the north of Orange.

Generally speaking, a north and east route would appear to be less expensive than a south and west route because the latter would pass through more intensely developed and more valuable agricultural land.

Criterion (b)

(i) Standard of the route provided:- The most simple route in terms of alignment is N.E.3. All the other routes show greater degrees of complexity in terms of curvature - both horizontal and vertical. Provided that a 60 m.p.h. operational design standard can be reached upon a route, there does not seem to be any reason why one route should be given preference because of the simplicity of its alignment when drawn on a plan. Second, if the social costs arising from a particular route are very high but could be reduced if the standards of the design were slightly lowered, it may well be that the long term benefits to the community of the route would be increased. This applies particularly to route S.W.1 in the vicinity of Wentworth Park. Here, the bisection of the proposed public

B. 5(b)

golf links might be avoidable, possibly at the expense of lowering the standards of the alignment or of increased initial expenditure.

Criterion (b)

(ii) & (iii) The effectiveness of the route and the enticements to traffic:- As pointed out in Part A of this Report, through traffic will find any suggested bypass route shorter than the present Summer Street route in terms of time. Consequently, acceptance and usage by a large proportion of through traffic seems certain. Route S.W.2 possibly approaches the marginal conditions for this choice, i.e. the additional distance involved may appear to balance the actual time saving. Although the major through traffic flows are along the Mitchell Highway - S.W.7 - there is a certain amount of through traffic along the other main southern and western roads, particularly the Parkes Road - T.R.61. Thus a bypass to the south and west of Orange seems preferable because it would remove more through traffic than a north and east route.

Although it is possible to plan a new entry road from the south into the central business district of Orange as well as a north and east bypass, this would involve additional major construction. A south and west bypass route, on the other hand, incorporates a large part of the construction required for this new entry road and consequently comprises a less expensive and more efficient overall road system.

A south and west bypass would also pass close to the recreational facilities in Orange which are likely to cause very heavy traffic flows for short periods at various times of the year. These include the Racecourse, the Mt. Canobolas Motor Cycle Racing Circuit, Duntry League and the proposed new public Golf Course in Wentworth Park. On the other hand, a north and east bypass would only serve the Orange Show-

B. 5(b)

grounds. Another point in favour of the south and west route is that it would enable traffic from the north-west and west of Orange to travel to the Orange Aerodrome and the Bloomfield Hospital without passing through the City. It would seem, therefore, that a south and west route, whilst providing adequately for through traffic, would serve local traffic much better.

Aesthetic conditions on the possible routes are very similar. The dullest route is likely to be N.E.3. To the east of Orange, this passes through ordinary grazing land but it passes close to the upper reaches of the Suma Park Water Reservoir and thus could present a contrasting panorama of calm water.

All the other routes will allow views over Orange. On N.E.1 and 2, these views would be best seen from the hill above the cemetery which could rather detract from them. On the south and west routes, the best views would be from the hill at the end of Sharpes Lane and from the slopes rising up towards the Racecourse. Generally, since the south and west routes would pass through a greater length of more intensely developed orchard country, they could be more attractive throughout their length.

Criterion (b)

(iv) Costs of disturbance:- The route which involves the lowest costs of disturbance appears to be N.E.3 because it runs through grazing country for about half its length. But the same route passes through the catchment of the Suma Park Water Supply Reservoir, close to the actual water's edge. This may be undesirable because it could become a source of pollution of the water supply. The other routes on the North and East also cause relatively little disturbance. Both affect land which is under offer to the Housing Commission. It is most undesirable that this estate be severed by a

B. 5(b)

part of the State Highway System. As the land in question is close to the natural limits of the City's growth in this direction, it is desirable that the route be diverted so that it passes north and east of the land or, at worst, severs it so that only a small portion lies east of the road. This can be achieved. The new route would climb the eastern side of the line of hills north of the Ophir Road, crossing from the eastern to the western side of the ridge about Dalton Street. This would mean a slight deviation of route N.E.2.

The other major land uses which could be affected or could affect this new location are the quarries in Lindsay Street and the service reservoir. The route would of necessity pass close to both of these and could restrict their future expansion.

The South and West routes effect a series of publicly owned land areas. From the east, these include:-

The old aerodrome, which is to be developed as a major recreational area - the relocation of Bloomfield Road will necessitate a severe truncation of the northermost corner of the area, but this is provided for in the present planning proposals.

The Orange School Farm which will be affected by a road widening as well as losing some accessibility but this again would have occurred in the existing bypass proposal.

The Rifle Range which would become useless if a road passed through it at any point, and which would probably have to be relocated. However, if the bypass is not constructed for some years, the use of the Rifle Range could continue unimpeded and, by the time of construction, the future need for rifle ranges may have changed. It should also be noted that the existing bypass proposal

B. 5(b)

would force the Range to be closed.

The Racecourse, which is set in ample grounds and would lose some of its land by severance under either of the South and West schemes. These severances would not affect the actual course or the associated spectator and service areas and buildings.

Wentworth Park. The Orange City Council plans to make this area into a public golf links in the near future. If route S.W. 1 were adopted, their future would be in some doubt. There appear to be several solutions. These include: (i) Planning the layout of the course to provide for the reservation and when the roadway is built, constructing underpasses and overbridges to allow players and tractors access across the road.

(ii) Purchasing more land to the west of the present Park and designing the golf links so that the entire course is west of the roadway.

(iii) Expending more money on the initial cost of construction of the road further to the west to preserve the major part of the Park in one section. This would seem to involve heavier earthworks, possibly a railway underpass rather than an overbridge and so on.

(iv) Lowering the standard of horizontal alignment and, as a last resort, the design speed of the roadway, to enable greater flexibility in the location of the reservation, thus preserving the major part of the Park in one section.

Considering these effects on the fringe land uses, it would appear that the North and East routes were preferable. However, it should be borne in mind that the existing bypass proposals would have much the same effect as the proposed

B. 5(b)

South and West routes except in so far as the Racecourse and Wentworth Park are concerned. The former is not a great problem. The latter is. It is the keystone to the possibility of the S.W.1 route. The S.W.2 route, of course, avoids this problem.

Criterion (b)

(v) The effects on city growth, and limitation on functional land use design within the system:- As suggested in Part B, Section 2, the most likely direction for the expansion of Orange is northwards and northwestwards. Accepting this, the effects of the two general bypass locations on town growth are almost diametrically opposed. The South and West motorway route would reinforce the existing non-urban land uses around those fringes of Orange and would force the development northwards.

The north and east motorway route would create a barrier to expansion to the north, at least in the initial stages of the City's expansion.

Arguments for and against the dissection of a city by parkways depend largely on the structure and topography of the city. If Orange is envisaged as growing to two or more times its present size within the context and life of the highway system now being planned, the two routes would result in entirely different city structures.

The South and West route and the Dubbo railway line could define a type of linear city with industrial areas along the Dubbo railway and residential areas paralleling them on the west. The town could stretch northwards to March, between M.R. 573 and the Dubbo Railway. It would be necessary to preserve east-west routes to enable local traffic to gain easy access to the Highway system via

B. 5(b)

M.R. 573. These roads need not be of very high standard - e.g. 100 ft. reservations should be sufficient in view of their relatively short length. It may also be desirable, if industrial areas are to be opened up along the railway, north of Orange, to provide a north-south road, on the east of Orange, to give these ready accessibility to the Bathurst - Sydney Road.

Now, if a north and east route is envisaged, together with northern expansion of Orange, the resultant town structure appears as a series of globules, or as one globule (the existing city) and a new linear suburb. This latter form would be difficult to administer without producing a serious imbalance in the functional patterns of the city.

Because it would simplify future city structure, because it does not create an additional barrier to the desirable expansion of Orange, and because it reinforces the existing barriers to the undesirable southern expansion of Orange, the South and West route appears preferable.

Entry Road

There are two possible entry boulevards from the South and West bypass which lead directly to the business centre along routes which could be tree-lined tourist attractions in themselves.

The first and simpler route is an almost straight North-South line up the gully from the Rifle Range, underpassing the Railway, and running directly to Sale Street, mainly through land zoned Non-Urban. This route has two possible faults; it runs between the two school sports ovals and the underpass may require special drainage. If these are proved to be overriding faults, then an alternative is possible.

B.5(b)

This alternate route would leave the bypass near the western end of Sharpes Lane, and would run northwards parallel to and west of Anson Street and over the railway. North of the railway, it would run to the northwest to join the first route west of the new school site. This route would not interfere with the area between the school ovals and would allow overbridging of, rather than underpassing of, the railway. It would, however, cut across land zoned for residential purposes immediately to the north of the railway.

No new entry road is possible from the east of Orange without the resumption of developed property and extensive ramping to cross the railway. From the north, one of the existing streets e.g. Hill Street, could be upgraded to form a new entry boulevard. This entry way could not be developed to the same standard as those suggested from the south because it would have to pass through streets already developed residentially.

WYOMING

THE URBAN PLANNING AND RESEARCH CENTRE
117 HARRINGTON ST., SYDNEY. TEL. 27 3633
Copyright Reserved

VEHICLE ORIGIN & DESTINATION SURVEYORANGE N. S. W.JUNE 1963INSTRUCTIONS FOR INTERVIEWERS1. GENERAL

The purposes of the Survey will be explained to you at the briefing sessions to be held the day before the Survey begins. Between 7.00 a.m. and 7.00 p.m., we are to stop and interview vehicles leaving Orange at Checkpoints along six Main Roads. The Checkpoints are numbered and located as follows:

Checkpoint	Location
One	State Highway 7, East of Orange, on Bathurst Road
Two	State Highway 7, North-West of Orange on Molong Road
Three	Trunk Road 61, West of Orange on Parkes Road
Four	Main Road 237, South-West of Orange on Canowindra Road
Five	Main Road 573, North of Orange, on Wellington Road
Six	Main Road 245, South of Orange, on Blayney Road

The allocation of interviewers at any one time will probably be as follows. This is subject to change as circumstances dictate.

Checkpoint	Number Working	Checking, Resting	Total
One	3)	2)	6
Six	1)	2)	
Two	2))	7
Three	1)	2)	
Four	1))	
Five	1))	

A policeman should be on duty at Checkpoints One and Two.

Collation and analysis of the survey results will be the responsibility of Clarke Gazzard Yeomans, Consulting City Planners, of Sydney. All field books should be handed to Mr. Clarke at the conclusion of the survey.

2. THE STOPPING OF VEHICLES, SAMPLING & THE USE OF FIELDBOOKS

The precise procedures for the stopping of vehicles, and safety measures to be adopted, will be laid down by the D.M.R. Divisional Engineer at the briefing session. His instructions must be obeyed.

Vehicles should be waved as far to the left shoulder of the road as possible. At busy Checkpoints, with frequent traffic in both directions,

especial care will need to be taken. This particularly refers to Checkpoints One, Two and Three, and particularly in the early morning and evening hours.

White coats and D.M.R. armbands will be issued to all interviewers and these must be worn at all times on duty, over all other clothing. Appropriate lighting at the Checkpoints will be provided by various authorities.

Interviews are required of a fifty percent sample of all vehicles outward bound from Orange past each Checkpoint. In practice, this means that every second motor vehicle will be stopped and the driver interviewed. For the purposes of the survey, road grading equipment and machines and pedal cycles, are excluded.

Every second motor vehicle should be waved on its way. However, queues may tend to develop at Checkpoints One and Two during peak periods. Two interviewers should be working at these Checkpoints during peak periods and every effort should be made to prevent the growth of queues.

Nevertheless, a queue of more than four vehicles at any one time should not be permitted. This would involve two drivers being interviewed with two drivers waiting. Other vehicles approaching a Checkpoint, when four vehicles are stopped should be waved on their way. If this occurs frequently, then the interview sample will be less than 50%.

Each fieldbook provides space for ten interviews on each of 50 sheets - a total of 500 interviews per book. Two fieldbooks will be in use at both Checkpoints One and Two, and one at each of the other Checkpoints. Every space on each sheet should be used to record an interview.

Where two fieldbooks are in use at a Checkpoint, interviews should be recorded in each alternately. Thus each book records every second interview and each book will contain a 25% sample.

3. STANDARDS OF COURTESY

Each interviewer must adhere strictly to a high standard of courtesy when speaking to motorists. No matter what rude or irrelevant remarks may be made by some drivers, interviewers must not, under any circumstances, answer back or prolong conversation. Interviewers must not allow themselves to be upset or sidetracked in any way.

4. PROCEDURE AS VEHICLE APPROACHES

As each vehicle approaches, the interviewer will begin filling in his interview sheet.

The time will be noted to the nearest 5 minutes. Every 5 minutes past and to the hour a note can be made in the left hand column.

The vehicle type will be quickly noted by a tick in the appropriate column, and by a note of the number of axles on vehicles with more than the usual two.

The columns will be used as follows:-

- | | |
|------------------|--|
| <u>Car</u> : | includes station wagons, jeeps and taxis. |
| <u>Utility</u> : | includes all panel vans and other vehicles designed equally for passenger and goods, on which the rear wheel mudguards are an integral part of the auto body, but <u>excludes</u> vehicles with double rear wheels on each side. |

- Light Truck: includes all vehicles primarily designed to carry goods which have a single rear axle and a single rear wheel on each side.
- Heavy Truck: all non-articulated vehicles with either dual rear wheels on each side or with more than two axles. (Note number of axles).
- Semi Trailer: includes all transport vehicles which consist of a prime mover and an articulated trailer. (Note number of axles).
- Other: includes vehicles pulling caravans and small trailers or horse boxes, motor cycles, omnibuses, timber jinkers. (Write precise description across columns and note number of axles).

A brief glance inside the vehicle should then reveal the number of persons. This should include children, and in the case of omnibuses, can be approximate.

5. PROCEDURE AS VEHICLE STOPS

As he approaches the driver, the interviewer will say:

"THANK YOU, SIR (MADAM). THIS IS A SURVEY BY THE DEPARTMENT OF MAIN ROADS. YOU'D BE HELPING THE DEPARTMENT PLAN THE ROAD SYSTEM BY ANSWERING A FEW QUESTIONS. THE FIRST IS - WHERE DID THIS TRIP START?"

If the driver is confused by the meaning of the word "trip", then the interviewer will say:-

"WHERE HAVE YOU SET OUT FROM?"

For the purposes of this survey, a "trip" is a purposeful journey from one place to another. A trip may be, for example, a trip from Sydney to Adelaide, from home to work, from work to an hotel, from hotel to home, from a farm to a shop, from one business call to another.

A further question may be necessary to ascertain the origin of the trip:-

"WHAT WAS THE NEAREST TOWN OR MAJOR DISTRICT?"

The interviewer may have to record entries such as "15 miles out (of Orange) along the Ophir Road", but generally, answers like Sydney, Bathurst or Forbes will suffice.

If the present trip has originated from Orange, the interviewer will ask:-

"WHICH PART OF ORANGE?"

If his answer cannot immediately be recorded as a tick under a Town Zone, then the interviewer can ask, in turn:

"THE OTHER SIDE OF THE GREAT WESTERN RAILWAY LINE, IN (EAST) OR (WEST) ORANGE?"

"IN THE SHOPPING CENTRE?"

"NORTH OF THE CENTRE?"

"SOUTH OF THE CENTRE?"

As a last resort, the driver may be shown the attached sketch map, but too much time should not be wasted on this question.

6. REASONS FOR STOP IN ORANGE

If the present trip originated elsewhere than in Orange, then the next question is:-

"DID YOU GET OUT OF THE CAR (TRUCK) IN ORANGE AND, IF SO, FOR WHAT MAIN REASON?"

The interviewer can prompt the driver by mentioning one or two likely reasons from the following alternatives listed on the sheet.

<u>DELIVER:</u>	Delivery of goods or passengers.
<u>JOB:</u>	Trip to or from place of employment.
<u>BUSINESS:</u>	Visit to a business, civic or professional office for purposes of consulting, selling, paying or buying.
<u>SHOPPING:</u>	Buying or looking at ordinary retail goods.
<u>REFRESHMENT:</u>	Food or drink for consumption on the spot.
<u>PETROL:</u>	Visit to a service station for petrol or repairs.
<u>ACCOMMODATION:</u>	Overnight stay.
<u>SEE:</u>	A tourist stop "Just to see what the town is like", to see the parks, trees, shops etc.
<u>PERSONAL:</u>	Any other reason.

Much will here depend upon the skill and tact of the interviewer in order that people be reassured that no personal prying is involved.

It may be necessary to tell some people that no record is being taken of their number plate or name.

It may be that some drivers who say their trip has originated in Orange may have merely, say, stayed there briefly while on a very long trip. In cases of doubt, such drivers should also be asked the main reason for their stop in Orange.

Drivers who express several reasons for stopping in Orange should be recorded with several ticks under the relevant columns.

7. DESTINATION

The last question is:-

"WHERE WILL THIS TRIP END?"

This should be recorded as the nearest large town or district. The answer may simply be "15 miles out", meaning "15 miles out of Orange along this road". It may even be "Orange", if the trip is a delivery or business call out to, and back from a property near Orange.

APPENDIX C

TRAFFIC VOLUMES WHICH WOULD HAVE OCCURRED ALONG A SOUTH AND WEST BYPASS
ROUTE HAD IT BEEN IN OPERATION ON TUESDAY JUNE 5, 1963.

(Assignment based on the results of the O & D Survey conducted on that day. Corresponds to Fig. 3)

Road Junction	Directions of Movement			No. of Vehicles per Day (7am-7pm)	
	From	Type of Turn			To
		R. H. T.	L. H. T.		
1. Departure of Bypass from S. H. 7 (Bathurst Road closed off inbound of junction)	Orange			Bathurst	688
	Bathurst			Orange	932
2. Junction of Bypass and M. R. 245	M. R. 245	x		Bypass	4
	Bypass		x	M. R. 245	2
	M. R. 245		x	Bypass	392
	Bypass	x		M. R. 245	272
3. Junction of Bypass and New Entry road to Orange	Bypass	x		New Entry	1,098
	New Entry		x	Bypass	812
	New Entry	x		Bypass	0
	Bypass		x	New Entry	0
	East			West	230
	West			East	150
4. Junction of Bypass and } Pinnacle Rd - M. R. 526 }	No estimate of volumes available				
5. Junction of Bypass M. R. 237 and Coronation Drive	Bypass		x	M. R. 237	12
	M. R. 237	x		Bypass	6
	Bypass	x		Coronation	0
	Bypass	x		M. R. 237	2
	M. R. 237		x	Bypass	6
	Bypass		x	Coronation	237
	Coronation	x		Bypass	332
	Coronation		x	Bypass	0
	M. R. 237			Coronation	216
	Coronation			M. R. 237	219
	South			North	212
	North			South	134

Road Junction	Directions of Movement			No. of Vehicles per Day (7am-7pm)	
	From	Type of Turn			To
		R. H. T.	L. H. T.		
6. Junction of Bypass and T. R. 61	Bypass		x	T. R. 61	384
	T. R. 61	x		Bypass	237
	Bypass	x		T. R. 61	2
	T. R. 61		x	Bypass	4
	South			North	170
	North			South	86
7. Junction of Bypass and S. H. 7	Bypass		x	S. H. 7	162
	S. H. 7	x		Bypass	74
	S. H. 7		x	Bypass	258
	Bypass	x		S. H. 7	324
	South			North	8
	North			South	12
8. Junction of Bypass M. R. 573 and March Road to Orange	Bypass	x		March Road	256
	M. R. 573		x	March Road	143
	March Road		x	Bypass	324
	March Road	x		M. R. 573	132
	Bypass			M. R. 573	10
	M. R. 573			Bypass	14

APPENDIX D

TRAFFIC VOLUMES WHICH WOULD HAVE OCCURRED ALONG A NORTH AND EAST ROUTE HAD IT BEEN IN OPERATION ON TUESDAY JUNE 5, 1963.

(Assignment based on the results of the O & D Survey conducted on that day. Corresponds to Fig. 4(a))

Road Junction	Direction of Movement			No. of Vehicles Per Day (7am-7pm)
	From	Type of Turn	To	
		R. H. T. L. H. T.		
1. Departure of bypass from S.H. 7 east of Orange (Bathurst Rd. remains open to local traffic)	S. H. 7	x	Bypass	74
	Bypass		S. H. 7	158
	South		North	858
	North		South	530
2. Junction of bypass and new northern entry road	Bypass	x	New Entry	149
	New Entry		Bypass	140
	Bypass		New Entry	0
	New Entry	x	Bypass	0
	West		East	74
	East		West	158
3. Junction of bypass and M. R. 573	Bypass		M. R. 573	2
	M. R. 573	x	Bypass	0
	Bypass	x	M. R. 573	146
	M. R. 573		Bypass	157
	West		East	66
	East		West	152
4. Junction of bypass and S.H. 7 (Molong Road remains open to local traffic)	S. H. 7		Bypass	68
	Bypass	x	S. H. 7	152
	North		South	264
	South		North	338

Traffic flows as illustrated by Figs. 4b and 4c are simple derivatives of this case.

PH
TELEGRAMS & CABLES:
"ELECTRICOM," SYDNEY
ADDRESS ALL MAIL TO:
BOX 5257, G.P.O., SYDNEY



APPENDIX E
KELVIN HOUSE
15 CASTLEBACH STREET
SYDNEY
TELEPHONE: B 0323
Ext. 500

9th July 1963
Quote Ref: T/Des/TLD/JAH.

Messrs. Clarke, Gazzard & Yeomans,
Architects/Planners,
117 Harrington Street,
SYDNEY. N.S.W.

Attention: Mr. Clarke.

Dear Sir,

City of Orange - Highway Development.

With reference to your recent verbal request for information concerning transmission line easements in the vicinity of the City of Orange, the approximate routes of those lines controlled by this Commission have been marked in various colours according to the code shown in the title -space on the attached plan supplied by your firm. This is intended solely as a basis for defining areas in which you are interested, preparatory to our supplying such detailed information as may be required, and it is suggested that this be effected by a direct approach to Mr. Henderson, Engineer for Wood-Pole Line Design, 5th Floor, Gardiner House, cnr. George and Barlow Streets, Sydney (Phone B 0323 Extension 503).

For your guidance, samples are also enclosed of the three types of plan used by the Commission.

1. The Locality Plan is used mainly in negotiations with other public bodies.
2. The Route Plan is primarily a line construction and maintenance document.
3. The Easement Plan would probably have more application to your needs, in that the precise location and width of strip are shown. This varies from 60 ft. in the case of 66kV single pole lines to 150 ft. for the double-pole 132kV circuit.

With the recent completion of a second 132kV line from Wallerawang, it is probable that long-term development will take the form of replacement of the existing wood-pole construction by double-circuit steel towers on the same easements. This applies particularly to the green and yellow lines approaching the present Orange substation from the east.

Yours faithfully,

K. C. Fraser,

(K. C. FRASER)
MANAGER & SECRETARY.

Encls.

gah

The City of Orange

REFERENCE No. ABM:FB.

Town Hall,

Orange

29th July, 1963.

Messrs. Clarke Gazzard Yeomans,
117 Harrington Street,
SYDNEY.

City of Orange Planning Scheme - Planning
of Highway, etc.

30 JUL 1963

Dear Sirs,

Receipt is acknowledged of your letter of July 24th.
The notes forwarded in explanation of your sketch plan will be helpful.

Concerning Wentworth Park, the whole of this area of 133 acres is dedicated (and not merely reserved) for public recreation; it is wholly required for an 18-hole public golf course the construction of which is scheduled to commence next month, and although the Council welcomes the co-operation of the D.M.R. in road planning a change of user or planning in respect of any part of Wentworth Park is not open to negotiation. This position has been made clear to the D.M.R. by the Council by letter to-day.

Accordingly, your purpose of road planning for incorporation in the City of Orange and Canobolas Shire planning schemes can be more effectively assisted by the two Councils if you will please forward diagrammatic road locations which do not encroach upon Wentworth Park. Arrangements have been agreed upon by both Councils to discuss at an early date whatever material is available from you.

It would be appreciated if you will give this matter early attention.

As an additional area for golf course purposes negotiations are proceeding for the acquisition of Lot 7 Section 4 D.P. 5704 of 4 acres 2 roods 22 perches which adjoins Wentworth Park on the north. This area is unlikely to be of interest to your planning but its intended acquisition is nevertheless made known to you.

Yours faithfully,

A.B. McDowell
(A.B. McDowell)
TOWN CLERK

MD.

ST 8872-2

ADDRESS ALL MAIL TO
P.O. BOX No. 4248,
SYDNEY, N.S.W.
TELEGRAPHIC ADDRESS:
DELOGO, SYDNEY

TELEPHONE 2 056. EXT. 2174.



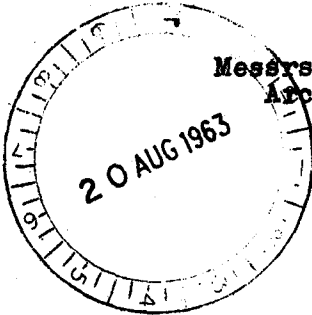
APPENDIX E

Department of Local Government

Bridge and Phillip Streets

Sydney 19 AUG 1963

PLEASE QUOTE NO. M.63/64
IN YOUR REPLY



Messrs. Clarke Gazzard Yeomans,
Architects/Planners,
117 Harrington Street,
S Y D N E Y.

City of Orange: Proposed by-pass road: Your letter - 3/7/63.

Dear Sirs,

Consideration has been given to the preliminary work undertaken by you on behalf of the Department of Main Roads and this Department's view is that a southern and western by-pass road is preferable to a northern and eastern route. The matter was examined under the following headings and comment on each item is furnished for your information:

1. The topographical and engineering difficulties associated with any route.

The northern and eastern route involves only one crossing of a railway while the southern and western route involves two such crossings. Otherwise there does not appear to be any marked engineering or topographical advantage between the routes.

2. The effectiveness of the route in the short and long term in distributing traffic.

There is little difference between the two major routes on this aspect. In the long term, access via March Street to the City centre might be better than via Anson Street but the former requires either a level crossing or a railway bridge while the latter does not. However, it can be expected that the Anson Street bridge must be replaced in due course.

3. Attraction for through traffic, including length, visual attraction, etc.

The northern and eastern route could be the more attractive as it would be possible to obtain from it a fine view of the City near March Street. Both, however, could be attractive from a scenic point of view. From a through traffic point of view the weight is slightly in favour of the southern and western route.

4. The cost and disturbance to existing property.

The information on the question of relative cost between the two routes is inconclusive at the present time. However, with regard to disturbance to existing property, the southern and western route appears to be the better as disturbance to both Wentworth Park and the Racecourse need not be so much as to spoil these areas if suitably treated.

5. Whether or not the route selected allows for a sound land use arrangement within its confines.

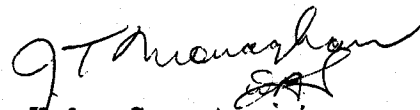
It appears that development in the City of Orange is likely to extend northwards rather than to the south and west particularly from the points of view of land suitability and of providing essential services in an economical manner. Extension to the east is severely limited due to the water catchment area. It seems therefore that selection of the northern and eastern route would create difficulties so far as the extension of the City northward is concerned.

On the other hand land uses to the south of the southern route indicate a different pattern of development which could well be retained. Also, as the land was not as suitable topographically, extension of services would be more costly.

6. Relationship to routes planned previously.

On this ground the southern and western route is strongly established. The southern route has been determined in part for a number of years and is already incorporated in the planning scheme as exhibited. In addition a part of the route has been shown on the west of the City.

Yours faithfully,


Under Secretary.

APPENDIX F

AUTHORITIES CONSULTED IN THE PREPARATION OF THIS REPORT

Department of Main Roads

Commissioner
Assistant Chief Engineer
Traffic Services Engineer
Investigations Engineer
Divisional Engineer (Parkes)
Senior Surveyor

Mr. J.A.L. Shaw
Mr. R.E. Johnston
Mr. M. Fairlie
Mr. L.W. Burgess
Mr. H.J. Vant
Mr. A.T. Lenehan

Department of Local Government

Chief Town Planner

Mr. N.W. Ashton

State Electricity Commission

Engineer for Wood -
Pole Line Design -

Mr. Henderson

Department of Public Works

Engineering Section
Water Supply Branch

Mr. Cruikshank

Department of the Army

Inspector of Rifle Ranges
Army Property Officer

Mr. Lown
Lt. Col. Cameron

Orange City Council

Town Clerk
City Engineer

Mr. A.B. McDowell
Mr. N. Lee

Canobolas Shire Council

Shire Clerk
Shire Engineer
Consultant Town Planner

Mr. J.K.G. Williams
Mr. W. Yeates
Mr. A.J. Brown