VICTOR GRUEN ASSOCIATES

SUMMARY REPORT

CHRYSLER ENGINEERING CENTER

TROY, MICHIGAN

January 7, 1958

TABLE OF CONTENTS

FOREWORD

During the past several months we have conducted extensive research, analysis, and planning for the proposed new Chrysler Engineering Center to be located in the City of Troy.

Certain of these studies have been conducted with the assistance of Mr. Larry Smith, Economic and Real Estate Consultant, and Mr. Lloyd Reid, Traffic Consultant.

The following report summarizes, in detail, our work during this period. Activities of our consultants are summarized in separate reports.

Invaluable assistance and information was provided by the Architectural Coordinating Committee, the Planning Group, and the Administration Group.

Report references to plates are in accordance with the numbering system assigned to the graphic material presented to the Architectural Coordinating Committee on December 12 and 13, 1957.

COMPILATION OF DATA

Working in conjunction with the groups described above and in accordance with our proposal, the information shown in the Bibliography, Attachment A, was collected during the course of our preliminary planning.

ANALYSIS OF DATA

The preliminary documentation of the findings and recommendations of the Engineering Division for the new Engineering Center were drawn together in the Planning Guide. This Guide was used extensively to assist in the giving of direction to our studies.

Planning studies for the surrounding area not occupied by the Engineering Center were tempered by the tone expressed in the Planning Guide, as well as by Corporate expressions in Architectural Coordinating Committee meetings.

Our work on the surrounding area was carried out with the goal of serving and enhancing the Center as the primary objective. Also important in the consideration of the surrounding area was the impact upon the City of Troy and the economic implications of an expected appreciation of real estate values.

It was continually emphasized by the Chrysler Real Estate Division during our analysis and planning that the Chrysler Corporation was not in the real estate business.

EXTENT OF INITIAL AND PROJECTED FACILITIES

The Planning Guide established preliminary space planning objectives as follows:

1. Present space occupied: 1,165,450 sq. ft.
2. 1959-63: 800,000 sq. ft. at Troy
3. 1962-72: 2,000,000 sq. ft. at Troy
4. 1965-xx: 3,000,000 sq. ft. at Troy
5. 19xx: 4,500,000 sq. ft. at Troy

During the course of our preliminary design, extensive investigation of these assumptions was made by us, both independently and in conjunction with the Planning Group. Much valuable background information was provided to us by Chrysler in the Forward Planning Report of the Engineering Division, in several memoranda regarding time and sequence of facility construction and move sequence, in a series of site plans prepared by the Architectural Styling Department, in a space allocation chart resulting from a building type expansion study, in a report on the needs of the Styling Section, and in two sets of lecture notes used in the Chrysler Institute of Engineering.

Several of the documents were prefaced with the caution from the Planning Group against their use as accepted policies of the Chrysler Corporation. However, there was sufficient agreement with their content, related to our independent findings, so that much of the data was invaluable, particularly that contained in the Forward Planning Report and the Move Sequence memoranda.

In a meeting held October 29 in our office with the Planning Group, preliminary area assumptions were agreed upon for the purpose of the presentation on December 12 and 13. These assumptions were:

1. That 1,000,000 sq. ft. would require approximately two years to construct and occupy.

2. That 2,000,000 sq. ft., built concurrently, would require thirty-six to forty-four months to construct and occupy.

3. Design time and preparation of working drawings would range from one to two years and would be in addition to the construction time described in 1 and 2.

4. Chrysler engineering manpower requirements will increase 500 persons per year.

It was emphasized that these were assumptions and approximations and that they should be treated as best estimates only.

In addition, it was further assumed at this meeting that, for the purposes of our initial presentation on December 12 and 13, the following area allocations would be made:

1. First stage: 1,000,000 sq. ft. at Troy - 1,034,000 sq. ft. at Highland Park.

2. Second stage: 2,000,000 sq. ft. at Troy - 250,000 sq. ft. at Highland Park.

3. Third stage: 3,000,000 sq. ft. at Troy - no space at Highland Park.

4. Fourth stage - Ultimate: 4,500,000 sq. ft. at Troy - no space at Highland Park.

Assuming a personnel increase of approximately 500 persons per year would mean that by 1968 the total Engineering Center population would be nearly 12,000 persons. This would correspond roughly with the third stage of development above, assuming 250 sq. ft. per person.

At subsequent meetings further discussion resulted in additional modification to these area assumptions. During the middle of October, Mr. E. Lamb said that present plans would best be accommodated by assuming that 1,000,000 sq. ft. would be built at Troy immediately, followed in concurrent fashion by two second stage construction programs of 630,000 sq. ft. each. At the end of this period, there would be a total of 2,126,000 sq. ft. at Troy and the present Highland Park Engineering Center would be occupied in the main by other Chrysler Corporation Divisions, possibly Administration. There might still remain a remnant of the Engineering Division but for all intents and purposes, the Engineering Division could be assumed as totally located at Troy.

A realistic construction schedule should make it possible to occupy the 2,126,000 sq. ft. by late 1962 or early 1963. This would provide, at the present population growth rate, an area of approximately 274 sq. ft. per person in 1963, which compares favorably with the present space allocation of 228 sq. ft. per person.

In light of the above, our preliminary studies, presented December 12 and 13, show the following:

1. Master plan for Engineering Center containing 2,126,000 sq. ft.

2. Indication by dotted line of initial 1,000,000 sq. ft. to be occupied.

3. Indication by dotted line of general expansion possibilities to the ultimate 4,500,000 sq. ft.

A detailed consideration of the areas to be occupied by the various functions indicated there were no accepted criteria by which exact future space could be allocated. In consideration of this, it was decided to adjust present areas upwards in a relationship somewhat proportional to the increase in total area.

Based upon detailed inspection of all departments, conferences with the Planning Group and Architectural Coordinating Committee, discussions with Department Heads, Section Heads, and Executive Engineers, and observations of our own, certain disproportionate increases, or decreases, were applied as adjustments. These resulted in the Section areas indicated on Plate 49.

Very early in our work the Planning Group confirmed our decision to plan in terms of sections rather than departments in the preparation of the tentative master plan. It was felt, after exhaustive analysis of the function and organization of the Engineering Center, that departmental planning at this time would involve unnecessarily detailed studies.

RELATIONSHIP OF ENTITIES WITHIN THE FACILITY

From the earliest meetings one of our major goals was to realistically evaluate and place properly each facility in its ideal location. Initially, our greatest effort in this respect was a detailed inspection of 155 of the total of 188 departments in the Engineering Division. The results of this inspection trip by members of our staff, accompanied by a member of the Chrysler staff and a member of Yamasaki Leinweber & Associates staff were detailed in a report entitled Supplementary Inspection Survey of the Chrysler Engineering Division. Copies of this report were furnished to the Planning Group and to Yamasaki Leinweber & Associates.

Observations of this inspection team were later incorporated in a comprehensive Victor Gruen interoffice manual which dealt in detail with each section, incorporating comments from Chrysler survey sheets and results of the communications analyses.

During this period several conferences were held with Mr. R. Delderfield of the Management Planning Department. These resulted in the preparation of a report entitled Styling and Body Engineering Coordination. Copies of this were distributed to the Chrysler Corporation and to Yamasaki Leinweber & Associates.

On July 11, in preparation for the inspection trip, an extensive Planning Group conference was held at which Messrs. B. Smith and G. Berry of Chrysler discussed, in detail, the organization and function of the Engineering Division. The minutes of this meeting formed the basis for much of our later investigation.

It was obvious from data contained in the Planning Guide that Chrysler recognized the importance of communication. Also emphasized in the Planning Guide was the necessity for determining in greater detail the characteristics of all elements contained within the Engineering Division.

Therefore, concurrently with the physical inspection of the present Engineering Center, we worked with the Planning Group to formulate a departmental questionnaire from which detailed planning information at the department level could be obtained. This information was later used by us to establish area requirements, analyze general utility needs, obtain comments from departmental personnel and to acquaint us with all special needs of each department.

Contained in the survey questionnaire was a request for two-way confrontation frequency. This information indicated the number of personal, face-to-face contacts the personnel of one department had with the personnel of another department in a period of one week. At this time it was recommended by us that information regarding telephone communication and mail communication be made a part of this survey. However, because of certain anticipated response difficulties, the Planning Group requested this be made a later and separate survey.

On August 8, 1957, at the request of the Planning Group, we furnished a recommended procedure for the conducting of the telephone survey. The telephone and mail surveys were immediately made, and the data processed by I.B.M. Tapes on all services were furnished during the first three weeks in September.

Upon their receipt, we prepared a set of communication charts, indicating the frequency of all:

1. Two-way personal confrontations by section for one week.

2. One-way telephone contacts by section for a two-day period.

3. Mail contacts for a three-day period.

Combining this communications data, the results of the departmental inspection trips, the results of conferences with the Planning Group, Section Heads, and Executive Engineers, the information in the survey sheets, and the data contained in the Engineering Division Organizational Manual, published in June 1957, we were able to graphically depict both the organizational pattern and the functional relationship of activities in the Chrysler Engineering Division.

This was approached from two different viewpoints:

1. First, the derivation from communications data.

2. Second, the derivation from empirical observation.

The sequence of relationships derived from confrontation resulted in a section arrangement in which the length of travel between areas of heaviest confrontation frequency were minimized. Upon this were superimposed telephone communications data, which agreed closely with the confrontation data.

The empirical arrangement of functional operations resulted in the relationships shown on Plate 43. This drawing was derived from distillation of activities out from the organizational pattern, as shown on Plates 41 and 42.

There was marked correlation between the activity relationship shown in Plate 43 and the physical layout of sections as derived from the confrontation data.

Meanwhile, the Planning Group programmed the confrontation data and, working with their Computer Department, obtained an optimum solution based on volume of communications and distances only. We received this on October 15, 1957, and, comparing this study with our previously arrived at relationships, we found that there was a reasonably close correlation.

Recognizing the deficiencies in an analysis of this type, which might be affected by inaccurate reporting, we made certain modifications which resulted in a basic section relation arrangement as shown on Plate 52.

BASIC GROUND USE REQUIREMENTS AND HEIGHT INDEX OF CENTER

The survey results indicated that close attention must be paid to the basement, grade level, and upper floor requirements of each facility within the new Engineering Center.

During the early part of August, working with the Planning Group, we established space occupation factors which were to be applied to each department in order to determine at which vertical level it could operate most efficiently.

On October 23, in conference with the Planning Group, our thinking was crystallized into a listing of 20 desirability factors for occupancy of floor space (see Attachment B). These were then applied as criteria to basement, grade level over basement, grade level no basement, and upper level space for each of the 188 departments in the Engineering Division.

Preliminary analysis of the distribution of floor space indicated that an approximate 60% - 40% split in grade level-upper level space, respectively, would be appropriate. This is a preliminary figure and will be subject to modification as designs are refined.

CONSTRUCTION

As planning progresses from the Tentative Master Planning stage into preliminary working drawings for the Engineering Center, detailed analysis of the type of construction to be used must be made for each building element. For the purpose of this early report, we feel it is sufficient to generalize, commenting only briefly on the elements that must be considered in determining a construction system.

1. Foundations

   Exploratory wells drilled at three locations on the site indicate generally favorable soil conditions. However, the presence of the River Rouge, running from north to south, and the importance of this body of water as a design element make it imperative that detailed subsoil information be obtained as quickly as building locations have been established.

If the subsoil is capable of sustaining loads ranging from three thousand pounds per sq. ft. upward, the relatively low rise buildings projected can be supported in the main on spread footings. Special attention, however, should be paid to subsoil conditions in the high rise Engineering Center Administration Building since column loads here are apt to be considerably higher than in the remaining portions of the Center.

Where soil conditions are poor and bearing capacity less than three thousand pounds per sq. ft. is indicated, serious consideration of supports other than spread footings must be given. These may include structural steel H piling or concrete piles either cast in place or precast.

If it is found that suitable bearing capacity occurs at a considerably lower elevation than would normally be encountered by spread footings but still not deep enough to require the use of driven foundation supports, drilled in caissons may provide an economical foundation.

Another factor to be considered in the design of the building foundations is the Evergreen Interceptor. At present, efforts are under way to locate this sewer so that no buildings are to be constructed over it. However, if it is necessary to bridge this utility, no major technical problems are anticipated. The problems here are more of a legal nature. However, any time utility interference is encountered in the design and installation of a substructure, it involves added design and construction expense.

Those portions of the project having special machine foundation requirements, such as dynamometer area, cold rooms, vibration and noise testing equipment, must all be especially designed.

2. Super Structure

There are many framing methods which might be used in the super structure. At present, the majority of the buildings in Highland Park are reinforced concrete construction. Chrysler has indicated that new buildings at Troy should have the same fire resistant qualities, which would indicate the use of Type One (fireproof) construction for the majority of the space.

There are many ways that a fire proof structure might be provided. One of the simplest of these is by use of reinforced concrete building frames. However, concrete has the disadvantage of relative inflexibility. Changes, additions, or deletions in a reinforced concrete structure are expensive, noisy, and dirty.

In addition, the use of concrete on lightly loaded horizontal areas, such as roofs, imposes a heavy penalty on the vertical supporting system because of the large dead load. Additionally, in areas which require spans greater than 40 ft., horizontal concrete framing requires excessive depth for beams and girders. Of course, where large spans must be provided and where the overhead enclosure is not restricted so far as shape is concerned, many interesting applications, using a thin concrete slab, folded and curved in different manners, can prove aesthetically and economically exciting.

The advantages of structural steel as a basic framing material, however, cannot be overlooked. Revisions to a steel frame are always far simpler than corresponding changes made in a concrete frame. With proper attention to design, the same advantages of continuity can be achieved both in structural steel and in reinforced concrete.

The major problem encountered in any structural steel building is the provision of adequate fireproofing. Several methods can be used.

Generally, if the floor system is of reinforced concrete, this material can be carried around the beams, girders, and columns to provide integral fireproofing.

The second method of fireproofing utilizes vermiculite or perlite plasters ranging from 1 inch to 1½ inches in thickness. The plaster may be applied on a metal lath system; boxing in beams, girders, and columns; or using the double ceiling principle where a fireproof ceiling is hung above the exposed ceiling and the space between is used to house duct work, electrical fixtures, sprinkler lines, and other utilities.

All of the methods of fireproofing structural steel normally result in increased costs over the use of reinforced concrete. However, at certain periods (for example - such as now), the availability of structural steel, with the subsequent lowering in tonnage cost and erection, may outweigh other cost differentials, and in conjunction with good design practice, prove to be comparable in cost, or even less expensive, than reinforced concrete.

As with concrete, where large column free space must be provided and where overhead enclosure is not restricted horizontally, certain rigid steel frame shapes offer a unique beauty and economy of their own. It should be remembered, however, that, as spans on structural steel members increase, fireproofing requirements may impose severe aesthetic and financial limitations on their use.

As design of the Engineering Center proceeds, it will be necessary to totally evaluate the structural systems, considering the following items:

a. Flexibility required:

   (1) Revisions

   (2) Vertical expansion

   (3) Horizontal expansion

b. Load carrying capacity in relation to depth of framing required

c. Bay sizes

d. Height of buildings

e. Fenestration and other exterior treatment

f. Building code requirements

g. Size of vertical members

h. Insurance requirements

i. Repetitive units (large repetition of steel or concrete elements makes for economies in fabrication and erection)

j. Importance of weight savings relative to footing loads (important where poor soil conditions exist)

MECHANICAL AND ELECTRICAL SERVICES

For the purposes of preparing preliminary master plans for the Engineering Center, mechanical and electrical studies were limited in scope to provide basic information only concerning the general characteristics of these utilities.

It was assumed that a central type boiler-refrigeration plant would be used, and that power for prime movers would be purchased from a utility company, while coal and/or oil would be used for fuel. This preliminary decision was made based on past experience regarding normal comparative initial and operating costs, flexibility, reliability, and other operational features.

Considerations regarding the use of coal and/or oil are significant at this phase of the work relative to the following points regarding nuclear power and fuels:

1. If for any reason, Chrysler should prefer to use nuclear energy for steam production, either with or without electric power generation, the central plant concept would probably be revised.

2. At present and in the near future, comparative initial and/or operating cost factors make a nuclear installation a promotional and/or research facility rather than a basically sound economic installation.

3. If coal burning is anticipated now or in the future, the central plant should also be located away from the building group. Coal and ash handling make this a practical necessity.

4. It is assumed that economics do not justify the provision of electric power generation as a part of this development. Any further investigation of this matter should be done at a later stage of development.

Based upon these assumptions, we have, in our preliminary plans, indicated a combined central boiler-refrigeration plant with all necessary auxiliary units for heating-cooling service requirements of the Engineering Center. A building size of approximately 150 feet by 100 feet, with a height of 50 feet, has been used for preliminary plant sizing.

Dependent upon the staging of construction, the plant would probably have three or four steam or hot water boilers; each with its own stack. Stack sizes would be between 4½ and 5 feet in diameter. Their heights above the plant would depend to a large extent on the location of the plant relative to other buildings in the group. If the plant is closer than 200 feet to a building extending more than 25 feet above the plant, then the stacks should be carried to a point approximately 50 feet above the plant roof line. The stack group would be placed in about one-half of the long plant dimension.

A cooling tower bank for refrigeration condensing water purposes will be required. This tower can be placed adjacent to the boiler-refrigeration plant or, if necessary, on top of one-half of the plant.

The mass of the cooling tower should be approximately 60 feet by 80 feet by 20 feet to 25 feet in height.

Pumping and treatment of sanitary water would probably be conducted in a facility somewhat remote from the main building group. For this reason, we have made no effort to locate it at this phase of the planning. In addition to the plant itself, it will be necessary to have pump house units for each well location. These pump houses will be small building units, probably about 10 feet by 15 feet by 10 feet high.

An elevated gravity storage and pressure tank will probably be necessary. The size and height of this tank depend upon many factors, and should be investigated in detail once preliminary planning has proceeded further.

A ground water reservoir may also be necessary or justified in addition to the elevated tank but, again, this is a matter which should be considered once preliminary plans have progressed further.

Assuming that power will be taken from the public utility at high voltages and reduced for underground and in-building primary distribution to unit type substations and load centers, the substation facility would consist of a combination switchyard transformer and meter house. The location of this installation will depend upon many factors. Although the boiler-refrigeration plant might provide a location for the primary substation, it could prove desirable to have this primary facility more remote from the building group. The utility highline leading into the substation would be difficult to conceal. This in itself would make it desirable to keep the substation away from visually exposed areas where aesthetic considerations are important.

FLOOR USES AND LOADINGS

The multiplicity of uses to which space in the new Engineering Center is to be put requires that careful analysis of location and loading with respect to the type of floor be made.

In conjunction with the Planning Group, the Desirability Factors listed in Attachment B were measured against the departmental space requirement and the desirability of using basement, grade level over basement, grade level no basement, or upper level space. By use of this guide, we were then able to assign not only location but loading specifications to each of the types of space encountered.

Generally, the space at the Center will be one of eight types: drafting, studio, office, shop, laboratory, garage, stock room, or special purpose. Floor loadings for each of these must be determined at the time preliminary working drawings are begun.

Many times widely varying floor loadings can be expected even in similar space occupancy; therefore, listed below by range are the floor loadings which should be considered during our preliminary work.

1. The first figure given is the live load required by the city of Detroit

2. The second figure given is that required by the Basic Building Code of 1950

3. The third figure given is a composite made up of several source recommendations

Type	Detroit	BOCA	Composite Recommendations
Drafting	50 to 100	60 to 100	80 to 125
Studio	100 to 125	120	80 to 120
Offices	50 to 125	50 to 100	50 to 100
Shop	120 to 200	120 to 250	125 to 250
Laboratory	100 to 150	100 to 250	100 to 250
Garage	80 to 150	75 to 175	80 to 175
Stock Rooms	50 to 150	50 to 250	100 to 150
Special Purpose	40 to 250	40 to 250	40 to 250

We recommend that all slabs which are placed on fill be designed for a live load of 250 pounds per square foot. We have found that this can be accomplished with very little increase in cost over substantially lighter loading requirements.

A major reason for designing heavy capacity into slabs on fill is the tendency for building occupants to pay less attention when loading this kind of slab than supported floors. Additionally, most slabs on fill receive directly the heaviest loading from incoming and outgoing material since it is located generally at a transshipment level.

WATER

An extensive study was made of the water problem by consultants retained by Chrysler through the Detroit Edison Company. These studies were predicated upon three test wells drilled in Section 8.

Results of these three test wells show an expected supply of 3,000,000 gallons of water per day. Since expected sanitary sewage flow during stage three (12,000 persons) is 903,000 gallons per day, it appears that the quantity of water available is adequate. It should be cautioned that dependence upon well supply by such a large operation as is anticipated at the new Engineering Center is less than desirable.

At present the Southwest Oakland County Water Authority supplies some water to the southern areas of the City of Troy. The Oakland County Authority buys its water from the city of Detroit. Detroit had started the installation of a 54-inch water main on Dequindre, and planned to extend it to Pontiac, Michigan. Political disagreements stopped construction of this main at Twelve Mile Road. Presently, the matter of extension is under consideration by the City of Detroit Council.

Another source of water supply in the area besides the wells on the site is an existing main located on Nineteen Mile Road and terminating one-half mile east of Crooks Road. This main receives its water supply from a well located in Section 4 of the City of Troy.

The construction of the Engineering Center and the resulting improvement and development of the surrounding areas should assist in hastening the installation of a municipal or county water system. We would recommend that Chrysler Corporation take an active role in supporting such projects.

SEWAGE

At the present time there are no storm sewers servicing the Engineering Center site. It is planned to utilize the River Rouge to absorb surface water from the drainage area. Gates or other regulating devices will be used to properly control stream level. Flooding conditions of the River Rouge have not been encountered. Undoubtedly, the small area drained accounts for part of this. In addition, the area is relatively structure-free land with good vegetation growth, all of which allows absorption of 80 to 85 per cent of the water falling upon it. However, once paved parking areas, roads, and buildings are constructed, we can expect that 90 to 100 per cent of the water falling upon these areas will have to be routed to the River Rouge. The River, in its present condition, does not have the capacity to take this runoff, and our storm water improvements must include reshaping and regrading the present creek bed. A discussion and complete report regarding the River Rouge has been prepared and furnished the Chrysler Corporation by us.

Regarding sanitary sewage, a survey of the existing Engineering Center at Highland Park showed that the total metered discharge on the basis of an eight-hour day with a population of 4,560 persons was approximately 50 gallons per capita per day. It is proposed that the new Engineering Center in Troy will be serviced by the North Evergreen Interceptor. Hubbell, Roth & Clark, the designing engineers of the Interceptor, assigned residential density of 3,500 persons to Section 8 of the City of Troy. On the basis of a residential sanitary sewer design factor, 258 gallons per capita per day, our total sanitary sewage capacity available to Chrysler is 903,000 gallons per day total in Section 8. Even increased sanitary discharge from 50 to 80 gallons per capita per day shows that the now designed sewer can accommodate slightly more than 11,000 people. If the ultimate population of the Engineering Center increases beyond the existing sewer capacity, it may be necessary to provide impounding or treatment methods by means of which sanitary wastes can be retained or treated.

ATTACHMENT A

CHRYSLER COMMUNICATIONS WITH VICTOR GRUEN

(Reports, Drawings, Correspondence, etc.)

Classification A: Organization, Functional Relationships, and Communications. Job No. 7069

Description or Title	Date Received	Remarks	Author or Source
Functional Relationship of Activities	11/57		VG
Organization & Activities Chart	11/57		VG
Organizational Relationships of Groups Chart	11/57		VG
Department Location Chart	11/13/57	Department location by building	CH
Chrysler Engineering Division Functions & Communications Analysis Report	10/57	An operational guide to the functions of the Chrysler Engineering Division	VG
Communications Diagram	10/57	Development of section relationships through communications	VG
Communication Study	10/7/57	Charts prepared from confrontation, phone & mail surveys.	VG
Memo-Personnel Administration - General Office	10/24/57	Statistics on General Office Personnel	CH
Optimum Arrangement of Sections (IBM)	10/15/57	Analysis of space arrangement based on communications and distance only	CH
Memo on Projected Personnel	10/15/57	Analysis by Management Planning Department based on 1956 Ford Plan	CH

Description or Title	Date Received	Remarks	Author or Source
Material Procurement Operations Memo	10/8/57	Information concerning problems involved.	CH
Chrysler Institute of Engineering Graduate School Brochure	9/57	History and description of the Institute's programs.	CH
IBM Communications Tapes	9/57	Section and departmental tapes for confrontation, telephone and mail surveys.	CH
Visual Communication Reports	9/12/57	Closed circuit television possibilities.	CH
Styling & Body Engineering Coordination	8/57	Sequence of design development prior to production (Supplementary Inspection Survey Report, Part II).	VG
Supplementary Inspection Survey Report	8/57	Supplementary information concerning present operation - Engineering Division.	VG
Graduate School Lecture Notes - Organization	8/57	Description of function and organization of all sections.	CH
Departmental Telephone Directory - Engineering Division	8/57		CH
Survey of By-products at Troy	8/21/57	Concerns salable and non-salable materials.	CH
Integration of New Body Program, Chart II	8/16/57	Styling and Body Engineering coordination.	CH
Organization Manual	7/57	Organization and areas of responsibility of Chrysler Corporation.	CH
Chrysler Corporation Organization Chart	7/26/57		CH
Security Provisions Report	7/25/57	Control of material, people and information.	CH
Planning Guide	6/28/57	A guide for planning the new Engineering Center.	CH

ATTACHMENT A

CHRYSLER COMMUNICATIONS WITH VICTOR GRUEN

(Reports, Drawings, Correspondence, etc.)

Classification B: Space Requirements. Job No. 7069

Description or Title	Date Received	Remarks	Author or Source
Summary Chart for Chrysler Engineering Center	11/20/57	Includes space requirements, parking requirements and communications.	VG
Summary Chart for Department Areas	11/20/57	Includes space requirements, parking requirements and communications.	VG
Time & Sequence of Facility Construction	11/13/57	Recommendations as a starting point for the sequence of construction at Troy. (Includes area distribution charts).	CH
Memo - Corporate Space Demands	11/13/57	Discussion of problems of corporate space demands.	VG
Move Sequence	11/12/57	Analysis of chassis and styling move sequences.	VG
Sequence of Move Study	11/11/57	Analysis of moves of Highland Park spaces to Troy. (Includes area distribution charts).	VG
Developing Expansion Methods by Types of Space	11/6/57	Thoughts of the Facilities Planning Department regarding expansion techniques.	CH
Survey of Personnel & Space	11/6/57	Summary bed sheets containing personnel and space in Engineering Division. (Corrected 11/4/57).	CH
Memo - Initial Space Requirements	10/30/57	Quantitative and Qualitative factors in space requirements.	VG

Description or Title	Date Received	Remarks	Author or Source
Desirability Factors for Occupancy of Floor Space	10/23/57	Vertical location of departments by levels.	VG
Air Conditioning Cost Report	10/16/57	Air conditioning as affected by orientation and solar protection.	CH
Building Types Expansion Study	9/57	Expansion study based on space allocation chart.	CH
Summary of Grade Level Requirements	9/26/57	Grade level space requested by engineering departments.	CH
Expansion Study Drafting Type Space	9/26/57	Efficiency in expanding drafting room area.	CH
Design Proposal for a Styling Building	9/16/57	Plans and expansion studies.	CH
Site Plan Studies	8/57	Photos of models and plans.	CH
Sequence of Movement Problems	7/25/57	Influence of move sequence on space arrangements.	CH
Memo - Air Conditioning	7/24/57	Buildings to be air conditioned.	CH
Memo - Car Movement	7/10/57	Movement of cars within buildings.	CH

ATTACHMENT A

CHRYSLER COMMUNICATIONS WITH VICTOR GRUEN

(Reports, Drawings, Correspondence, etc.)

Classification D: Physical Site Characteristics. Job No. 7069

Description or Title	Date Received	Remarks	Author or Source
City of Troy Future Water Planning	9/57	Includes water mains, low pressure areas, water storage - present and future.	Troy Planning Commission
Evergreen Interceptor Easement - 1"=200'	9/57	Includes plans and profiles.	VG
River Rouge Report	9/18/57	Rouge River data and characteristics.	VG
Troy Township Map 1" = ½ mile	8/57	Oakland County, Michigan	VG
Traverse Survey of Site 1"=500'	8/26/57	Compilation of Chrysler property, boundaries and easements.	VG
Troy Zoning Map-1"=1000'	7/3/57		Vilican & Leman
Topographical Survey of Site - 1"=100'	6/57	2' contour interval.	CH
U.S. Geological Survey Map - 1"=2000'	6/57	Includes cities of Pontiac, Birmingham and Rochester.	VG
U.S. Geological Survey of Site - 1"=500'	6/57	Enlargement of above.	VG
Photo Record of Site	6/9/57	Ground level photos of site.	Weil
Aerial Photos	6/2/57	Oblique and vertical photos of site.	Clark Aerial Survey

CHRYSLER COMMUNICATIONS WITH VICTOR GRUEN

(Reports, Drawings, Correspondence, etc.)

Classification E: Land Use — Job No. 7069

Description or Title	Date Received	Remarks	Author or Source
Economic Memo	11/15/57	Discussion of Economic Land Use Studies	VG
Memo - Metropolitan and State Highway Programs	11/11/57	Expressways and Interregional Highway Programs	Lloyd Reid
Parking Facilities Report	11/7/57	Parking problem at new Engineering Center	CH
Letter - Transportation Facilities Used by Chrysler Employees	10/30/57	Transportation facilities used by Chrysler employees to and from work	Lloyd Reid
Business Conditions Around G.M. Tech Center	10/28/57	Discussion regarding compatibility of land use and establishment of compatible industries	VG
Chrysler Engineering Center Road Inventory	10/4/57	Existing conditions and capacities of roads and intersections	Lloyd Reid
Regional Planning Commission Report	9/57	Land use and related studies	Regional Planning Commission
Oakland County Planning Commission Progress Report	9/57	Land use and related studies	Oakland County Planning Commission
Population Estimates Detroit Regional Planning Commission	9/57	Population estimates by units of government	Detroit Regional Planning Commission
1970 and 1980 Population Projections	9/57	Population supplement for St. Clair and Washtenaw Counties	Detroit Regional Planning Commission

ATTACHMENT A

Description or Title	Date Received	Remarks	Author or Source
Occupied Dwelling Units	9/57	Estimated from residential building permits	Detroit Regional Planning Commission
Home Location Pattern of Industrial Workers	9/57	Concerns factors affecting home location	Detroit Regional Planning Commission
Roads Needed in Warren-Sterling Township	9/57	Traffic study in G.M. Tech Center Area	Lloyd Reid
Development Alternatives Report	9/17/57	Concerns property development	Larry Smith
Preliminary Traffic Report	9/10/57	Survey of existing roads and recommendations for new Center	Lloyd Reid
Proposed Subdivision Regulations	8/57	Ordinance for platting of land	Troy Planning Commission
Troy Zoning Considerations	7/10/57	Review of zoning potentials for the Troy site	CH
Summary Report on Land Use	7/3/57	Industrial development, commercial location, and neighborhood unit for City of Troy	Vilican and Leman

ATTACHMENT A

CHRYSLER COMMUNICATIONS WITH VICTOR GRUEN

(Reports, Drawings, Correspondence, etc.)

Classification C: Utility Requirements. Job No. 7069

Description or Title	Date Received	Remarks	Author or Source
Utility Availability	11/14/57	Availability of water, electric power, and natural gas for Troy.	VG
Memo on Troy Water	11/1/57	Outline of water problems to be considered at Troy.	VG
Water Classification	10/8/57	Supply, distribution and drainage of all water.	CH
Utilities Summary & Planning Factors	10/7/57	Utility consumption survey.	CH
Letter on North Evergreen Interceptor	10/4/57	Recommendations for preliminary status of master planning.	VG
North Evergreen Interceptor	9/57	Design prepared for North Evergreen sewage disposal authority.	Hubbell, Roth & Clark
Survey on Water Towers	9/25/57	Schematic drawings of water towers.	CH
Well Water Test Borings at Troy Site	6/57	Includes information on soil conditions and water supply.	CH
Aquifer Performance Test	6/57	Analysis of test wells indicating yields.	Detroit Edison
Plant Waste Survey of Highland Park Site	6/57	Plant waste by building at central engineering in Highland Park as related to new site.	CH
Boundary Map of North Evergreen Interceptor	6/57	Included in above report.	CH
Memo - North Evergreen Authority	5/29/57	Confirmation of no increase in sewer capacity due to extended sewer area.	CH

CHRYSLER COMMUNICATIONS WITH VICTOR GRUEN

(Reports, Drawings, Correspondence, etc.)

Classification F: Committee Meetings — Job No. 7069

Date Received	Subject
11/18/57	Property Control, North Evergreen Sewer, Consultants, Property Survey Closure
10/28/57	Evergreen Interceptor, School Property, General Administration Growth
10/25/57	Corporation Development, Progress Report, Consultants, Corporate Population Characteristics
10/4/57	Survey Summaries, Rouge River Engineering Functions. North Evergreen Authority Property Acquisition - School, Property Survey Closure, Consultants
10/1/57	Economic Report, Economies of Land Use
9/13/57	Communications Surveys, Progress Report, Consultants, Property Acquisition
9/3/57	Progress Reports, Communications Surveys
8/23/57	Survey Questionnaire, Mail Survey, Telephone Survey, Progress Reports
8/2/57	Policy Proposals, Troy Zoning, Survey Questionnaire, Contour Model
7/26/57	Manpower Projections, Management Planning, Inspection Survey
7/24/57	Site Plan Studies by Chrysler Corporation, Telephone Survey, Inspection Survey, Policy Proposals, Present Policy
7/12/57	Consultants, Progress Reports, Publicity, Sewage, Site Route, Property Acquisitions, Peripheral Land Use, Policy Proposals

ATTACHMENT A

Date Received	Subject
6/25/57	Economic Analysis, Traffic, Contour Model, Survey Questionnaire Summary, Troy Planning Commission
6/21/57	Sanitary Sewer, Storm Water Disposal, Acquisition of Additional Property, Consultants, Move Sequence, Publicity, Visit to Site
6/14/57	Consultants, Outside Planning Agencies, Air Conditioning, Survey Questionnaire
6/12/57	North Evergreen Sewer, Acquisition of Additional Property, Site Visit
6/7/57	Gruen Organization, Communications, Project Hours, Consultants
6/5/57	Publicity, Organization Planning Guide, North Evergreen Sewer

October 23, 1957

DESIRABILITY FACTORS FOR OCCUPANCY OF FLOOR SPACE

1. Saving in fenestration in areas such as toilet rooms, locker rooms, storage, etc.
2. Sound control, where deadening effect of heavy exterior walls and/or backfill would assist in reducing noise transmission.
3. Vibration control, where heavy walls and/or backfill would help reduce vibration.
4. Radiation control, where heavy walls and/or backfill could be used for shielding.
5. Physical security, where heavy walls could be used to provide security from exterior.
6. Visual control, when bulky unattractive equipment would necessitate undesirable blind wall areas.
7. Visual security where below grade location would be desirable to conceal operations.
8. Housekeeping in receiving and delivery areas where concealment and separation of noise, odor and unsightliness, should be provided from other activity areas.
9. Heavy floor loadings.
10. Large volume and/or bulk of material handling.
11. Large volume of pedestrian traffic.
12. Disposal of industrial waste.
13. Underground servicing of operational equipment.
14. Operations involving whole cars.
15. Extensive ductwork and utilities where extension through work space would be inconvenient.
16. Large floor areas unobstructed by columns.
17. Security requirements.
18. Freedom from grade level noises, dirt and odors.
19. Light floor loadings.
20. Privacy and/or protection from outside.

Dept. No.	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
141	Engineering Records	(Truck Vault) 1,5,6,8,9	—	—	18,19,20
142	Service Parts Analysis	—	—	—	18,19
143	Engineering Design Standards	—	—	—	18,19
144	Reproductions and Vault	1,5,6,8, 9	10,12*	9,10,12*	15
150	Chief of Section - Mat'l Procurement Operations	—	—	—	18,19
151	Passenger Car Materials Procurement	—	11	11	—
152	Truck Materials Procurement	—	11	11	—
153	Research Materials Procurement	—	—	—	19
154	Procurement and Processing Records	—	—	—	19
155	Estimating and Planning	—	—	—	19
156	Materials Handling	1,5,6,8, 9	(9,10)	9,10	—
157	Experimental Machine Shop	—	—	9,10	—
158	Inspection	—	—	9,10	—
159	Materials Procurement Operations	1,9	—	9,10	—
170	Buildings & Facilities Management	—	—	—	18,19 20
171	Architectural Styling	—	—	—	18,19
172	Facilities Planning	—	—	—	18,19
173	Architectural Engineering	—	—	—	18,19

12 (*) Water disposal to be replaced by vent

Dept. No.	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
175	Bldgs & Equipment Maintenance	Outdoor storage should be provided 1,6,8,9 (Lt Strge). consider seperate yard	—	9,10,11 Shops	Equip't Garage Req'd
176	Bldgs & Grounds Maintenance Service	1,6,8,9 (Lt Strge).	—	9,10,11 Shops	—
177	Facilities Procurement	—	—	—	18,19
190	Chrysler Institute of Engineering	—	—	Auditorium 11,14	18,19
210	Product Programming Section Mgt.	—	—	—	18,19,20
211	New Product Ideas	—	—	—	18,19,20
212	Product Profiling	—	—	—	18,19,20
221	Management Planning	—	—	—	18,19
231	Product Information	—	—	—	18,19
232	Presentations	1	—	10	19
233	Technical Reports & Standards	—	—	—	18,19
300	Body Engineering Chief Engineer	—	—	—	18,19,20
302	Staff Operations	—	—	—	18,19
310	Body Shops	—	—	—	18,19
311	Wood Mill - HP	20% storage 1,6,8	—	9,10,12	—
312	Wood Forms Shop - HP	20% storage 1,6,8	—	9,10,12	—
313	Metal Shop - HP	20% storage 1,6,8	—	9,10,12	—
314	Paint Shop - HP	20% storage 1,6,8	—	9,10,12,14	—

Dept. No.	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
315	Trim Shop - HP	20% storage 1,6,8	—	9,10,12,14	—
316	Plastic Shop - HP	20% storage 1,6,8	—	9,10,12,14	—
317	General Model Shop - HP	—	—	—	19
321	Die Model Building - HP	1,6,8	10	9,10	—
322	Die Model Checking - HP	1,6,8	10	9,10	—
323	Die Model Building - OD	1,6,8	10	9,10	—
331	Body Shops - OD	1,6,8	10,14,17	9,10,14,17	—
339	Trim Shop - OD	1,6,8	10,14,17	10,14,17	—
340	Body Design - HP Chief Engineer	—	—	—	18,19
341	Body-in-White Design	—	—	—	16,18,19
342	Interior Design	—	—	—	16,18,19
343	Front End Design	—	—	—	16,18,19
351	Sealing Development	—	—	—	18,19
352	Hardware & Mechanisms Development	—	—	—	18,19
353	Body Components Development	—	—	—	18,19
361	Seating Design & development	—	—	—	18,19
362	Color & Trim Specifications	—	—	—	18,19
371	Advance Body Design & Cost Analysis	—	—	—	18,19

Dept. No.	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
381	Body Design - OD	1,5,8	—	—	18,19,16
600	Styling Management	—	—	—	18,19
602	Cost Control	—	—	—	18,19
605	Long Range Planning	—	—	—	18,19
608	Personnel Administration	—	—	—	18,19
610	Exterior Design Management	—	Near exterior studios		—
611	Plymouth Exterior Studio	—	Close to Clay studios 17	17	—
612	Dodge Exterior Studio	—	Close to Clay studios 17	17	—
613	Suburban Studio	—	Close to Clay studios 17	17	—
61[illegible]	Commercial Studio	—	Close to Clay studios 17	17	—
621	De Soto Exterior Studio	—	Close to Clay studios 17	17	—
622	Chrysler Exterior Studio	—	Close to Clay studios 17	17	—
623	Accessory Studio	—	Close to Clay studios 17	17	—
624	Imperial Exterior Studio	—	Close to Clay studios 17	17	—
640	Interior Design Management	—	17	17	18,19
642	Fabric & Materials Studio	—	17	17	18,19
643	Color Studio	—	17	17	18,19
645	Plymouth Interior Studio	—	—	—	17,18,19

Dept. No.	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
646	Dodge Interior Studio	—	—	—	17,18,19
647	De Soto Interior Studio	—	—	—	17,18,19
648	Chrysler Interior Studio	—	—	—	17,18,19
649	Imperial Interior Studio	—	—	—	17,18,19
650	Styling Product Development Management	—	—	—	18,19
651	Preliminary Body Development	—	—	—	18,19
653	Technical	—	—	—	18,19
654	Preliminary Body Design	—	—	—	18,19,16
656	Advance Exterior	—	—	—	18,19
657	Advance Interior	—	—	—	18,19
658	Styling Product Development	—	—	—	18,19
662	Clay Studios	—	—	3,9,10	—
663	Clay Shops	—	—	3,9,19	—
671	Product & Exhibits	—	—	—	18,19
672	Styling Training School	—	—	—	18,19
710	Chassis Design Section Management	—	—	—	18,19
711	Special Projects - Chassis	—	14 parital chassis	14	18,19
712	Engine Design	—	—	—	16,18,19

Dept. No.	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
714	Chassis Components Design	—	—	—	16,18,19
716	Advance Chassis Design	—	—	—	16,18,19
718	Transmission Design	—	—	—	16,18,19
721	Development Design	—	—	—	16,18,19
740	Electrical - Chief Engineer	—	—	—	18,19
741	Special Projects - Electrical	—	—	—	18,19
742	Advance Electrical Design	—	—	—	16,18,19
743	Production Car Electrical Design	—	—	—	16,18,19
744	Truck Electrical Design	—	—	—	16,18,19
751	Engine Electrical Systems	—	9,14	9,14	—
752	Car and Engine Electrical Applications	—	9,14	9,14	—
753	Electrical Actuator Systems	—	9,14	9,14	—
756	Lighting & Switching	—	9,14	9,14	—
757	Radio & Instrumentation	—	3,9,14	3,9,14	—
758	Car Air Conditioning	—	9,14	9,14	—
759	Wiring Systems	—	9,14	9,14	—
770	Truck - Chief Engineer	—	—	—	18,19
771	Special Projects - Truck	—	—	—	18,19

Dept. No.	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
777	Advance Chassis Design	—	—	—	16,18,19
778	Advance Body Design	—	—	—	16,18,19
782	Light Truck Chassis	—	—	—	16,18,19
783	Forward Control & Multi-Drive	—	—	—	16,18,19
786	Light Truck Body	—	—	—	16,18,19
800	Planning & Scheduling Labs & Vehicle Testing	—	—	—	18,19
802	Equipment Design	—	—	—	16,18,19
810	Materials Laboratories Chief Engineer	—	—	—	18,19
811	Chemical Laboratories	—	2,3,4,9,11, 12,13,14	2,3,4,9,11, 12,13,14	19 ,15,
816	Metallurgical Laboratories	—	2,3,4,9,11, 12,13,14	2,3,4,9,11, 12,13,14	19 ,15,
821	Organic Materials Laboratories	—	2,3,4,9,11, 12,13,14	2,3,4,9,11, 12,13,14	19 ,15,
830	General Laboratories Chief Engineer	—	—	—	18,19
831	Engine	—	2,3,9,10,13 15,14	2,3,9,10,14, 15	—
832	Fuel Systems	—	2,3,9,10,13 14,15	2,3,9,10,14, 15	—
833	Engine Cooling	—	2,3,9,10,13 14	2,3,9,10,14	—
841	Sound and Vibration	—	—	2,3	—
843	Car Dynamics	—	—	2,3,9,10, 14	—
851	Mechanical	—	—	2,3,9,10	—

Dept. No.	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
852	Transmission & Hydraulic Drive	—	—	2,3,9,10	—
853	Axle & Gear Functions	—	—	2,3,9,10	—
854	Product Development	—	3,9	—	—
861	Structures	—	—	2,3,9,10, 14	—
862	Suspension & Steering	—	—	2,3,9,10, 14	—
863	Fluid Dynamics	—	9,13	—	—
864	Body Components	—	—	9,14,3	—
865	Body Analysis	—	—	3,9,14	—
870	Vehicle Testing - Chief Engineer	—	—	—	18,19
881	Experimental Car Engineering	—	garage	9,14,16	—
882	Experimental Car Garage Operations	—	garage	9,14,16	—
886	Experimental Truck Development	—	garage	9,14,16	—
887	Experimental Truck Testing	—	garage	9,14,16	—
897	Vehicle Performance Analysis	—	garage	9,14,16	—
900	Research	—	—	—	18,19
921	Physics Research	—	2,3,13	2,3	—
922	Instrumentation Research	—	2,3,13	2,3,14	—
931	Chemical Research	—	2,3,4,9,11, 12,13,14	2,3,4,9,11, 12,13,14	15, 19

Dept No	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
941	Metallurgical Research	—	2,3,4,9,11, 12,13,14	2,3,4,9,11, 12,13,14	15, 19
950	Automotive Research - Chief Engineer	—	—	—	16,18,19
951	Gas Turbine Design	—	—	—	16,18,19
952	Gas Turbine Power Plants	—	—	—	16,18,19
953	Gas Turbine Components	—	—	—	16,18,19
961	Research Design	—	—	—	16,18,19
962	Research Mechanical Laboratory	—	9,14	9,14	—
963	Computer	2,3	use code 3 if near vibration	3	3,18,19
971	Automotive Research	—	—	—	18,19

ATTACHMENT B

Dept. No.	Name	Basement	Grade Level Over Basement	Grade Level No Basement	Upper Level
10	Executive Offices	—	—	—	18,19,20
20	Product Development & Planning	—	—	—	18,19,20
40	Patent Mgt.	dead files 5, 6	—	—	18,19
80	Comptroller Office	—	—	—	18,19,20
81	Accounting	—	—	—	18,19
83	Cost & Financial Analysis	—	—	—	18,19
84	Budget & Projects Analysis	—	—	—	18,19
85	Methods Analysis	—	—	—	18,19
86	Data Processing	Use code 2,3	3 only if near vibration 9 Can be used	9,3	16, 3,18,19
110	Chief of Section - Personnel & Gen. Services	—	—	—	18,19
111	Administrative Services	1,6,8	10	10	—
112	Cafeteria	food Preparation 8	10,11	Can be used	—
114	Labor Relations & Safety	—	—	—	18,19
115	Personnel Development	—	—	—	18,19
118	Employment	—	—	11	Proved undesirable
119	Technical Personnel	—	—	11	through expreience
121	Engineering Library	1,9	10,11	—	18
140	Chief of Section - Engineering Staff Serv.	—	—	—	18,19

CHRYSLER ENGINEERING CENTER

PLAN "G"

Ralph J. Stephenson
323 Hiawatha Drive
Mt. Pleasant, MI 48858

FEBRUARY 20, 1958

SUBSEQUENT TO THE MEETING IN MID-JANUARY WHEN PLANS "D" AND "E" WERE PRESENTED, WORK HAS PROCEEDED ALONG SEVERAL LINES SIMULTANEOUSLY -- CIVIL ENGINEERING, MATERIALS HANDLING, PARKING LAYOUTS, AREA STUDIES, ETC. PLANNING WISE, THE WORK HAS BEEN DIRECTED TOWARD IMPROVEMENT OF PLAN "E."

AFTER A TEMPORARY STOPPAGE SOME WEEKS AGO, VICTOR GRUEN & ASSOCIATES WERE AUTHORIZED BY CHRYSLER CORPORATION TO CONTINUE THE PLANNING ONLY UP TO A POINT WHERE THE WORK SINCE JANUARY WOULD BE COMPREHENSIVE. THE INTENT OF THE AUTHORIZATION WAS TO SUMMARIZE THE PLANNING STUDIES AS A POINT OF REFERENCE RATHER THAN TO COMPLETELY DEVELOP A CONCEPT. WE BELIEVE THE ACCOMPANYING PLANS ANSWER THIS PURPOSE.

SCHEME "E," OUR STARTING POINT, WAS BASED ON THE PRINCIPLES OUTLINED IN VICTOR GRUEN'S LETTER OF JANUARY 10, 1958; AND IT AIMED AT OVERCOMING THE CHRYSLER CORPORATION'S OBJECTIONS TO THE EARLIER PRESENTED "UNIFIED" PLAN BY REDUCING THE EXTERIOR SCALE AND GIVING MORE IDENTIFICATION TO THE MAJOR ELEMENTS. WE FELT THE PLAN NEEDED IMPROVEMENT IN THE PLACEMENT OF SHOPS AND VEHICLE TEST, THAT STYLING AND BODY DESIGN SHOULD OCCUPY MORE IMPORTANT LOCATIONS, THAT CONFRONTATION TIME COULD BE REDUCED BY RE-ARRANGEMENT OF THE SECTIONS NEAR THE RIVER, THAT A SERVICE SYSTEM WELL RELATED TO MATERIAL PROCUREMENT NEEDED DEVELOPMENT, AND THAT THE RIVER LEVEL WITH ITS POSSIBILITY OF CONCENTRATED VENDOR ACTIVITY NEEDED FURTHER EXPLORATION. THESE IMPROVEMENTS HAVE BEEN MADE IN PLAN "G" ATTACHED.

BASIC CONCEPT: THE BASIC CONCEPT OF A MAIN, COMPACT WORKING LEVEL BRIDGING THE VALLEY AND KEPT TOTALLY FREE OF INTERNAL VEHICULAR TRAFFIC HAS BEEN RETAINED. THE ELEVATION OF THIS UPPER LEVEL COINCIDES APPROXIMATELY WITH THE HIGH LAND EAST OF THE RIVER.

A LOWER LEVEL, SEVERAL FEET ABOVE THE CONTROLLED WATER LEVEL OF THE LAGOONS, IS DEVELOPED IN THAT PORTION OF THE ENGINEERING CENTER THAT SPANS THE VALLEY. THIS LAGOON LEVEL IS SERVED BY A MAJOR ROAD SYSTEM, FED FROM SQUARE LAKE ROAD AND COOLIDGE ROAD, THAT PERMITS VISITOR, VENDOR AND EXECUTIVE CARS TO ARRIVE AT THE CENTER OF THE PROJECT WITHOUT ANY INTERFERENCE WITH THE PEDESTRIAN FLOW.

A SYSTEM OF COURTS AND TERRACES WITH COVERED AND PROTECTED WALKS SERVES THE COMPACT GROUPING OF SECTIONS AND CONNECTS THEM WITH THE EMPLOYEE PARKING AREAS.

A BASEMENT LEVEL SERVICE CONCOURSE CONTACTS ALL SECTIONS EAST OF THE RIVER FOR THE EFFICIENT HANDLING OF MATERIAL, WHOLE CARS, MOCK UPS, E.M.D.'S AND THE REMOVAL OF RUBBISH.

THE ADMINISTRATIVE FUNCTIONS ARE HOUSED IN A MULTI-STORY STRUCTURE; RESEARCH IS TWO STORIES WITH BOTH LEVELS AT GRADE ON ONE SIDE, BUT ALL OTHER DEPARTMENTS ARE SINGLE STORY WITH ACCESS TO GRADE. BULK STORAGE, RECEIVING AND SHIPPING ARE AT BASEMENT LEVEL BENEATH THE INDIVIDUAL SECTIONS AND DIRECTLY ADJACENT TO THE SERVICE CONCOURSE.

EMPLOYEE PARKING IS CONTAINED IN EIGHT AREAS SO ARRANGED AS TO MINIMIZE WALKING DISTANCES, CONFORM TO THE NATURAL GRADE SO THAT EXISTING TREES MAY BE SAVED, AND TO RETAIN GREAT AREAS FOR SITE ENHANCEMENT.

THE PRINCIPAL ELEMENTS OF THE ENGINEERING CENTER EACH DOMINATE ONE OF THE MAJOR DIRECTIONS OF APPROACH:

STYLING FROM THE SOUTHWEST AND THE INTERNAL DRIVE,

THE INSTITUTE AND RESEARCH FROM THE WEST,

BODY DESIGN AND BODY ENGINEERING FROM THE CENTRAL LAGOON,

ADMINISTRATION FROM THE NORTH,

LABORATORIES FROM THE NORTHEAST,

THE GREAT SHOP BUILDING FROM THE SOUTHEAST.

THE ROUGE RIVER HAS BEEN DEVELOPED INTO A SERIES OF LAGOONS SO ARRANGED AS TO ENHANCE THE VALLEY, ADD INTEREST TO THE NEAR AND FAR APPROACH VISTAS, AND TO OFFER A DELIGHTFUL VIEW FROM THE MAXIMUM NUMBER OF DEPARTMENTS. ALL ADMINISTRATIVE DEPARTMENTS, THE INSTITUTE, RESEARCH, BODY ENGINEERING, BODY DESIGN, STYLING AND PROCUREMENT HAVE AN OUTLOOK OVER THE LAGOON AREAS. THE INTERNAL APPROACH ROAD SKIRTS THE LAGOONS AS IT LEADS TO THE VISITOR-VENDOR RECEPTION AREA.

RELATIONSHIP OF SECTIONS: THE MULTI-STORY ADMINISTRATION BUILDING, HOUSING SECTIONS 10-20-40-80-110-140-170-200-210-510, IS CENTRALLY LOCATED AND FORMS THE NORTHERN BOUNDARY TO THE MAJOR INTERIOR COURT. STYLING, BODY DESIGN, BODY ENGINEERING, BODY SHOPS AND CHASSIS FRONT ON THE UPPER LEVEL OF THIS COURT. TWO MAJOR PENETRATIONS OPEN THE COURT TO MATERIAL PROCUREMENT AND THE RECEPTION AREA AT THE LAGOON LEVEL. THIS COMPACT ARRANGEMENT OF ADMINISTRATION, VISITOR-VENDOR RECEPTION, STYLING, BODY DESIGN, BODY ENGINEERING, BODY SHOPS AND PROCUREMENT CONFORMS TO THE CONFRONTATION PATTERN AND, IN ADDITION, BY USE OF THE EFFICIENT SERVICE CONCOURSE AT THE LOWER (LAGOON) LEVEL, GREATLY FACILITATES THE TRANSPORT OF E.M.O.'S, WHOLE CARS, MOCK UPS, ETC.

A MALL LEADING EAST FROM THE MAIN COURT IS FLANKED ON THE NORTH BY CHASSIS, ELECTRICAL AND TRUCK; ON THE SOUTH BY BODY SHOPS AND VEHICLE TEST, AND IS TERMINATED BY THE LABORATORIES. AGAIN, THIS RELATIONSHIP IS IN CONFORMANCE TO THE PERSONNEL FLOW AS CHARTED BY THE CONFRONTATION ANALYSIS. THE LOWER LEVEL SERVICE CONCOURSE IS DIRECTLY BELOW THE MALL AND CONNECTS THE PARTIAL BASEMENTS OF EACH OF THESE CLOSELY-RELATED SECTIONS.

WEST OF THE MAIN COURT, THE NATURAL CONTOURS DROP TO THE RIVER LEVEL AND THEN RISE AGAIN, THOUGH NEVER QUITE TO THE SAME LEVEL AS THE RIDGE EAST OF THE RIVER. THE PLAN TAKES ADVANTAGE OF THIS NATURAL FALL BY DEVELOPING A MAJOR WATER AND LANDSCAPE AREA APPROXIMATELY TWENTY FEET BELOW THE MAIN LEVEL. BECAUSE THIS LEVEL IS BELOW THE MAIN WORKING LEVEL, IT IS POSSIBLE TO PROVIDE A MAJOR ACCESS ROAD LEADING ALMOST TO THE CENTER OF THE PROJECT WITHOUT INTERRUPTION OF, OR CONFLICT WITH, THE PEDESTRIAN FLOW WHICH IS CONCENTRATED ON THE WORKING LEVEL ABOVE. THIS ARRANGEMENT PROVIDES AN IDEAL POINT OF ENTRY FOR ALL VISITORS TO THE ENGINEERING CENTER.

THE LOOP ROAD FROM THE NORTH AND WEST GATES BRING THE VISITOR ALONG THE SHORES OF THE LAGOONS ON A ROUTE THAT PASSES THE ADMINISTRATION TOWER, BODY DESIGN, BODY ENGINEERING, STYLING, RESEARCH AND THE CHRYSLER INSTITUTE.

THIS ROAD LEADS DIRECTLY TO THE RECEPTION MALL AND TO THE VISITOR PARKING GARAGE LOCATED BENEATH BODY ENGINEERING. THE RECEPTION MALL OVERLOOKS THE NORTHERN LAGOON AND THE PROPOSED SITE OF THE CORPORATE OFFICE BUILDING. IT CONTACTS THE ADMINISTRATION BUILDING, MATERIAL PROCUREMENT OFFICES AND THE EXECUTIVE PARKING GARAGE. ESCALATORS LEAD FROM IT TO THE UPPER LEVEL.

THIS RECEPTION AREA FUNCTIONS AS AN INFORMATION CENTER, AN EXHIBIT AND DISPLAY AREA, A SECURITY CHECKPOINT, AND MAKES IT POSSIBLE TO CENTRALIZE

ALL OUTSIDE CONTACTS, SUCH AS VENDING, IN ONE PLACE COMPLETELY SEPARATED FROM THE SECURITY AREAS, YET IN IMMEDIATE PROXIMITY WITH THE SECTIONS HAVING THE BULK OF OUTSIDE CONTACTS.

AT THIS LAGOON LEVEL, THE PUBLIC IS EXPOSED TO THE MOST BEAUTIFUL PARTS OF THE SITE, RECEIVES THE FULL IMPACT OF THE MAJOR ELEMENTS OF THE ENGINEERING CENTER BUT CAUSES ABSOLUTELY NO INTERFERENCE WITH THE WORKINGS OF THE CENTER OR RISKS ITS SECURITY.

THE RESEARCH WING BRIDGES THE VALLEY AND TOUCHES NATURAL GROUND EAST OF THE LAGOONS. THIS STRONG HORIZONTAL LINE ACCENTUATES THE GENTLE SLOPE OF THE VALLEY WHICH OTHERWISE IS NEARLY LOST AS BUILDINGS ARE CONSTRUCTED ON THE SITE (SEE DIAGRAMS ERUSTRATING THIS POINT) AND PROVIDES A DESIRABLE CONTRAST WITH THE SEVENTEEN STORY ADMINISTRATION TOWER.

THE INSTITUTE, PLACED ON A TERRACE WEST OF THE LAGOONS, HAS INDEPENDENT ACCESS FROM COOLIDGE ROAD; ALTHOUGH IT CAN BE QUICKLY REACHED FROM THE RECEPTION AREA AT THE LAGOON LEVEL OR BY CORRIDOR IN THE RESEARCH WING CONNECTING IT WITH THE REST OF THE CENTER.

STYLING IS PLACED SOUTH OF THE ADMINISTRATION TOWER. THIS GROUP PENETRATES THE EXCELLENT STAND OF TREES IN THE SOUTHWEST QUADRANT OF THE SITE, HAS ACCESS TO THE VISITOR APPROACH ROAD AND OVERLOOKS THE LAGOON DEVELOPMENTS. INTERNAL COURTS PROVIDE HIGH SECURITY VIEWING YARDS. CLAY STUDIOS ARE IMMEDIATELY ADJACENT TO THE BODY SHOPS FACILITATING THE MOVEMENT OF MODELS. CARS AND MATERIAL REACH THE STYLING GROUP FROM THE SERVICE CONCOURSE BELOW IT.

BODY DESIGN AND BODY ENGINEERING ADJOIN STYLING TO THE WEST.

BODY SHOPS AND VEHICLE TEST ARE GROUPED IN THE SAME BUILDING IN CLOSE CONTACT WITH LABS, STYLING, BODY ENGINEERING, BODY DESIGN, CHASSIS, ELECTRICAL AND TRUCK. THE HEAVY CONTACT BETWEEN PROCUREMENT AND SHOPS IS MAINLY HANDLED AT THE LOWER LEVEL WHERE PROCUREMENT, CENTRAL RECEIVING AND SHOP STORAGE ARE ALL GROUPED CLOSELY TOGETHER ALONG THE SERVICE CONCOURSE.

PARKING AND ROADS: EXECUTIVE AND VISITOR PARKING IS REACHED VIA THE INTERNAL LOOP ROAD AND IS LOCATED AT THE LAGOON LEVEL UNDER BODY DESIGN AND BODY ENGINEERING. THIS IS THE ONLY GARAGE PARKING CONTEMPLATED IN THE PLAN.

TWO PARKING AREAS SERVING RESEARCH, THE CHRYSLER INSTITUTE, AND PART OF BODY DESIGN ARE REACHED FROM COOLIDGE ROAD. THESE TWO AREAS HAVE BEEN HELD A CONSIDERABLE DISTANCE BACK FROM THE WATER AREAS SO THAT EFFECTIVE SCREENING BY GRADING AND LANDSCAPING MEANS CAN BE ACHIEVED. FURTHER, THESE TWO AREAS HAVE BEEN SEPARATED SO THAT THE APPROACH FROM COOLIDGE ROAD TO RESEARCH AND THE INSTITUTE IS NOT MARRED BY THE PARKING AREAS.

PARKING AREAS ON THE NORTH PERIMETER SERVE THE ADMINISTRATION BUILDING, THE BALANCE OF THE REQUIREMENT FOR BODY DESIGN AND ENGINEERING AND CHASSIS, ELECTRICAL AND TRUCK. LABS ARE SERVED FROM EASTERN PERIPHERAL LOTS, WHILE STYLING AND BODY SHOPS ARE SERVED FROM THE SOUTH.

THE PARKING AREAS NORTH, EAST, AND SOUTH OF THE SITE WILL NOT REQUIRE EXTENSIVE GRADING AND IT IS INTENDED THAT A GREAT PORTION OF THE NATURAL GROWTH WOULD BE RETAINED.

THE ROAD SYSTEM CONNECTING THE MAJOR PARKING AREAS WITH THE SURROUNDING HIGHWAYS AND EXPRESSWAY IS SCHEMATIC ONLY AND SHOULD NOT BE CONSIDERED A FINAL SOLUTION TO THIS COMPLEX PROBLEM. IT DOES INDICATE, HOWEVER, SOME PRINCIPLES WHICH SHOULD BE ADHERED TO IN LATER STAGES OF PLANNING.

THE INTERNAL LOOP ROAD USED MAINLY BY VISITORS SHOULD NOT BE SUBJECTED TO THE EXTREMELY HEAVY LOADS IMPOSED BY THE EMPLOYEE REQUIREMENT. THE SITE PLAN SUBMITTED INDICATES A CONNECTION, BUT NOTE THAT THIS CONNECTION IS SECONDARY AND THAT EMPLOYEE LOTS CAN BE SERVED INDEPENDENTLY.

BECAUSE OF THE TRANSITION WITHIN THE SITE FROM A HIGH-SPEED APPROACH TO A SLOW-SPEED PARKING SYSTEM, ADEQUATE MAGAZINE SPACE IS MANDATORY, IF JAMS ON THE APPROACH ROUTES ARE TO BE AVOIDED. THIS PLAN INDICATES DEEP MAGAZINES AT ALL CRITICAL POINTS.

A THIRD PRINCIPLE ILLUSTRATED BY THIS PLAN IS THAT CIRCULATION WITHIN THE SITE MUST BE TWO-WAY AND THAT SINCE TWO-WAY TRAFFIC WILL ALWAYS CONFLICT AT INTERSECTIONS, CRITICAL INTERSECTIONS SHOULD HAVE GRADE SEPARATIONS. THESE GRADE SEPARATIONS CAN BE LIMITED TO THE PRIMARY ACCESS AND EGRESS POINTS AND THEY WILL NOT BE REQUIRED DURING THE EARLY STAGES OF OPERATION, HOWEVER.

MOVE SEQUENCE AND EXPANSION: PLAN "G" FITS ALL PREVIOUSLY DISCUSSED MOVE SEQUENCES. SINCE BODY AND STYLING ARE WEST OF THE SHOPS WITH CHASSIS TO THE EAST, EITHER THE EASTERN OR WESTERN PORTIONS COULD BE CONSTRUCTED AS AN OPERATIONAL UNIT WITH THE SHOP AREA AS A NUCLEUS.

IT WOULD ALSO BE POSSIBLE TO INITIALLY CONSTRUCT ANY ONE GROUP INDEPENDENT OF THE OTHER. THE STYLING GROUP, FOR EXAMPLE, COULD BE IN OPERATION SOLELY OR WITH BODY DESIGN, ENGINEERING AND A PORTION OF THE BODY SHOPS. THE INSTITUTE DEPENDS ON NO OTHER ELEMENT FOR ITS CONSTRUCTION. THE ONLY LIMITATIONS THAT WOULD OCCUR WOULD BE IN THE AREA WHERE MATERIAL PROCUREMENT IS CLOSELY INTEGRATED WITH BODY SHOPS AND THE SERVICE CONCOURSE.

THIS PROCURING, SHIPPING, RECEIVING, STORAGE AND MATERIAL MOVEMENT TO SHOPS FUNCTIONS AS A UNIT AND, BECAUSE OF ITS GREAT EFFICIENCY, SHOULD BE CONSTRUCTED AT ONE TIME. IF THIS SHOULD NOT BE POSSIBLE IN THE EARLY MOVES, THEN TEMPORARY FACILITIES COULD BE PROVIDED WITH SOME COST AND OPERATIONAL INEFFICIENCIES AS THE PENALTY.

ALTHOUGH WE INITIALLY HAD GRAVE DOUBTS AS TO BEING ABLE TO SATISFY OUR SELF-IMPOSED DEMAND THAT EXPANSION TAKE PLACE WITHOUT DILUTION OF THE ORIGINAL CONCEPT AND WITHOUT DISINTEGRATION OF THE ARCHITECTURAL CHARACTER, WE BELIEVE PLAN "G" OFFERS A DIRECTION IF NOT YET A TOTAL SOLUTION TO THIS DIFFICULT BUT EXTREMELY IMPORTANT POINT. THE EXPANSION PLANS INDICATE THAT SOME SECTIONS CAN GROW INWARD THUS MAINTAINING AN INTEGRATED EXTERNAL APPEARANCE AS WELL AS ESTABLISHING A PERMANENT CHARACTER FOR THE MAIN COURT AND MALL. SECTIONS WHICH CAN BE EXPANDED IN THIS MANNER ARE RESEARCH, BODY ENGINEERING, PROCUREMENT, BODY DESIGN, BODY SHOPS AND VEHICLE TEST.

THE OTHER SECTIONS--LABORATORIES, THE STYLING GROUP, CHASSIS, ELECTRICAL, TRUCK AND THE INSTITUTE--CAN BE EXPANDED MOST FEASIBLY BY THE ADDITION OF NEW WINGS OR OTHER BUILDING ELEMENTS. PLAN "G" INDICATES THAT WHERE THIS OCCURS, A UNIFYING SCREEN WALL WILL BE ERECTED INITIALLY TO SURROUND THE AREA SET ASIDE FOR FUTURE EXPANSION. THE AREA WITHIN THESE SCREEN WALLS CAN BE TREATED IN A VARIETY OF WAYS--AS TEMPORARY PARKING, AS A COURT WITH TRANSPLANTABLE ELEMENTS, A COMBINATION OF BOTH; OR, THE SPACE CAN BE DEVOTED TO THE INTERIM HOUSING OF OPERATIONS NOT YET ACCOMMODATED IN THE OVER-ALL PERMANENT FACILITY.

WE BELIEVE THAT WHEN PLANNING WORK RESUMES, THIS PROBLEM CAN BE FULLY SOLVED.

FLEXIBILITY: THE FLEXIBILITY OF PLAN "G" IS ACHIEVED BY THE GROUPING TOGETHER OF OPERATIONS HAVING SIMILAR PHYSICAL SPACE REQUIREMENTS. FOR EXAMPLE - CHASSIS, ELECTRICAL AND TRUCK ARE IN ONE BUILDING AND SPACE CAN BE EXCHANGED BETWEEN THEM AS THE NEED ARISES. BODY SHOPS AND VEHICLE TEST ARE JOINED, THEREBY GAINING THE SAME ADVANTAGE. THE TWO LAB SECTIONS HAVE THIS SAME FLEXIBILITY AS WELL AS BODY DESIGN AND BODY ENGINEERING AND STYLING AND CLAY.

ANOTHER IMPORTANT ASPECT OF THIS PLAN IS THAT BY ITS COMPACTNESS, FLEXIBILITY FAR BEYOND THE INTERCHANGE OF SPACE WITHIN A BUILDING CAN BE ACHIEVED AND STILL RESULT IN EFFICIENT OPERATIONS. FOR INSTANCE, A CRASH PROGRAM IN THE LABS COULD BORROW SPACE FROM VEHICLE TEST AND STILL BE ONLY A FEW FEET AWAY FROM THE PARENT OPERATIONS. EVEN TEMPORARY LAB SPACE IN THE SHOP AREA IS CLOSE AT HAND. STYLING AND ENGINEERING, THE INSTITUTE AND RESEARCH OR ANY OF THE ADMINISTRATIVE FUNCTIONS FACED WITH A SUDDEN DEMAND, CAN, BY REASON OF THE COMPACTNESS, EFFICIENTLY OPERATE TEMPORARY SPACE IN ANOTHER BUILDING.

CONSTRUCTION COST: ALTHOUGH THE CONSTRUCTION COST FOR PLAN "G" WOULD BE SOMEWHAT HIGHER THAN FOR THE UNIFIED SCHEME PRESENTED EARLIER, THIS PLAN RETAINS MOST OF THE ECONOMICAL FEATURES OF THE EARLIER PLAN AND SHOULD, THEREFORE, STILL BE LESS THAN NORMAL. THE MAJOR SAVINGS WILL STEM FROM THE COMPACTNESS AND WOULD BE REFLECTED IN UTILITIES COSTS, SERVICE TUNNEL COSTS, AND THE COSTS OF DURABLE EXTERIOR WALLS.

THERE SHOULD BE A FURTHER SAVINGS IN MAINTENANCE AND SERVICING EXPENDITURES.

- - - - - - - - - -

CONCLUSION:

WE BELIEVE THAT PLAN "G" CAN, WITH REFINEMENT, SATISFY ALL OF THE STRINGENT DEMANDS OF THE CHRYSLER ENGINEERING DIVISION, THE ARCHITECT AND THE PLANNERS. IT HAS BEEN ACHIEVED WITHOUT COMPROMISE OF ANY OF THE PRINCIPLES PREVIOUSLY LAID DOWN. IT NEEDS SOME ADDITIONAL STUDY IN RELATION TO THE ROAD SYSTEM AND EXPANSION AND SOME MINOR MODIFICATIONS IN THE BALANCING OF PARKING AREAS WITH THE SECTIONS THEY SERVE.

WE ARE LOOKING FORWARD TO THE RESULT OF THE ENGINEERING DIVISION'S REVIEW OF THIS PLAN AND HOPE THAT, SOON, WORK WILL ONCE AGAIN GO FORWARD.

VICTOR GRUEN & ASSOCIATES, INC.

Ralph J. Stephenson

A SYSTEM FOR EVALUATING ALTERNATE PLANS FOR THE PROPOSED CHRYSLER ENGINEERING CENTER

Ralph J. Stephenson
323 Hiawatha Drive
Mt. Pleasant, MI 48858

THIS SYSTEM TAKES INTO CONSIDERATION FOUR MAJOR GROUPS OF FACTORS: OPERATIONAL, PHYSICAL, ESTHETIC AND ENVIRONMENT AND COST. THESE GROUPS ARE BROKEN DOWN INTO SPECIFIC FACTORS HAVING A MAJOR EFFECT ON THE IMMEDIATE AND LONG-TERM SUCCESS OF THE PROJECT. A RATING SYSTEM USING 1000POINTS HAS BEEN APPLIED TO THESE FACTORS WITH THE RATING REFLECTING THE RELATIVE IMPORTANCE OF THE FACTOR.

THE CONSIDERATION OF AESTHETIC AND ENVIRONMENTAL FACTORS IS INHERENT IN ALL PARTS OF THE WORK. FUNCTION AND EFFICIENCY, THE PROPER USE OF PHYSICAL FACTORS HAVE THEIR OWN STRONG AESTHETICAL EXPRESSIONS. THUS, AESTHETIC AND ENVIRONMENTAL FACTORS MAKE UP A GOOD PART OF POINTS I AND II. POINT III DEALS MORE DIRECTLY WITH PURELY AESTHETIC AND ENVIRONMENTAL FACTORS, IN CONTRAST TO POINTS I AND II, WHERE THEY ARE AN INTEGRAL PART OF THE CONSIDERATIONS OF TECHNICAL, OPERATIONAL AND ARCHITECTURAL REQUIREMENTS.

FOLLOWING THIS TABULATION IS A DESCRIPTION OF EACH FACTOR AND AN EXPLANATION OF THE CONSIDERATIONS INVOLVED IN ARRIVING AT A RATING.

SUMMARY OF GROUPS

I	OPERATIONAL FACTORS	380 POINTS
II	PHYSICAL FACTORS	320 "
III	PURELY AESTHETIC AND ENVIRONMENTAL FACTORS	200 "
IV	COST FACTORS	100 "
	TOTAL	1,000 POINTS

GROUP I: OPERATIONAL FACTORS	380 POINTS
A. EFFICIENCY OF INTER-SECTIONAL TRAVEL OF PERSONNEL.	_____
B. EFFICIENCY OF CENTRAL SYSTEM OF MATERIALS FLOW (MOCK UP AND WHOLE CARS, SUPPLIES, MAIL, ETC.; REMOVAL OF WASTE).	_____
C. EFFICIENCY OF SECURITY AND CONTROL OF VISITORS AND VENDORS.	_____
D. FLEXIBILITY AND INTERCHANGEABILITY OF LIKE TYPES OF SPACE BETWEEN SECTIONS.	_____
E. WALKING AND DRIVING DISTANCES FROM PARKING AREAS TO BUILDINGS, BETWEEN BUILDINGS AND WITHIN SITE.	_____
F. EFFICIENCY OF INTER-SECTIONAL TRAVEL OF PERSONNEL DURING MOVE SEQUENCE.	_____
G. EFFICIENCY RESULTING FROM EXPANSION OF SPACES.	_____

GROUP II: PHYSICAL FACTORS	320 POINTS
A. AREA REQUIREMENTS, INITIAL AND ULTIMATE.	_____
B. GRADE OR UPPER LEVEL REQUIREMENTS.	_____
C. SITE UTILIZATION.	_____
D. DEPARTMENTAL ORIENTATION.	_____
E. COMPATABILITY OF ADJACENT SPACES.	_____
F. PARKING REQUIREMENT.	_____
G. ACCESS AND EGRESS REQUIREMENT.	_____
H. ABILITY TO ADAPT TO VARIOUS MOVE SEQUENCES.	_____

GROUP III: PURELY AESTHETIC AND ENVIRONMENTAL FACTORS — 200 POINTS

A. BUILDING PLACEMENT FOR SITE ENHANCEMENT _____

1. RIVER

2. TERRAIN

3. TREES

B. CONCEPT AND PHYSICAL EXPRESSION OF PROJECT _____

C. ENVIRONMENT _____

1. OF IMMEDIATE WORK AREA

2. OF NON-WORK AREAS

3. OF AREAS MOVED THROUGH FROM SECTION TO SECTION

4. OF VISITOR AND PASSERBY

D. INTEGRATION WITH PERIMETER ENVIRONMENT _____

E. ABILITY OF PLAN TO RETAIN THE ABOVE FACTORS _____
AS GROWTH OR CHANGE OCCURS EVEN THOUGH THE
NATURE OF THE GROWTH OR CHANGE CANNOT NOW BE
EXACTLY DETERMINED. _____

GROUP IV: COST CONSIDERATIONS — 100 POINTS

A. CAPITAL COST OF STRUCTURES. _____

B. CAPITAL COST OF SITE WORK. _____

C. CAPITAL COST OF PROVISIONS FOR EXPANSION. _____

D. MAINTENANCE AND OPERATIONAL COSTS. _____

E. TRUCK TUNNEL COST. _____

APPLICATION OF EVALUATION FACTORS TO A PLAN

IT IS IMPORTANT THAT EACH OF THE FOLLOWING FACTORS BE CONSIDERED ONLY WITHIN THEMSELVES; ANY REPERCUSSION THEY HAVE ON OTHER ELEMENTS OF THE PLAN SHOULD BE DISREGARDED, AS THEY WILL BE PICKED UP ELSEWHERE IN THE EVALUATION.

I OPERATIONAL FACTORS - 380 POINTS

A. EFFICIENCY OF INTER-SECTIONAL TRAVEL OF PERSONNEL.

APPLY THE FOLLOWING FORMULA TO THE PLAN:

$$\frac{\text{DISTANCE BETWEEN SECTIONS} \times \text{NO. OF CONFRONTATIONS}}{\text{DISTANCE WALKED IN ONE MINUTE}} = \text{TIME LOST IN CONFRONTATIONS}$$

DISTANCE BETWEEN SECTIONS - WOULD BE MEASURED FROM THE CENTER POINT OF SECTIONS, FOLLOWING RIGHT ANGLE LINES AS INDICATED IN FIGURE 1. IT SHOULD BE NOTED THAT IF TWO OR MORE SECTIONS ARE LOCATED IN A SINGLE BUILDING, THEY WILL STILL CONTRIBUTE TOWARDS "TIME LOST IN CONFRONTATIONS" AND BE EVALUATED THE SAME AS SECTIONS HOUSED IN SEPARATE BUILDINGS. IN THE CASE OF THE ENGINEERING CENTER ADMINISTRATION TOWER, IT IS ASSUMED ALL PLANS WILL INCLUDE THE SAME SECTIONS IN THE TOWER AND THEREFORE THE CONFRONTATIONS BETWEEN SECTIONS IN THE TOWER WOULD BE THE SAME IN EACH PLAN AND MAY BE DISREGARDED. THOSE SECTIONS THAT MAY BE LOCATED IN THE TOWER ACCORDING TO CHRYSLER ARE:

SECTIONS 10, 20, 40, 80, 110, 140, 170, 200, 210, 510

NO. OF CONFRONTATIONS - BETWEEN SECTIONS WOULD BE TAKEN FROM THE "COMMUNICATION ANALYSIS."

DISTANCE WALKED IN ONE MINUTE. WE RECOMMEND A DISTANCE OF 270 FEET PER MINUTE; HOWEVER, AS LONG AS THIS FIGURE IS CONSTANT FOR EACH EVALUATION, THE ACTUAL DISTANCE USED IS NOT IMPORTANT.

SCORING - IT IS NOT DIFFICULT TO DETERMINE WHICH OF THE PLANS BEING EVALUATED BY CHRYSLER IS SUPERIOR TO THE OTHER IN RESPECT TO THIS FACTOR. THAT PLAN WITH THE LEAST AMOUNT OF "TIME LOST IN CONFRONTATIONS" WOULD BE THE MOST EFFICIENT AND CONSIDERED TO BE SUPERIOR. HOWEVER, CHRYSLER WOULD HAVE NO ASSURANCE THAT THE AFORE-MENTIONED "SUPERIOR" PLAN COULD NOT BE EXCEEDED BY SOME OTHER PLAN NOT YET CONCEIVED; THEREFORE A PLAN THEORETICALLY PERFECT IN THIS FACTOR HAS BEEN DEVISED (SEE FIGURE 2), AND RECEIVES THE MAXIMUM SCORE OF _____ POINTS WITH ITS ABSOLUTE MINIMUM OF _____ HOURS LOST IN CONFRONTATIONS. AS EACH PLAN IS INDIVIDUALLY EVALUATED, THE NUMBER OF HOURS IT LOSES IN CONFRONTATIONS WILL BE COMPARED TO THE MINIMUM LOSS OF _____ HOURS, AND A PORTION OF THE MAXIMUM SCORE OF _____ POINTS WILL BE ASSIGNED ACCORDINGLY.

WE REALIZE THIS METHOD OF DETERMINING EFFICIENCY OF INTER-SECTIONAL TRAVEL OF PERSONNEL IS AN OVER-SIMPLIFICATION OF THE SITUATION AND THAT DISTANCE MEASURED AS DESCRIBED IN FIGURE 1 IN ALL PROBABILITY DOES NOT REPRESENT THE ACTUAL DISTANCE WALKED (THOSE DEPARTMENTS WITHIN A SECTION THAT HAVE HEAVY CONFRONTATIONS WITH DEPARTMENTS IN ANOTHER SECTION WOULD POSSIBLY BE LOCATED IN THAT PORTION OF THE BUILDING CLOSEST TO THE OTHER SECTION, RATHER THAN IN THE CENTER OF THE SECTION. ALSO, TIME LOST BY HIGHLY PAID EMPLOYEES SHOULD HAVE MORE WEIGHT THAN TIME LOST BY THOSE EARNING A LOWER WAGE).

HOWEVER, ANY SYSTEM THAT TRIES TO GO INTO FURTHER DETAIL WOULD PROBABLY BE VERY UNWIELDY AND COMPLEX.

B. EFFICIENCY OF CENTRAL SYSTEM OF MATERIALS FLOW (MOCK UP AND WHOLE CARS, SUPPLIES, MAIL, REMOVAL OF WASTE, ETC.) - THE SAME SITUATION IS EVIDENT IN THIS FACTOR AS WAS EVIDENCED IN THE PREVIOUS "INTER-SECTIONAL TRAVEL" ANALYSIS IN THAT A SUPERIOR PLAN MAY BE READILY SELECTED FROM A GROUP OF PLANS BY A SYSTEM OF RELATIVE MERIT, AND THAT IT MUST ALSO BE EVALUATED AGAINST A PLAN THEORETICALLY PERFECT IN THE FACTOR UNDER CONSIDERATION. IN THE CASE OF EACH OF THE FOLLOWING ITEMS, A FORMULA IS SET FORTH TO DETERMINE THE DEGREE OF EFFICIENCY A PLAN HAS IN THAT PARTICULAR CATEGORY, AND THE SAME FORMULA HAS BEEN APPLIED TO A THEORETICALLY PERFECT PLAN TO ESTABLISH THE BASIS FOR A PERFECT SCORE.

1. MOVEMENT OF MOCK UPS AND WHOLE CARS.

APPLY THE FOLLOWING FORMULA TO SECTIONS ENGAGED IN THE MOVEMENT OF CARS AND MOCK UPS:

DISTANCE BETWEEN TWO SECTIONS ENGAGED IN THE MOVEMENT OF MOCK UPS AND WHOLE CARS	X	NO. OF MOCK UPS OR WHOLE CARS MOVED PER MONTH BETWEEN TWO SECTIONS IN QUESTION IN EXISTING FACILITIES	=	DISTANCE TRAVERSED BY CAR MOVEMENTS PER MONTH BETWEEN TWO SECTIONS

ADD UP THE RESULTS OF THE COMPUTATIONS FOR THE VARIOUS SECTIONS AND ESTABLISH THE TOTAL DISTANCE TRAVELED BY WHOLE CARS AND MOCK UPS PER MONTH. THE THEORETICALLY PERFECT PLAN, FIGURE 3, HAS A TOTAL OF _____ MILES TRAVELED PER MONTH AND RECEIVES A MAXIMUM SCORE OF _____ POINTS.

OTHER PLANS ARE SCORED ON A BASIS RELATIVE TO THE MINIMUM DISTANCE OF _____ MILES.

IF THE MOVEMENT OF WHOLE CARS AND MOCK UPS IS INTERMINGLED OR CONFLICTING WITH PEDESTRIAN TRAFFIC AT ANY ONE POINT, THE SCORE IS TO BE REDUCED BY _____% (BY _____% IF CONFLICTING AT MORE THAN ONE POINT). IF THE WHOLE CARS AND MOCK UPS ARE EXPOSED TO THE WEATHER AT ANY POINT DURING THEIR MOVEMENT, NO POINTS ARE TO BE GIVEN FOR THIS FACTOR.

2. MOVEMENT OF MATERIALS. CHRYSLER HAS ESTIMATED THAT 80% OF INCOMING MATERIAL IS RECEIVED IN ONE CENTRAL AREA, AND THENCE TRANSPORTED TO A RECEIVING FACILITY IN EACH GROUP OR IN EACH BUILDING. DELIVERY TO THE SECONDARY RECEIVING FACILITY WOULD BE MADE IN A STAKE OR PICK-UP TRUCKS. THIS BEING THE CASE, MEASURE THE LENGTH OF A DELIVERY CIRCUIT FROM CENTRAL RECEIVING TO EACH OF THE SECONDARY STATIONS, THAT WOULD BE TRAVELED BY A TRUCK MAKING A DELIVERY TO EACH SECONDARY STATION. THE THEORETICALLY PERFECT PLAN, FIGURE 4, HAS A CIRCUIT _____ FEET LONG AND RECEIVES A MAXIMUM SCORE OF _____ POINTS. OTHER PLANS ARE TO BE SCORED ON A BASIS RELATIVE TO THE _____ FEET CIRCUIT.

IF THE DELIVERY TRUCKS ARE PERMITTED TO MIX WITH OTHER VEHICULAR TRAFFIC, NO POINTS ARE TO BE GIVEN FOR THIS FACTOR.

3. REMOVAL OF WASTE. IT IS PRESUMED THAT A ROUTE, SIMILAR TO THAT DESCRIBED IN "MOVEMENT OF MATERIALS", WOULD BE FOLLOWED IN PICKING UP WASTE MATERIALS AND RUBBISH. THEREFORE, THE SAME PROCEDURE IS TO BE FOLLOWED

IN EVALUATING THE VARIOUS PLANS. AS INDICATED IN FIGURE 4, THE THEORETICALLY PERFECT PLAN HAS A CIRCUIT _____ FEET LONG AND RECEIVES A MAXIMUM SCORE OF _____ POINTS.

IF THE RUBBISH AND WASTE PICK-UP TRUCKS ARE PERMITTED TO MIX WITH OTHER VEHICULAR TRUCKS, OR BE VIEWED FROM ANY PART OF THE CENTER, NO POINTS ARE GIVEN FOR THIS FACTOR.

4. DELIVERY OF MAIL. APPLY THE FOLLOWING FORMULA:

$$\text{DISTANCE BETWEEN SECTIONS} \times \text{NO. OF LETTERS DELIVERED} = \text{INDICATION OF EFFICIENCY OF OPERATION}$$

DISTANCE BETWEEN SECTIONS IS TO BE MEASURED FROM CENTER POINT TO CENTER POINT AS ILLUSTRATED IN FIGURE 1.

NO. OF LETTERS DELIVERED IS TO BE TAKEN FROM THE "COMMUNICATION ANALYSIS."

SCORING. THE THEORETICALLY PERFECT PLAN, SIMILAR TO FIGURE 2, EXCEPT SECTION ARRANGEMENT IS BASED ON MAIL DELIVERY INSTEAD OF CONFRONTATIONS, HAS AN INDEX OF _____, AND RECEIVES A MAXIMUM SCORE OF _____ POINTS. OTHER PLANS ARE TO BE SCORED ACCORDINGLY.

C. EFFICIENCY OF SECURITY AND CONTROL OF VISITORS. A THEORETICALLY PERFECT PLAN IN THIS RESPECT WOULD ARRANGE VISITOR AND SECURITY AREAS IN SUCH A MANNER THAT NO TIME WOULD BE REQUIRED BY GUIDES AND GUARDS IN CONTROLLING AND SUPERVISING VISITORS. SUCH A PLAN RECEIVES A MAXIMUM OF _____ POINTS. PLANS BEING EVALUATED ARE TO BE STUDIED AND THE NUMBER OF HOURS PER DAY OF GUIDE

AND GUARD TIME IS TO BE ESTIMATED, AND SCORING IS RELATIVE TO THE PERFECT PLAN. ITEMS TO BE CONSIDERED IN ESTIMATING TIME EXPENDED ON SUPERVISING VISITORS ARE:

1. TIME SPENT SUPERVISING VISITORS IS PROPORTIONAL TO THE DISTANCE A VISITOR WILL TRAVEL IN TOURING THE VISITOR AREAS.
2. TIME SPENT BY EMPLOYEES GUARDING HIGH SECURITY AREAS IS PROPORTIONAL TO THE DEGREE OF PHYSICAL SEPARATION ACHIEVED BETWEEN SECURITY AND NON-SECURITY AREAS.

D. FLEXIBILITY AND INTERCHANEABILITY OF LIKE TYPES OF SPACE BETWEEN SECTIONS.

OPTIMUM FLEXIBILITY IS DEFINED AS "A CONDITION WHEREIN SPACES HAVE AN OPPORTUNITY TO EXPAND INTO ADJACENT SPACES WHICH HAVE A FUNCTION SIMILAR TO THEIR OWN." APPLY THE FOLLOWING FORMULA TO THE PLAN:

NUMBER OF SQ.FT. OF SIMILAR USE SO ARRANGED SO IT CAN BE EXPANDED INTO ITS NEIGHBORING SECTION OR CONTRACTED WITHIN ITSELF ÷ NUMBER OF UNITS THIS SPACE IS BROKEN INTO = NO. OF SQ.FT. OF FLEXIBLE SPACE.

IF TWO SPACES WITH SIMILAR FUNCTION ARE SEPARATED BY EVEN A CORRIDOR WIDTH, THEY CANNOT BE COUNTED AS BEING ABLE TO EXPAND INTO ONE ANOTHER. TO DETERMINE WHETHER OR NOT A BUILDING COMPLEX MAY BE CONSIDERED AS A SINGLE UNIT OR AS MANY UNITS, CONSIDER TWO BUILDINGS AS SEPARATE IF THE CONNECTION BETWEEN THE BUILDINGS IS LESS THAN THREE-QUARTERS OF THE OVERALL DIMENSION OF THE BUILDING SIDES FACING ONE ANOTHER.

FIGURE 5 INDICATES A SCHEMATICALLY PERFECT PLAN RECEIVING THE MAXIMUM SCORE OF _____ POINTS. OTHER PLANS ARE TO BE SCORED ACCORDINGLY.

SPACES WITHIN THE ENGINEERING CENTER MAY BE CATEGORIZED AS FOLLOWS:

1. OFFICE
2. STORAGE
3. DRAFTING
4. SHOP
5. LABORATORY
6. FIXED ELEMENT

E. WALKING DISTANCES FROM PARKING AREAS TO BUILDINGS. MEASURE THE DISTANCE FROM THE CENTER POINT OF EACH SECTION TO ITS PARKING AREA. RATHER THAN MEASURE TO THE CENTER POINT OF THE PARKING AREA, BREAK THE OVERALL PARKING AREA INTO SMALLER PARCELS AND MEASURE TO THE CENTER POINT OF EACH PARCEL, SEE FIGURE 6. TOTAL THE DISTANCES AND COMPARE THEM TO THE DISTANCE OF _____ FEET IN THE THEORETICALLY PERFECT PLAN, SIMILAR TO FIGURE 7, WHICH RECEIVES A MAXIMUM SCORE OF _____ POINTS.

F. EFFICIENCY OF INTER-SECTIONAL TRAVEL OF PERSONNEL DURING MOVE SEQUENCE. ASSUME THAT EITHER CHASSIS OR STYLING MOVES TO TROY, TAKING WITH THEM THOSE SECTIONS THEY REQUIRE IN ORDER TO OPERATE SMOOTHLY. MARK ON THE PLAN BEING CONSIDERED THE LOCATION OF THOSE SECTIONS MAKING THE FIRST MOVE AND ANALYZE THE OPERATING EFFICIENCY THAT RESULTS BY APPLYING THE SAME FORMULA WE USED IN DETERMINING OPERATION EFFICIENCY IN ITEM "A" UNDER THIS HEADING AND USING THE SAME SECTION LAYOUT AS INDICATED IN FIGURE 2. THE SCHEMATICALLY PERFECT PLAN RECEIVES A SCORE OF _____ POINTS.

G. EFFICIENCY RESULTING FROM EXPANSION OF SPACES. THERE ARE THREE CONDITIONS THE THEORETICALLY PERFECT PLAN SATISFIES:

1. EXPANSION TAKES PLACE WHERE IT IS NEEDED.
2. EXPANSION TAKES PLACE WITHOUT INTERRUPTING OPERATIONAL EFFICIENCY.
3. EXPANSION DOES NOT BLOCK FUTURE EXPANSION.

ANY OTHER PLAN THAT SATISFIES THESE SAME CONDITIONS RECEIVES A MAXIMUM SCORE OF _____ POINTS, OR AN APORTIONATE AMOUNT DEPENDENT UPON HOW MANY CONDITIONS ARE SATISFIED.

II PHYSICAL FACTORS - 320 POINTS

A. AREA REQUIREMENTS, INITIAL AND ULTIMATE. CHRYSLER HAS STATED THEIR INITIAL GROSS AREA REQUIREMENTS AS 2,250,000 SQ. FT., AND THEIR ULTIMATE REQUIREMENTS AS 4,000,000 SQ. FT. _____ POINTS ARE TO BE ALLOTTED ANY PLAN SATISFYING THESE REQUIREMENTS. IF A PLAN IS DEFICIENT BY MORE THAN 5%, NO POINTS ARE TO BE AWARDED, AND FOR EACH ADDITIONAL 5% DEFICIENCY SUBTRACT _____ POINTS FROM THE OVERALL SCORE.

B. GRADE OR UPPER LEVEL REQUIREMENTS. CHRYSLER HAS DETERMINED WHICH ACTIVITIES MUST BE LOCATED AT GRADE LEVEL. THEY ARE AS FOLLOWS:

_____ POINTS ARE TO BE ALLOTTED ANY PLAN SATISFYING ALL THESE REQUIREMENTS, OR SCORED IN PROPORTION TO THOSE REQUIREMENTS THAT ARE SATISFIED.

C. SITE UTILIZATION. A SCHEMATICALLY PERFECT PLAN IN THIS RESPECT RETAINS A MAXIMUM AMOUNT OF THE NATURAL BEAUTIES OF THE SITE BY KEEPING STRUCTURES, PAVED AREAS, AND ROADWAYS TO A MINIMUM, SEE FIGURE 7. THE PLAN IN THIS FIGURE KEEPS _____ ACRES OF LAND OPEN AND UNDISTURBED AND IS AWARDED THE MAXIMUM OF _____ POINTS. OPEN AREAS ON PLANS BEING EVALUATED SHOULD BE COMPUTED AND SCORED ACCORDINGLY.

D. DEPARTMENTAL ORIENTATION. CHRYSLER HAS INDICATED THAT THE FOLLOWING ACTIVITIES REQUIRE NORTH LIGHT:

A MAXIMUM OF _____ POINTS IS GIVEN A PLAN THAT ORIENTS THE BUILDINGS IN SUCH A MANNER AS TO PROVIDE THESE ACTIVITIES WITH NORTH LIGHT THROUGH THE NORTH FACADE. THIS SCORE IS LOW BECAUSE ANY ACTIVITY CAN RECEIVE NORTH LIGHT BY MEANS OF SKYLIGHTS, REGARDLESS OF THE BUILDING ORIENTATION. PROVISION OF NORTH LIGHT IN THIS MANNER MAY INCUR A VERY SLIGHT INCREASE IN COST, THEREFORE CREDIT IS GIVEN TO A BUILDING THAT DOES NOT REQUIRE SKYLIGHTS. (SHOULD THIS COME UNDER THE COST HEADING?)

E. COMPATABILITY OF ADJACENT SPACES. THE PLANS ARE TO BE STUDIED AND WHEREVER IT IS NOTED THAT TWO ADJACENT SPACES ARE CONFLICTING IN THE SENSE ONE DISTURBS THE OTHER THROUGH NOISE, ODOR, VIBRATION, UNSIGHTLYNESS, ETC., _____ POINTS ARE TO BE SUBTRACTED FROM THE OVERALL SCORE.

F. PARKING REQUIREMENT. CHRYSLER HAS DETERMINED THAT, ON THE BASIS OF ABOUT 9,000 EMPLOYEES IN THE 2-1/4 MILLION SQ. FT. PHASE, 7,100 CARS WILL BE REQUIRED, AND BASED ON 18,000 EMPLOYEES IN THE ULTIMATE PHASE, 14,200 CARS WILL BE REQUIRED. ASSUME 329 SQ. FT. PER CAR FOR PARKING AREAS WITH NO PLANTING, 345 SQ. FT. PER CAR FOR PARKING AREAS WITH MAN-MADE PLANTING, AND 352 SQ. FT. PER CAR FOR PARKING AREAS WITH NATURAL PLANTING.

IF A PLAN SATISFIES THESE PARKING REQUIREMENTS, IT IS TO RECEIVE _____ POINTS. IF IT IS MORE THAN 5% DEFICIENT, IT IS TO RECEIVE NO POINTS, AND FOR EACH ADDITIONAL 5% DEFICIENCY SUBTRACT _____ POINTS FROM THE OVERALL SCORE.

G. ACCESS AND EGRESS REQUIREMENTS. A PLAN IS TO BE SCORED IN ACCORDANCE WITH THE NUMBER OF CONDITIONS IT SATISFIES, WITH A MAXIMUM SCORE OF _____ POINTS. THESE CONDITIONS ARE:

1. IS PEAK LOAD EMPLOYEE TRAFFIC EVENLY DISTRIBUTED TO THE SURROUNDING TRAFFIC CARRIERS IN ACCORDANCE WITH THE CARRIERS CAPACITY?
2. DOES THE EMPLOYEE TRAFFIC FLOW DIRECTLY TO PARKING AREAS FROM ENTRY POINTS, AND VICE VERSA?
3. IS INTERNAL TRAFFIC CONGESTION AVOIDED BY PROVIDING ADEQUATE ROADWAYS AND PROPERLY CHANNELING TRAFFIC?

H. ABILITY TO ADAPT TO VARIOUS MOVE SEQUENCES. AS WAS POINTED OUT IN THE OPENING PARAGRAPH OF THIS SECTION, FACTORS MUST BE EVALUATED WITHIN THEMSELVES, AND IN SCORING, THE INFLUENCE THEY HAVE ON OTHER FACTORS MUST BE DISREGARDED. ITEM "I" PERTAINS ONLY TO THE EFFECT THE FIRST GROUP OF STRUCTURES CONSTRUCTED AT TROY WILL HAVE ON THE PUBLIC. IF IT IS FELT THAT THESE FIRST BUILDINGS CREATE THE IMPRESSION ON THE PUBLIC DESIRED BY CHRYSLER, A MAXIMUM OF _____ POINTS SHOULD BE SCORED. (THIS SHOULD PROBABLY BE UNDER AESTHETIC FACTORS.)

III PURELY AESTHETIC AND ENVIRONMENTAL FACTORS - 200 POINTS

A. BUILDING PLACEMENT FOR SITE ENHANCEMENT

1. THE RIVER:

   A. IS FULL ADVANTAGE TAKEN OF THE RIVER AS FAR AS ENHANCING THE GENERAL CHARACTER OF THE OVERALL CENTER?..... _____ POINTS

   B. IS THE WATER EFFECTIVELY USED AS A FEATURE TO ENHANCE THE CHARACTER OF BUILDINGS AS SEEN BY THE PASSING MOTORIST?..... _____ POINTS

   C. TO WHAT DEGREE DO THE EMPLOYEES HAVE THE OPPORTUNITY OF OVERLOOKING THE WATER AREAS?..... _____ POINTS

   D. IS THE WATER AREA PROPERLY SCALED TO THE PROJECT?..... _____ POINTS

2. TERRAIN:

   IS THE GENTLE SLOPE THE VALLEY NOW HAS ACCENTUATED OR MINIMIZED BY THE PLACEMENT OF THE BUILDINGS?..... _____ POINTS

3. TREES:

   IS FULL ADVANTAGE TAKEN OF THE TREES; THAT IS, ARE THEY USED IN PLACES WHERE THEY WILL DO THE MOST GOOD, SUCH AS:

   A. RELIEVING LARGE PARKING AREAS..... _____ POINTS

   B. ACTING AS GENERAL LANDSCAPING OF OPEN SPACES..... _____ POINTS

   C. ENHANCING INTERIOR COURTS..... _____ POINTS

B. CONCEPT AND PHYSICAL EXPRESSION OF NATURE OF PROJECT. THE CHRYSLER ENGINEERING CENTER IS TO BE ONE OF THE MOST IMPORTANT BUILDING PROJECTS OF THIS ERA AND NO COMPROMISES OR EXPEDIENCIES SHOULD BE TOLERATED. THE CONCEPT MUST BE ADVANCED, IMAGINATIVE, AND DARING, IN KEEPING WITH THE CORPORATION IT SERVES. OUT OF THIS MUST GROW AN AESTHETIC EXPRESSION THAT ENHANCES AND INTEGRATES THE VARYING FUNCTIONS. THIS AESTHETIC EXPRESSION MUST CLEARLY INDICATE THE CREATIVE AUTOMOTIVE ENGINEERING THAT IS DONE IN THE CENTER.

ANY PLAN THAT EXPRESSES THIS CONCEPT IS TO RECEIVE _____ POINTS.

C. ENVIRONMENT

1. OF THE IMMEDIATE WORK AREA - (THE DESK, THE DRAFTING TABLE, THE PRIVATE, GENERAL, OR SEMI PRIVATE OFFICE, THE LAB., CLASSROOM, OR SHOP) - A MAXIMUM OF _____ POINTS IS TO BE GIVEN IF A PLAN CREATES A PLEASANT ENVIRONMENT IN THE IMMEDIATE WORK AREA.

2. OF NON-WORK AREAS - (SPACES ONE TRAVELS THROUGH ON BUSINESS; CORRIDORS, COURTS, LANDSCAPED AREAS, ETC.) - A MAXIMUM OF _____ POINTS IS TO BE GIVEN IF THE PLAN CREATES AN UNINTERRUPTED PROGRESSION OF COURTS, WALKWAYS, WATER AREAS, ETC. THAT AN EMPLOYEE WALKS THROUGH IN GOING TO ANY OTHER SECTION, A CAFETERIA, ETC. IF THE EMPLOYEE IS SUBJECTED TO VEHICULAR TRAFFIC DURING THIS MOVEMENT, NO POINTS ARE TO BE GIVEN FOR THIS FACTOR.

3. OF NON-WORK AREAS - (REST AREAS, EATING PLACES, VISTAS AND GARDENS) IF THESE FACILITIES ARE PROVIDED FOR ENJOYMENT OF THE EMPLOYEE DURING OFF HOURS, GIVE _____ POINTS.

4. OF VISITOR AND PASSERBY - EXCLUDING THE ARCHITECTURAL CHARACTER THE CENTER WILL HAVE, THE SCALE OF THE STRUCTURES EXERTS THE GREATEST INFLUENCE ON ENVIRONMENT IN THIS RESPECT. THE EXTERIOR SHOULD BE SCALED TO THE FAST MOVING VIEWER, AND ONCE THE VISITOR IS ON FOOT THE SCALE SHOULD CHANGE, BECOMING INTIMATE AND HUMAN. SCORE _____ POINTS IF THIS IS ACCOMPLISHED.

D. INTEGRATION WITH PERIMETER ENVIRONMENT.

IF A PLAN ACHIEVES THE FOLLOWING CONSIDERATIONS, SCORE AS NOTED:

1. DOES THE PLAN OF THE ENGINEERING CENTER COMPLIMENT AND ACKNOWLEDGE THE CORPORATE ADMINISTRATION BUILDING?..... _____ POINTS
2. DOES THE PLAN OF THE CENTER TAKE THE BEST ADVANTAGE OF EXISTING HIGH-COST RESIDENTIAL AREAS?..... _____ POINTS
3. IS THE CENTER PROPERLY RELATED TO THE EXPRESSWAY?..... _____ POINTS
4. IS THE CENTER PROPERLY RELATED TO ROADWAYS PRIMARILY EMPLOYEES CARRIERS?..... _____ POINTS

E. ABILITY OF PLAN TO RETAIN AFORE-MENTIONED FACTORS AS GROWTH OR CHANGE OCCURS EVEN THOUGH THE NATURE OF THE GROWTH OR CHANGE CANNOT NOW BE EXACTLY DETERMINED. SINCE ADDITIONS AND APPENDAGES RESULTING FROM EXPANSION CANNOT BLEND IN WITH THE FACADES OF EXISTING BUILDINGS, DUE TO THE INABILITY TO MATCH LIKE MATERIALS, AND TECHNOLOGICAL AND PHYSICAL

REQUIREMENT CHANGES, THE CHARACTER AND ENVIRONMENT OF THE CENTER CAN BE JEOPARDIZED IF EXPANSION IS NOT PROPERLY HANDLED. _____ POINTS ARE TO BE CREDITED TO A PLAN THAT INCORPORATES THE NECESSARY EXPANSION AND STILL MAINTAINS A COHESIVE FACADE, AS ORIGINALLY CONCEIVED, REPRESENTING THE CHRYSLER ENGINEERING DIVISION TO THE PUBLIC.

IV COST CONSIDERATIONS - 100 POINTS

A. CAPITAL COST OF STRUCTURES. IT IS ONLY FAIR TO ASSUME THAT SUCH COST-INFLUENCING ITEMS AS INTERIOR AND EXTERIOR FINISHES, STRUCTURAL FRAME AND SPANS, CEILING HEIGHTS, ETC., WILL BE THE SAME FOR ALL PLANS. THE ONE COST FACTOR THAT WILL DIFFER IN EACH PLAN WILL BE CONSTRUCTION COST REQUIRED FOR EXTERIOR WALLS. A THEORETICALLY PERFECT PLAN IN THIS RESPECT WOULD HAVE 8,000 LINEAL FEET OF EXTERIOR WALL, AND RECEIVE A MAXIMUM OF _____ POINTS. OTHER PLANS WOULD BE JUDGED AND SCORED ON THIS BASIS.

B. CAPITAL COST OF SITE WORK.

1. UTILITIES. UTILITY EXPENDITURES ARE DIRECTLY RELATED TO THE LENGTH OF UTILITY RUNS. THE SCHEMATICALLY PERFECT PLAN HAS A MINIMUM RUN OF _____ LINEAL FEET, (DETERMINED BY MEASURING THE LENGTH OF A LINE PASSING THROUGH THE CENTER POINT OF EACH SECTION) AND RECEIVES A MAXIMUM OF _____ POINTS. USE THE PLAN IN FIGURE 2 FOR THE SCHEMATICALLY PERFECT PLAN. OTHER PLANS ARE SCORED ACCORDINGLY.

2. COVERED WALKWAYS - THE SCHEMATICALLY PERFECT PLAN IN THIS RESPECT WOULD HAVE NO COVERED WALKWAYS AND RECEIVES A MAXIMUM OF _____ POINTS. THE TOTAL NUMBER OF LINEAL FEET OF COVERED WALKWAYS INCORPORATED IN EACH PLAN IS TO BE MEASURED AND POINTS GIVEN IN RELATION TO THOSE AWARDED THE SCHEMATICALLY PERFECT PLAN.

C. CAPITAL COST OF PROVISIONS FOR EXPANSION. THE SCHEMATICALLY PERFECT PLAN KEEPS CONSTRUCTION COST TO A MINIMUM BY ALWAYS EXPANDING OUTWARD FROM AN EXISTING BUILDING, THEREBY EFFECTING A SAVING IN CONSTRUCTION COST OF ONE EXTERIOR ELEVATION, SEE FIGURE 7. THIS PLAN HAS A TOTAL OF 8,000 LINEAL FEET OF EXTERIOR WALL AFTER THE CENTER HAS EXPANDED TO 4,000,000 SQ. FT. AND RECEIVES A MAXIMUM OF _____ POINTS. EXTERIOR WALL FOOTAGE IN THE ULTIMATE DEVELOPMENT WILL BE MEASURED IN EACH OF THE PLANS BEING EVALUATED, COMPARED TO THE MINIMUM AMOUNT POSSIBLE, 8,000 LINEAL FEET, AND SCORED ACCORDINGLY.

D. MAINTENANCE AND OPERATIONAL COSTS. THIS EXPENDITURE IS DEPENDENT MAINLY ON HEATING AND AIR CONDITIONING COSTS, AND THESE IN TURN ARE MARKEDLY INFLUENCED BY THE EXTENT OF GLASS AREA. NO PLANS WILL BE DETAILED TO A POINT WHERE THE EXTENT OF GLASS AREA COULD BE EXACTLY DETERMINED. HOWEVER, WE MAY ASSUME THAT EACH PLAN WILL HAVE THE SAME AMOUNT OF GLASS AREA PER LINEAL FOOT AS THE NEXT; THEREFORE THE SAME SCHEMATICALLY PERFECT PLAN ILLUSTRATED IN FIGURE 7, WITH 8,000 LINEAL FEET OF EXTERIOR WALL MAY BE USED AS BEING SCHEMATICALLY PERFECT IN THIS FACTOR AND RECEIVES A MAXIMUM OF _____ POINTS.

E. TRUCK TUNNEL. A SCHEMATICALLY PERFECT PLAN WOULD HAVE A TRUCK TUNNEL _____ FEET LONG, SEE FIGURE 4, SERVICING ALL REQUIRED ACTIVITIES IN ACCORDANCE WITH CHRYSLER'S POLICY PROPOSALS, AND WOULD RECEIVE _____ POINTS. MEASURE THE LENGTH OF TRUCK TUNNELS IN OTHER PLANS, AND SCORE THEM USING THE _____ FEET AS A BASIS FOR RECEIVING THE MAXIMUM NUMBER OF POINTS. IF THE TRUCK TUNNEL DOES NOT SERVE ALL SECTIONS, DECREASE THE SCORE BY _____% FOR EACH SECTION NOT SERVED.

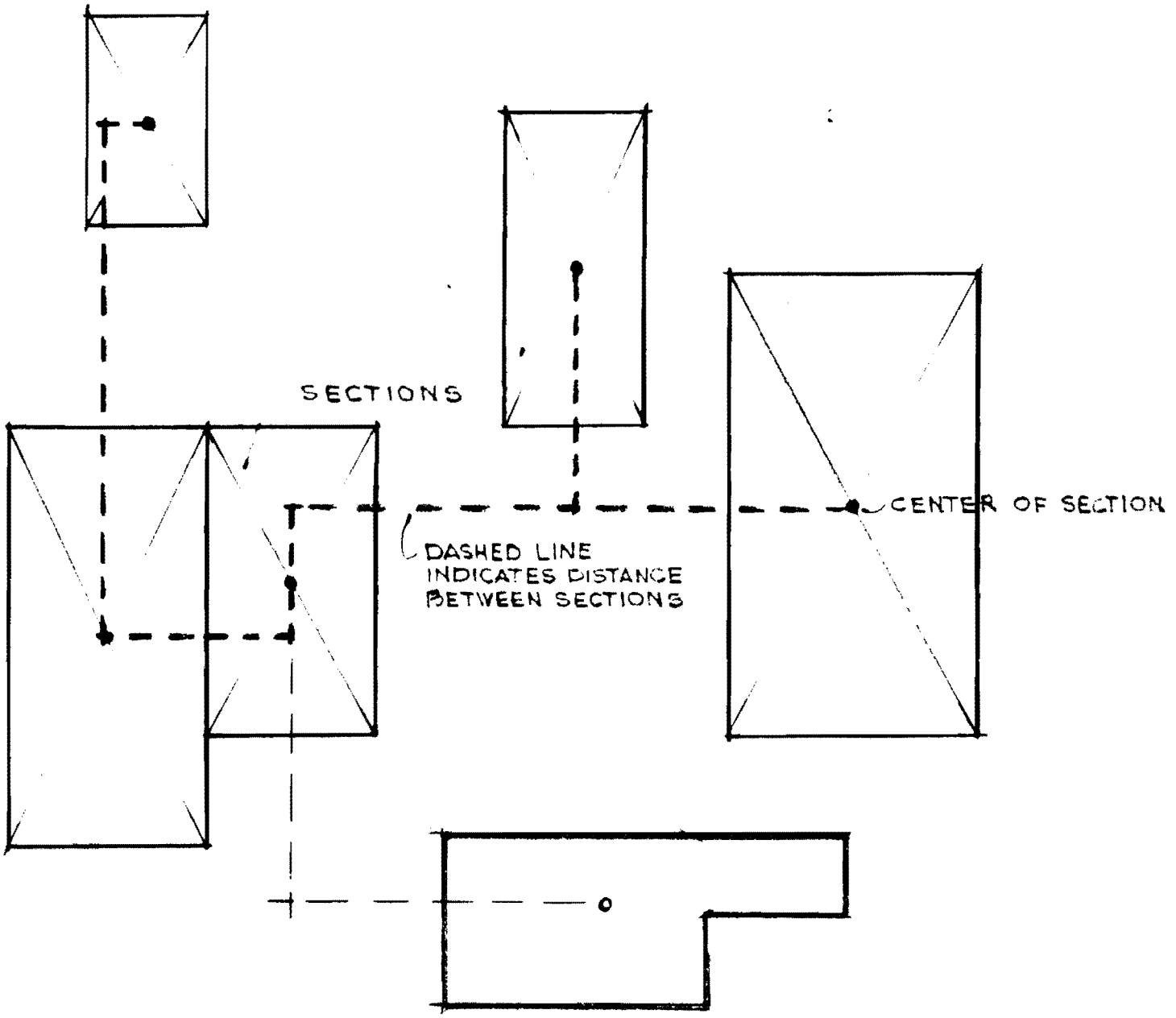
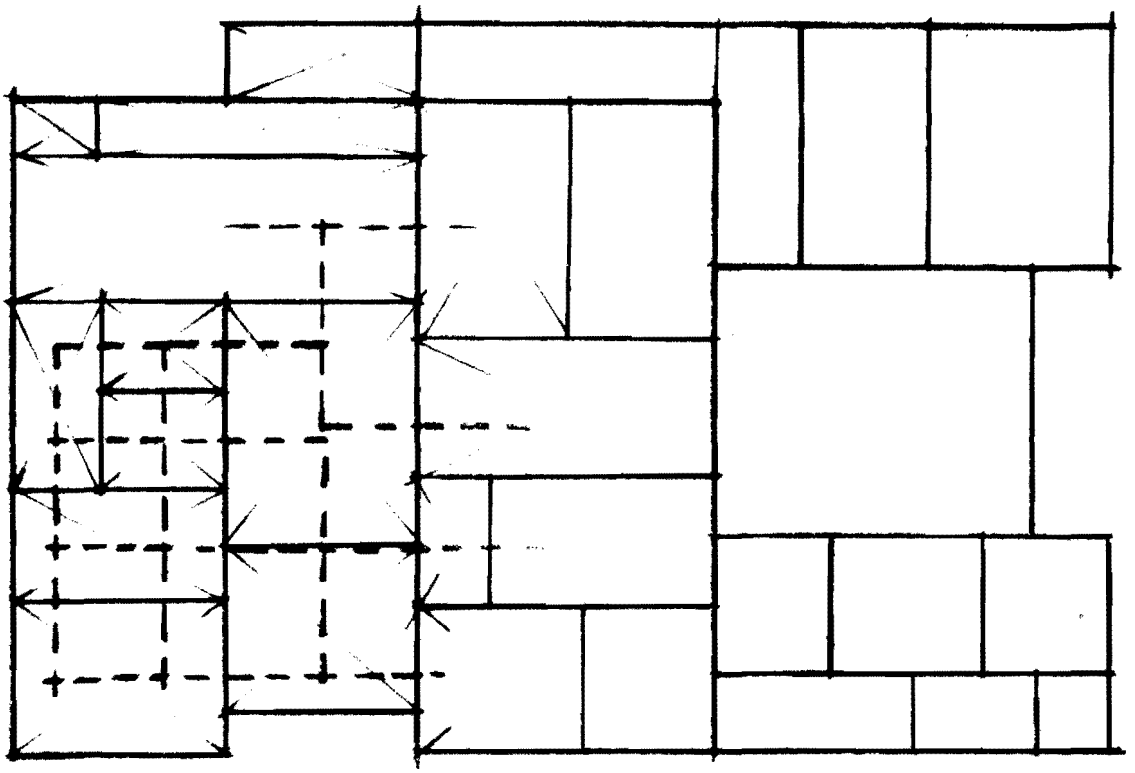

SECTIONS
CENTER OF SECTION
DASHED LINE
INDICATES DISTANCE
BETWEEN SECTIONS

FIGURE NO. 1



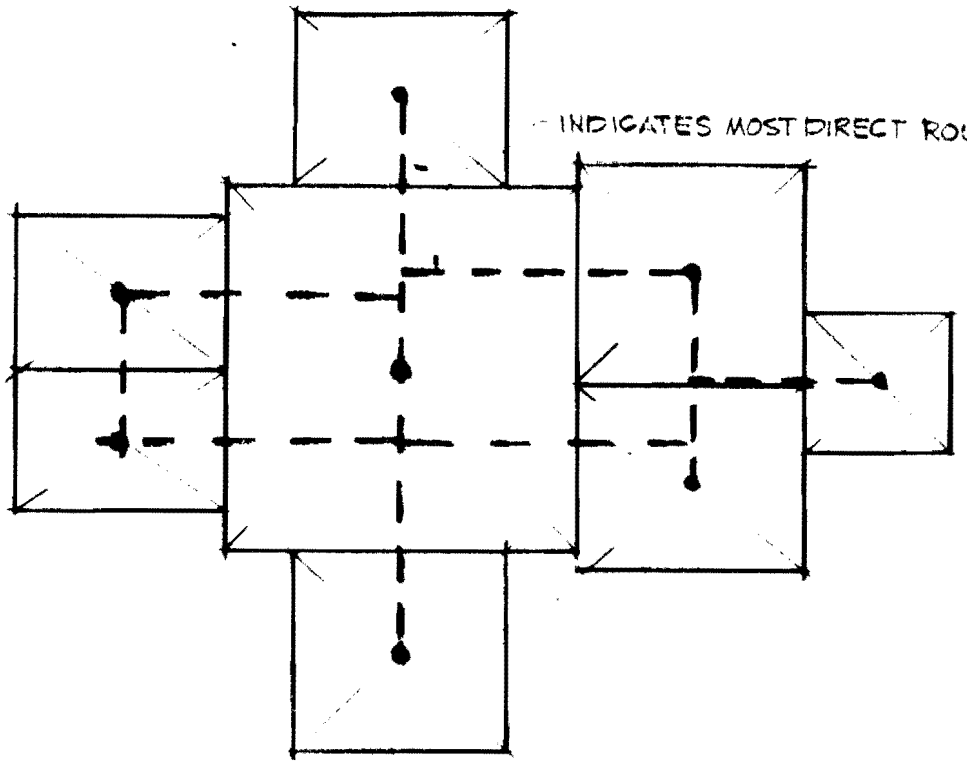
TAKE SECTION LAYOUT AS INDICATED BY I.B.M. SOLUTION.

BRING EACH SECTION INTO SCALE FOR ULTIMATE PHASE OF 4,000,000 SQ.FT.

MEASURE DISTANCE BETWEEN SECTIONS AS INDICATED IN FIG. 1.

APPLY FORMULA – USE RESULT AS IDEAL SOLUTION.

FIGURE NO. 2



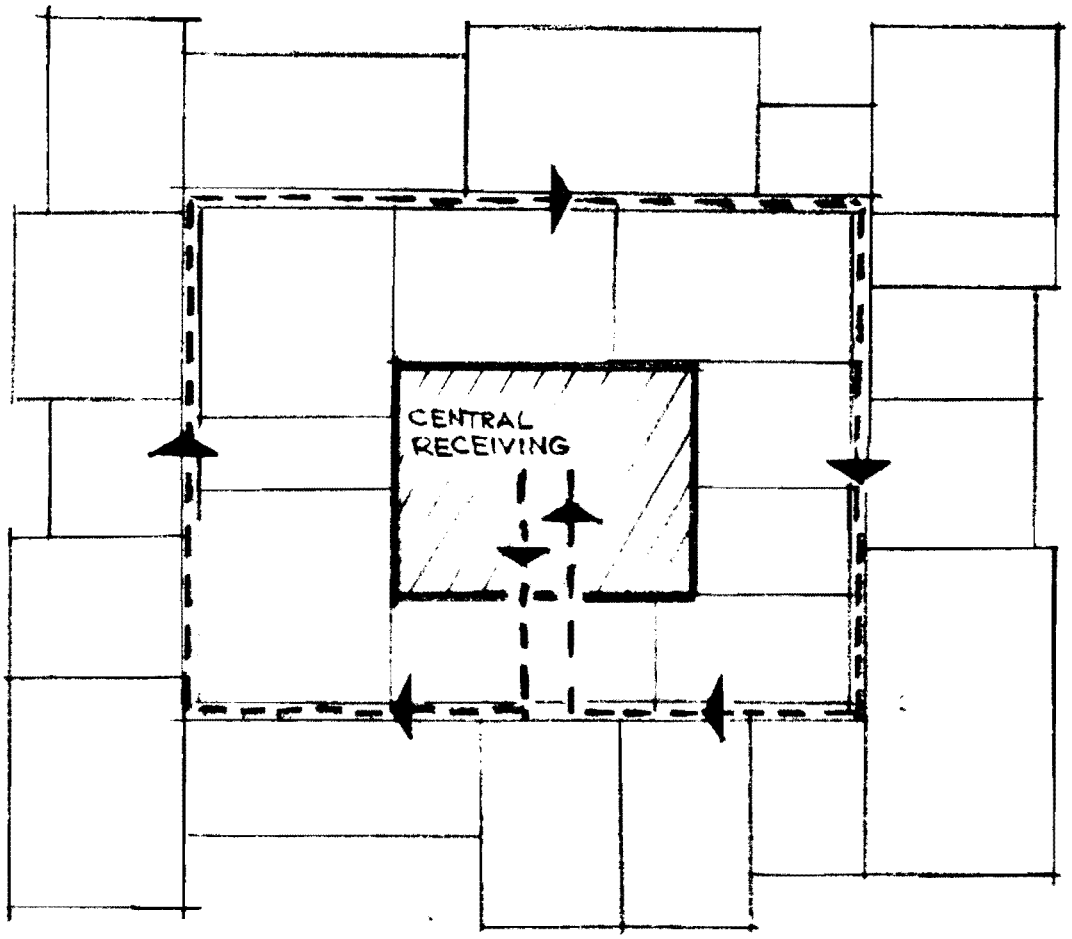
LAYOUT SECTIONS INVOLVED IN MOVEMENT OF MOCK-UPS AND WHOLE CARS.

BRING EACH SECTION INTO SCALE FOR ULTIMATE PHASE.

APPLY FORMULA - SECTIONS ARE TO BE SO ARRANGED SO AS TO RESULT IN THE ABSOLUTE MINIMUM DISTANCE TRAVELLED/MO.

THIS LAYOUT IS BASED SOLELY ON MOVEMENT OF CARS - NO OTHER FACTOR IS TO BE TAKEN INTO CONSIDERATION.

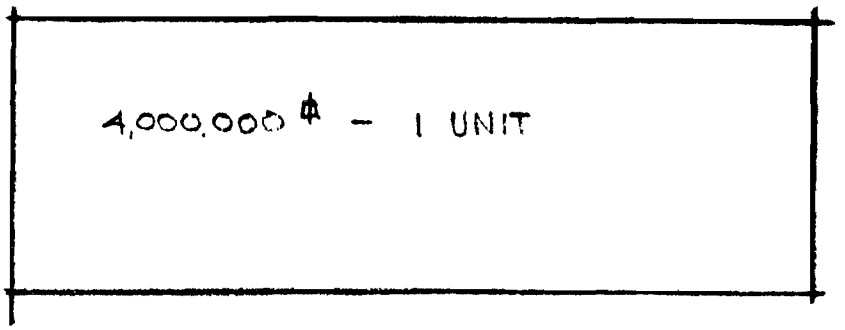
FIGURE NO. 3



LAY OUT CENTRAL RECEIVING TO SCALE, SURROUNDED BY ALL OTHER SECTIONS, ARRANGED SO AS TO HAVE A TRUCK ROUTE OF MINIMUM LENGTH SERVING ALL SECTIONS.

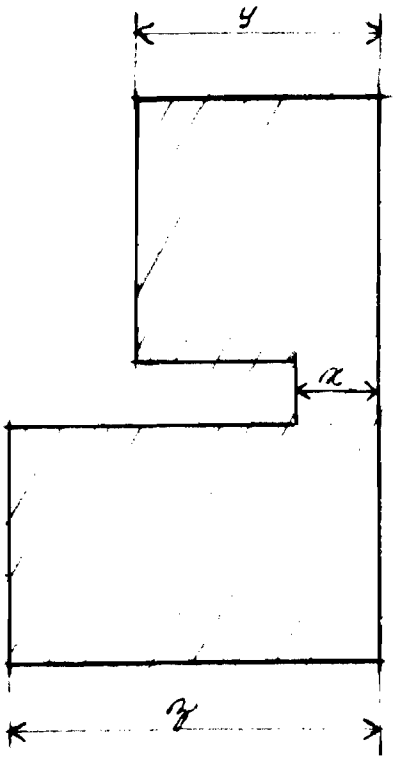
THOSE SECTIONS IN THE ADMINISTRATIVE TOWER MAY BE VERTICALLY ARRANGED IN THIS SCHEMATIC PLAN.

FIGURE NO. 4

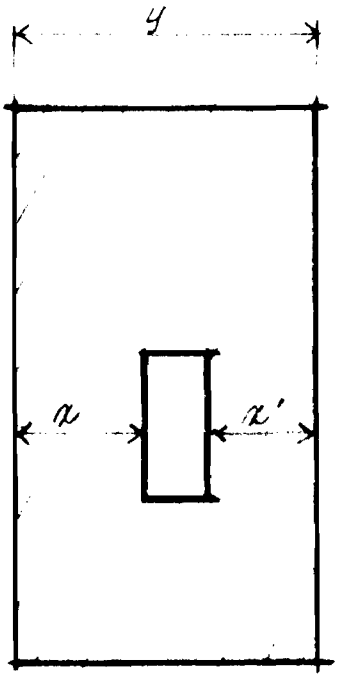


$$\frac{4000.000 \text{ SQ. FT.}}{1 \text{ UNIT}} = 4,000,000 \text{ SQ FT. OF FLEXIBILITY}$$

SCHEMATICALLY PERFECT PLAN

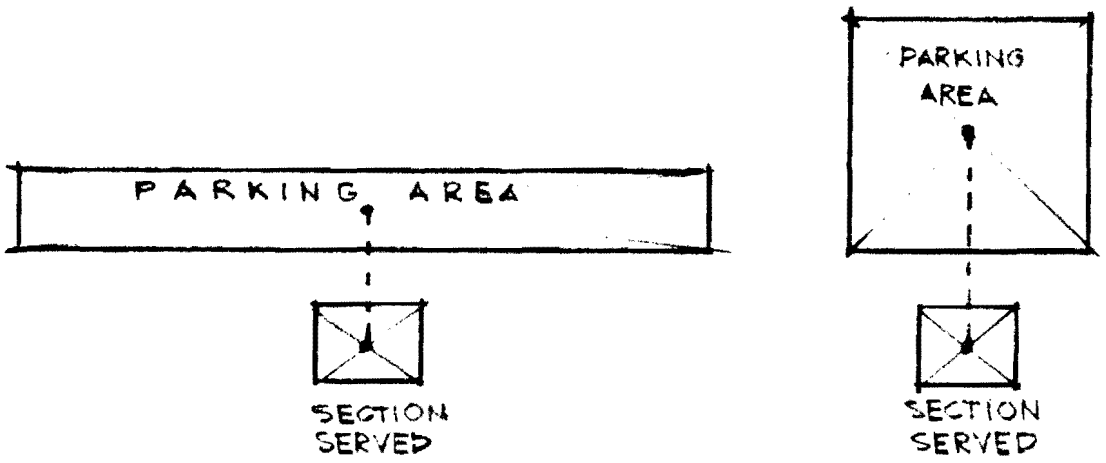


THIS BUILDING IS CONSIDERED AS TWO UNITS, BECAUSE x IS LESS THAN 3/4 OF z

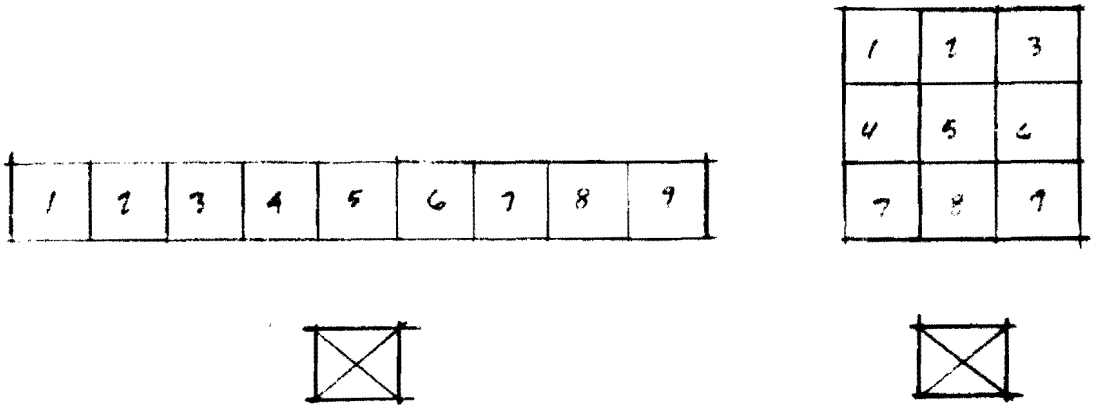


THIS BUILDING IS CONSIDERED AS ONE UNIT, BECAUSE $x + x'$ IS MORE THAN 3/4 y.

FIGURE NO. 5



PARKING EFFICIENCY HAS BEEN DETERMINED ABOVE, BY MEASURING FROM CENTER OF PARKING AREA TO CENTER OF SECTION. THE EXAMPLE TO THE LEFT WOULD SCORE HIGHER THAN THAT TO THE RIGHT, AND THIS IS UNFAIR AS ITS WALKING DISTANCES ARE NOT LESS THAN THE RIGHT HAND EXAMPLE.



IF THE PARKING AREAS ARE BROKEN INTO SMALL PARCELS AS SHOWN ABOVE, AND DISTANCES ARE MEASURED FROM CENTER OF PARCEL TO CENTER OF SECTION, A BETTER EVALUATION WILL RESULT.

FIGURE NO. 6

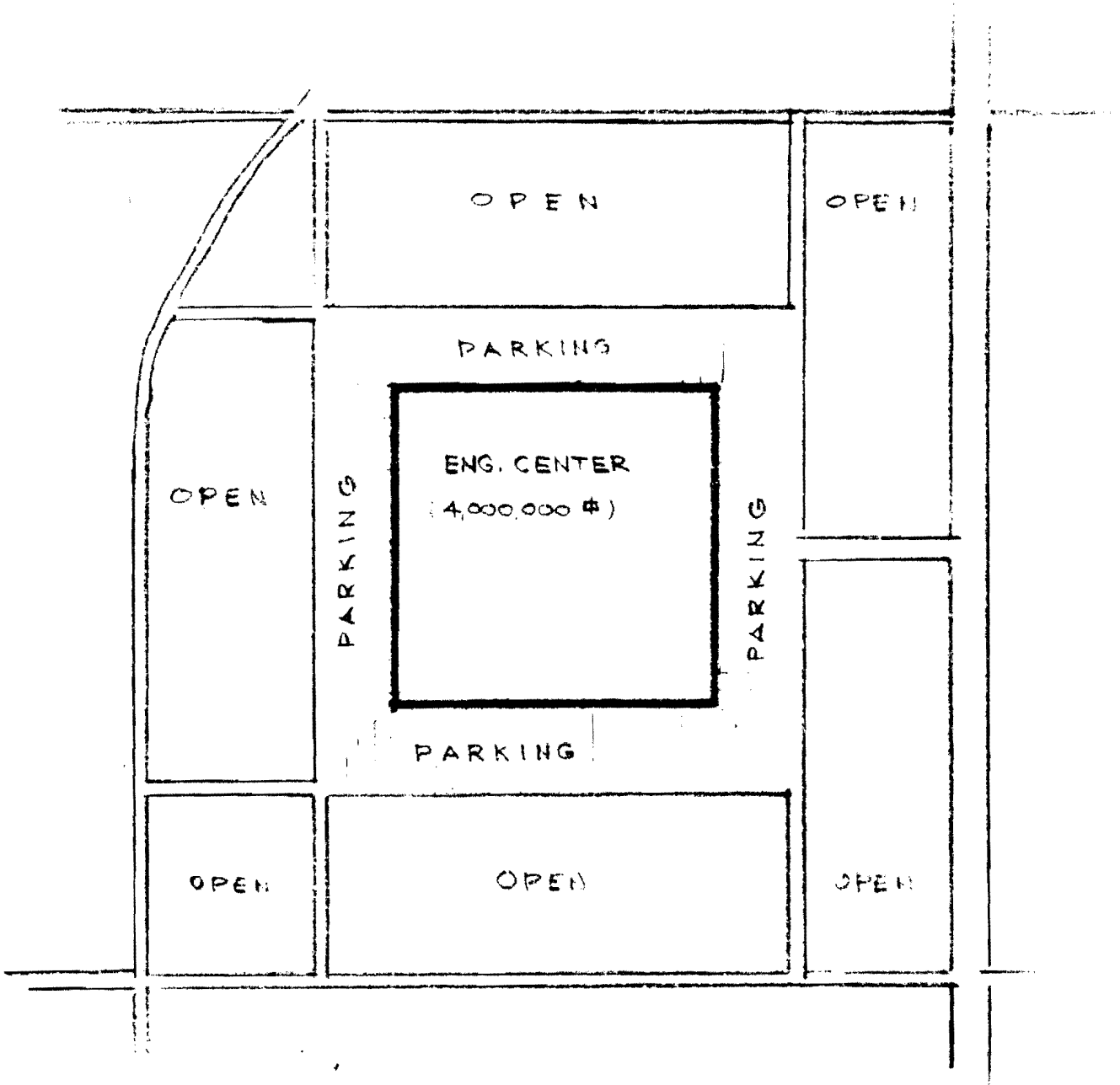

OPEN
OPEN
PARKING
OPEN
ENG. CENTER
(4,000,000 ₱)
PARKING
PARKING
PARKING
OPEN
OPEN
OPEN

FIGURE NO. 7

VICTOR GRUEN

SUPPLEMENTARY INSPECTION SURVEY

of the

CHRYSLER ENGINEERING DIVISION

INDEX

Forward:

This report contains pertinent supplementary information concerning present operation at the Chrysler Engineering Division. This report supplements the Chrysler Engineering Survey Questionaire.

PRODUCT DEVELOPMENT AND PLANNING GROUP - SECTION 20

There is no physical development carried on by this section.

Included in this section is the Automotive Safety Department. They are primarily concerned with programming and public relations and require rapid duplication of paper work (generally letters received).

100 SERIES - ADMINISTRATION GROUP

Department 111 - ADMINISTRATIVE SERVICES:

An impressive lobby should be considered to receive visitors.

(#1) Medical facilities for employee physical examinations are required by the Section. The current facility is located in the Highland Park General Hospital. Chrysler medical personnel at the hospital require ten examination rooms.

Department 112 - CAFETERIA:

Noise control and adequate ventilation are essential in the cafeteria.

(#2) Presently the supervisors dining room and the cafeteria are serviced by the same kitchen. Access to the supervisors dining room is through the cafeteria. This causes congestion in the cafeteria and results in an unnecessary delay to the supervisors dining room. The kitchen should be located adjacent to the supervisors dining room and the cafeteria so that both can be serviced directly. These areas should be easily accessible to the respective personnel.

Department 141 - ENGINEERING RECORDS:

Each desk should be provided with a reference table.

Department 144 - REPRODUCTION AND VAULT:

The Ozalid reproduction process demands adequate ventilation to exhaust ammonia fumes.

Filing important drawings and documents requires some security provision.

Department 151 - PASSENGER CAR MATERIALS PROCUREMENT:

Parking area for 25 cars is required for procurement activity (Department 151). This area should be located within reasonable distance of this operation.

All material in this department is procured according to information such as drawings, E.M.D.'s and sketches. Rapid transmittal of this material should be considered.

Department 158 - INSPECTION:

Incoming material that requires inspection is moved to this department. This department has an elaborate setup for inspecting precision tools, parts and machines.

Department 156 - MATERIAL HANDLING:

A covered receiving area with an overhead travelling crane is needed for Material Handling. The Inspection Department, 158, should be located near this receiving area. Fuels and food are delivered directly to their respective departments.

This department has charge of the stock rooms provided for Engineering Division with the exception of office supplies.

A storage area should be provided adjacent to each stock room in addition to a central general storage area.

Traffic congestion is generated by corporate and non-corporate vehicles. Separation of the two types should be considered.

Departments 175 - BUILDINGS AND EQUIPMENT MAINTENANCE,
176 - BUILDINGS AND GROUNDS MAINTENANCE SERVICE,
177 - FACILITIES PROCUREMENT:

These departments service all departments in the Engineering Division which requires a large amount of pedestrian traffic.

Department 175, Buildings and Equipment Maintenance, operates its own wood shop, machine shop, paint shop, electrical repair and storage rooms. Storage requirements run upwards of 100,000 square feet.

Department 176, Buildings and Grounds Maintenance, includes snow removal and landscape maintenance.

NON-ENGINEERING:

Non-Engineering Division departments are located within the Administration Group.

300 SERIES - BODY ENGINEERING GROUP

General:

Many of the departments in this group make use of the Engineering Metal Drafts. These E.M.D.'s are large aluminum plates (maximum 5½' x 20') on which a white enamel finish is applied. Working drawings of the different components of the car are then drawn in full size on this painted surface.

A problem to be considered is the transporting and storing of these drafts for quick and easy reference. Stairwells and halls should be able to accomodate these plates for ease of movement. A workable solution has been found in the use of a metal draft rack developed by Department 343. Metal tracks are suspended about 7 feet above the floor. The drafts are hung on hooks attached to rollers which move along these tracks. The track length is about twice the length of the draft so that the drafts can be stored at one end and any particular draft can be easily viewed by rolling it to the other end. The tracks are placed approximately 3" o.c.

Department 302 - STAFF OPERATIONS: F. Walter

This department is a staff function. A display rack for a large illustration board scheduling chart is required.

Department 315 - TRIM SHOP: M. L. Frankart

Work with fabrics in this department presents the problem of lint in the air. There is danger of an explosion if an electrostatic charge is built up. Therefore, provision should be made for air purification.

Work with, and storage of, leather in this department necessitates controlled temperature and humidity to avoid damage to the material caused by shrinking and cracking.

Department 317 - MODEL SHOP: R. B. Cain

(#3) The Model Shop often has to ~~Since this department often has~~ small parts plated, and the possibility of providing its own plating facilities should be considered. This would relieve ~~The~~ Plating Laboratory in the Chemical Laboratories Section ~~would then be relieved~~ for larger ~~plating~~ jobs. However, ~~consideration of~~ a plating facility for the Model Shop ~~this department~~ should be for convenience of the Shop only.

Department 311 - BODY SHOPS: Outer Drive

Consideration of E.M.D. storage is required in this area.

Temperature and humidity control is needed to prevent the wooden hammer forms from shrinking and warping. The hammer form is used in forming metal body sections.

In addition to its normal function of painting cars, models, and components, this department applies the white enamel finish to its own E.M.D.'s. The enamel finish is baked on the aluminum E.M.D. plate. The E.M.D.'s for Highland Park Engineering are purchased from an outside source.

Department 341 - BODY IN WHITE: H. V. Atnip

Consideration of E.M.D. storage is required in this area.

Department 342 - INTERIOR DESIGN: W. F. Artman

Consideration of E.M.D. storage is required in this area.

Provision should be made to accommodate 18 to 20 people at weekly meetings.

It should be emphasized that this department coordinates their work with a number of groups including Mechanical Laboratories, Electrical Laboratories, Styling, and other Body Design departments.

Department 343 - FRONT END DESIGN: L. J. Meinberger

The problem of storing and viewing the large E.M.D.'s has been alleviated in this department. For details see Body Engineering General.

A security problem exists ~~here as it does~~ in all body design

#4

departments. Security is controlled by challenging any suspicious or unknown person who is within the area. If a person has business within the department he can remain; if a person has no justification for being there he is asked to leave. The security problem is complicated by people using the center aisle as a corridor in order to get to the adjacent departments.

(4)

Department 351 - BODY SEALING: M. J. Sturtevant

Accommodations for storing experimental weather stripping should be made.

Department 352 - BODY HARDWARE AND MECHANISMS: D. R. Wolfslayer

This department should have a small storage area for full-size mock-ups of hardware such as door handles, truck and hood latches.

Department 361 - SEATING DESIGN AND DEVELOPMENT: R. B. Armstrong

Storage space is required for seat-spring samples within the department. Some additional storage space should be provided in the Trim Shops.

Department 362 - COLOR AND TRIM SPECIFICATIONS: J. H. Fennell

A work table should be provided to facilitate the cutting of the fabric to sample size.

A display board fitted with hangers for paint chip samples is required with daylight exposure.

A separate room should be provided for a Macbeth Lamp setup. The Macbeth Lamp is a device capable of simulating all types of lighting conditions for the purpose of color viewing and matching. The present facility has proven very satisfactory and is considered one of the best in the industry. Any new setup should closely duplicate the present layout with the addition of a ventilation system to dissipate the heat from the lamp when it is in operation.

Department 371 - ADVANCE BODY DESIGN AND COST ANALYSIS: E.G.Zeeb

Consideration of E.M.D. storage is required in this area.

Full size E.M.D.'s of the body sections are used in this department.

Cost estimating involves a critical time factor requirement. Personal contact is essential throughout the Body Engineering Group.

Department 381 - BODY DESIGN: Outer Drive

The large drafting rooms and the centralisation of telephones in one area requires the use of P.A. systems to summon persons wanted on the telephone. Artificial and natural lighting and drafting table spacing seem quite satisfactory. Duplication of these standards would be considered adequate by this Group.

The main function of the photography dark room is to reproduce the E.M.D.'s for the entire division. The reproduction is done photographically. A large portion of reproduction of the central engineering (H. P.) E.M.D.'s are handled on a contract basis with outside firms. Many of the larger E.M.D.'s (5½' x 20') are contracted to a downtown firm. Thought should be given to reproducing all E.M.D.'s for the Engineering Division because of the distance involved to outside reproduction facilities.

600 SERIES - STYLING GROUP

COLOR AND FABRIC STUDIOS

Color and fabric studios should be provided with maximum northern exposure to facilitate color matching.

A display area should be adjacent to the northern exposure.

DESIGN STUDIOS

Design studios should be provided with a northern exposure and should be accessible to the clay studios. A 7' square module is required for each work station which includes drawing board, storage cabinet and circulation space. In addition to drawing tables three work tables for 3/8 scale clay model cars should be provided.

CLAY STUDIOS

#5

The clay studios must have temperature and humidity control to maintain dimensional stability of clay models, and uniform illumination is essential to provide contrast-free and shadow-free work stations.

Each clay model (full size) weighs from four to seven tons.

Pegboard paneling on the walls of clay rooms is used to display styling sketches. The sketches help the clay modelers

to visualize the total design, however, all measurements are taken from working drawings.

Viewing the clay models at some distance is required in the studio even though the resulting open space may not be utilized for another purpose.

OUTDOOR VIEWING AREA

All clay modeling studios should be accessible to the Outdoor Viewing Area. This area is used to view cars at a distance and in a natural environment. Two or three turntables should be provided so that the cars can be turned within a small area.

This area has a high security requirement. Natural obstructions should be employed. Styling is the only group that should have access to this area.

SHOWROOM

The showroom requires a continuous parading of cars during the car shows. The cars should have a separate entrance and exit.

Full-size car models are brought into the showroom, turned on the turntables, then moved out in a continuous flow.

During a viewing session, controlled lighting is essential. This room requires a high intensity, low contrast general

lighting with spot down lighting to highlight car details.

The floor should simulate a road surface. Floor material should be such that distracting reflections from the bumpers or bodies would be at a minimum. Floor surface should resist skid marks from stopping and starting.

A planter should be incorporated into this room to provide background greenery for viewing the cars.

The showroom should be capable of showing the entire line of models at the same time.

A northern exposure is required to display colors and fabrics for seating and interior styling.

Adequate provision should be made for electrical outlets along walls and in the center of the floor area.

700 SERIES - CHASSIS, ELECTRICAL AND TRUCK

CHASSIS DESIGN SECTION:

Department 714 - COMPONENT DESIGN: W. P. Yreman

Consideration of E.M.D. (Engineering Metal Draft) storage is required in this area.

Department 721 - DEVELOPMENT DESIGN: R. B. Batchelor

A large space is required to store car mock-ups in this area. The security requirement in this mock-up area has been met by locked doors and plant protection guards which limit unauthorized personnel.

ELECTRICAL DESIGN AND DEVELOPMENT SECTION:

The Audio Laboratory is a copper-clad wood-frame building used to eliminate electron interference for horn testing.

Department 742 - ADVANCED ELECTRICAL DESIGN: J. G. Pent

Consideration of E.M.D. storage is required in this area.

Department 743 - PRODUCTION CAR ELECTRICAL DESIGN: P. MacBain

Consideration of E.M.D. storage is required in this area.

Department 756 - LIGHTING AND SWITCHING: P. J. Klinkille

The Lighting and Switching Department conducts photometric testing of headlights require a 40 foot unobstructed viewing distance. Taillight tests require a separate 10 foot unobstructed viewing distance. Space should be provided to accommodate the entire car in this laboratory, ~~for the purpose of testing headlights and taillights.~~

#6

Department 757 - RADIO AND INSTRUMENTATION: H. Sabarfinbing

D. C. generators are required for test equipment. The generators should be located outside the test cells to reduce excessive heat, noise and vibration within the cell. Electronic power supplies have replaced some of the generators.

A copper screened room is required to eliminate radio interference in the instrumentation testing operation.

TRUCK DESIGN:

The truck operation is similar to the passenger car operation.

800 SERIES - LABORATORIES AND VEHICLE TESTING

Department 811 - CHEMICAL LABORATORIES: D. M. Bigge

Noise-free offices should be considered near laboratory areas to be used for office work such as laboratory reports.

Adequate drainage of corrosive and acid waste is essential. Oil and grease waste disposal should also be provided.

Distilled water is frequently used in test operations. Instead of separate stills in each laboratory a central still servicing all the laboratories would be advantageous.

The nature of the operations in this department requires work surfaces such as tables and floors that will not be effected by chemicals.

Laboratories that require the use of oil and grease should be provided with work surfaces that are easy to maintain.

#7 Clean, air, temperature and humidity control are primary factors at many of the test stations. ~~This is~~ These are absolutely essential in the spectrographic room ~~in order~~ so as to eliminate adverse effects on test results.

Several of the laboratories have need of photographic dark room facilities. A central dark room could be maintained to service their needs. This would eliminate ~~the~~ a duplication of equipment and personnel.

(Cont.)

The glass and optics laboratory should be capable of being darkened without disturbing other laboratories. ~~The nature of the optical work demands that glass used in fenestration be distortion free. A new system should allow the testing of glass mounted on a full size car within the laboratory.~~

This laboratory has experimental glass breaking equipment that provides 35 feet of free fall height. The present unit now extends above the roof. ~~This is unsightly.~~ Efforts should be made to conceal this equipment within the building.

The salt spray laboratory is on the ground floor of Building 108 apart from other chemical laboratory operations. It would be advantageous to locate the salt spray laboratory in close proximity to the other chemical laboratories since the same personnel use both areas. Adequate ventilation should be considered. ~~This laboratory also has leakage through the floor slab.~~

The outdoor exposure laboratory, now located on the roof of Building 108, will be affected by different air characteristics. Radioactivity may have some effect on the experiments. Exposed area required is 135 feet by 30 feet.

The corrosion laboratory experiments with relatively small metal parts such as bumpers and door handles. The paint shop uses this laboratory extensively.

The radiographic laboratory has 1/4" thick lead lined walls and a 16" thick concrete floor slab.

Department 816 - METALLURGICAL LABORATORIES: Mr. Lehman

Machinery vibration impairs the measuring accuracy of the sensitive photographic equipment. Delicate instruments should be isolated from the effects of vibration.

The welding laboratory presents the hazard of arc flash. Direct and reflected rays from the flash can cause serious damage to the eyes. Provision should be made to eliminate direct viewing of the flash as well as the reflection from the walls and ceiling surfaces. If glass partitions are used the glass should be treated to filter the flash rays.

Department 821 - ORGANIC MATERIALS LABORATORIES: Mr. Rawson

The presence of oil on the floors from the equipment should be considered when selecting a floor surface material.

#8

The rubber compounding and processing laboratories in the Organic Materials ~~Laboratories~~ Department require adequate exhaust and clean air supply because of the presence of lamp black particles, ~~in the air.~~ The exhaust system should also be able to take care of the offensive odors that are released during operations.

This laboratory controls fibre glass mixture in the Body Shops.

The flammable material storage room requires temperature and humidity control to prevent spontaneous combustion.

Noise control should be considered in this area.

Department 832 - FUEL SYSTEMS: Mr. Holmes

Provision should be made for the disposal of fuel-water mixtures. Since this department is concerned with tests dealing with measured quantities of air, both temperature and humidity should be controlled. Clean air is also essential to prevent small dust particles from clogging testing equipment.

Department 851 - MECHANICAL LABORATORIES:

The nature of projects carried on in this department, such as building-up and tearing-down equipment, require the flexibility of space and testing equipment. These projects include life-testing of brakes, clutches and pumps. The mechanical laboratory also has equipment in the Experimental Car Garage.

Department 852 - EXPERIMENTAL CAR GARAGE:

The constant operation of car engines within the garage requires adequate ventilation because of carbon monoxide fumes.

Sufficient aisle and work space between cars should be provided to facilitate moving cars in and out of stalls.

Structural columns become hazardous when moving cars in and out of the garage. This is especially true with the trucks.

On the Experimental Garage

Adequate temporary storage should be provided for parts removed from the cars on which work is being done. Tire storage space is also required.

A parts washing and degreasing facility should be ~~easily~~ available accessible to remove grease, oil and dirt from such parts as the differential and wheels.

#9

An automatic car wash ~~should be considered.~~ would be useful since dirty cars cannot enter the garage. The present car washing facility is a bottle-neck in the Experimental Car Garage operation.

Additional rest room facilities are needed within the garage. This facility should be capable of handling garage personnel ~~and~~ as well as other personnel who use the Experimental Car Garage.

Maximum daylight and artificial light are essential. The light should be as shadow-free as possible. Light reflection from the floor coupled with lights within the floor would be advantageous.

Gasoline pumps should be located away from the garage entrances. This will reduce traffic congestion which is now a problem.

An adequate number of fire exits should be considered.

Department 882 - EXPERIMENTAL BODY BUILD-UP:

The function of this department is to build prototype pre-production cars for testing and evaluation. Their work is,

therefore, closely tied in with the Body Shops.

They also prepare custom-built cars for shipment to owners. The car is put into running order much the same as a dealer's garage preparing a car for custom delivery.

900 SERIES - RESEARCH

Department 921 - PHYSICS LABORATORIES

The isotope room involves work with radioactive materials. This room should be isolated from the other laboratories with suitable (lead sheet) wall materials. All interior surface materials should be maintenance free. These surfaces may become contaminated and may necessitate removal.

A storage pit for radioactive material is also required within this laboratory.

The electronics laboratory requires a copper wire-screened room to eliminate stray electron signals.

A quiet room should be provided to allow listening to tape recordings of automobile noises and to study the effects of noise on humans.

The optics laboratory requires a light-tight room for test operations.

Department 931 - CHEMICAL LABORATORIES:

In this laboratory alcohol fumes pose a health problem. A high velocity ventilating system should be installed.

A separate air conditioning and exhaust system is required for the radiochemical laboratory, where radioactive contamination is a hazard.

#10

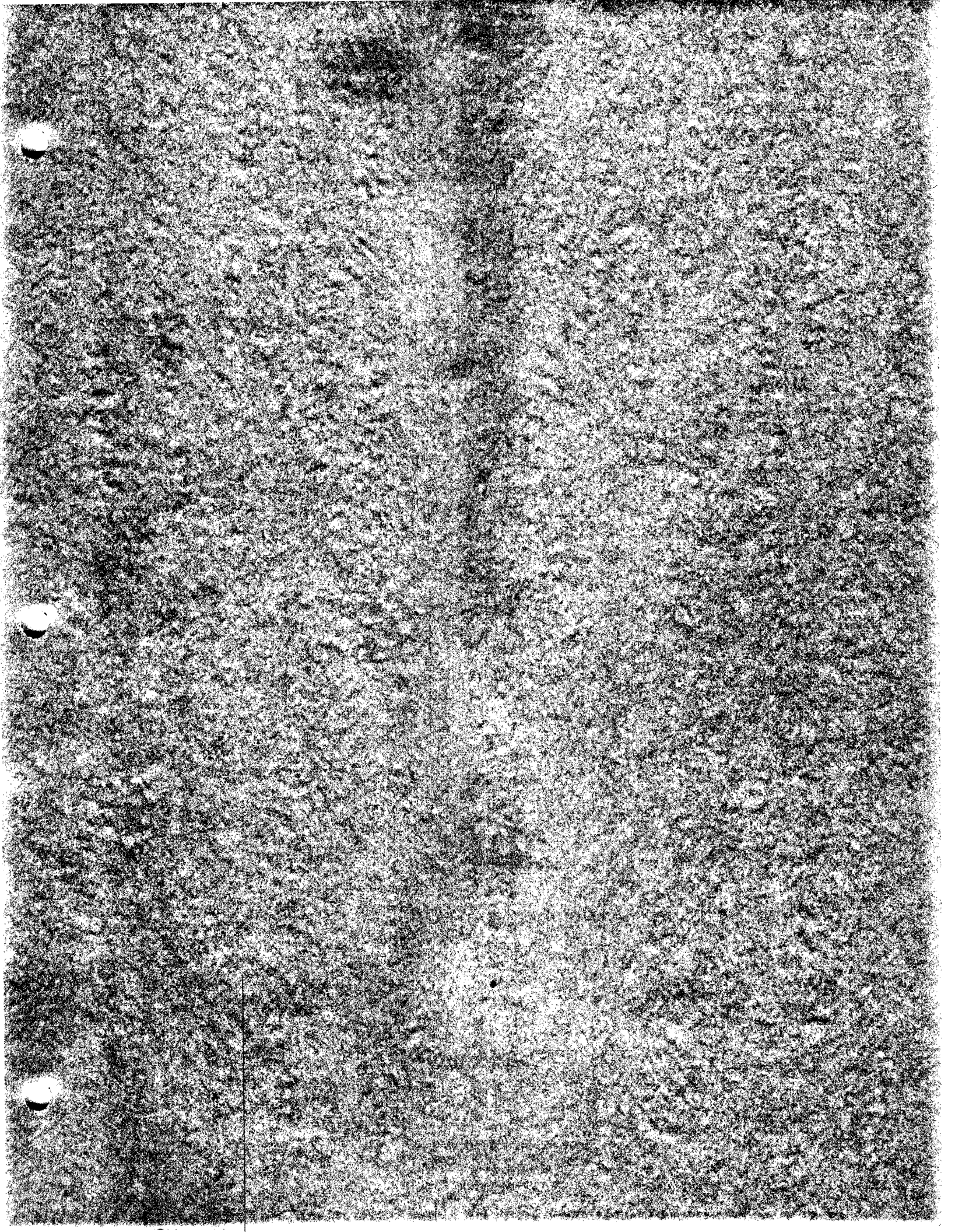
A new pilot plant chemical laboratory operation should be considered. This pilot plant is set up to test a production-operation. A clear height of at least 20 feet is needed to house an overhead crane and a mezzanine for material hoppers. Many pieces of equipment in this plant will require their own foundations.

Department 952 - GAS TURBINE POWER PLANTS

A concrete pit should be provided in the dynamometer laboratory for testing turbine rotors. This will prevent damage from flying particles of metal.

Department 963 - COMPUTER LABORATORIES

Temperature and humidity control should be provided to overcome heat given off by the computer machines.



STYLING AND BODY ENGINEERING COORDINATION

The sequence of development prior to the production of the automobile is complicated by the fact that the various steps overlap.

Many of the steps commence simultaneously and in most cases cease at different times. The development stages will be described in relation to the Styling and Body Engineering Group. In describing the development stages, there is reference to a time period or <u>lead time</u> for each stage. Lead Time (advance design and development time prior to production) is essential to formulate a comprehensive car design so that production can proceed with a minimum of uncertainties. At present the lead time period is 48 months and the trend is to extend this period.

STYLING GROUP

48-40 (monthly lead time period)

A. <u>IDEA SKETCHES</u> (41-40)

These are loose type sketches to illustrate ideas.

46½-39

B. <u>3/8 SCALE CLAY MODEL</u> (46½-39)

The idea sketches are transferred into clay. A wood sub-structure is used to support the clay model.

44-36 C. DEVELOPMENT (44-36)

The styling idea sketches are developed and the necessary details are worked out to attain more refined 3/8 clay model.

36-31 D. CORPORATE PRODUCT PLANNING COMMITTEE (36-31)

This committee reviews the sketches and clay models and makes corporate decisions on the future of the car design. The design may be totally accepted or accepted with modifications or not accepted at all. The committee is composed of executives throughout the corporation, including the Engineering, Manufacturing Divisions, Marketing and Sales Divisions, on up through the administrative vice president and president.

31-28 E. MINOR CLEAN-UP (31-28)

This operation consists of changing and slicking up of the car design based on the Corporate Product Planning Committee's decisions.

28-9 F. RELEASE INFORMATION TO ENGINEERING SECTIONS (28-9)

A Release is official information which is fed to the respective Engineering sections such as body design, electrical and chassis. The release is in the form of a full size clay model.

41-13 G. FULL-SIZE MODELING (41-13)

A full size clay model is made which is also built up on a wood sub-structure similar to the 3/8 clay model. The clay model depicts the exterior body design only. The right side may be a tudor hardtop and the right side may be a sedan.

Partial interior panels are made in clay, such as the instrument panel. Seats, steering wheel, windshield, and interior trim are arranged to study the interior space relationship. There are five separate styling design studios with their respective clay studios housing the Plymouth, Dodge, DeSoto, Chrysler and Imperial cars. Each car studio is separated from the others to eliminate any influence on the respective car designs. The Director and Chief of Styling integrates unifying character throughout all the different car designs.

32½-17 H. TEMPLATING (32½-17)

Templates are taken from the full size clay model. These templates serve to establish basic contour lines on large metal drawings called Engineering Metal Drafts (E.M.D.). The drafts are made of aluminum sheet, coated with white enamel. Sheet sizes range 3 ft. x 5 ft. to 5½ ft. to 20 ft.

30-9 I. PRELIMINARY DRAFTING AND RELEASING (30-9)

This is not production type drawing, but a raw outline of the styling activity related to Body Design. Sketches are made to amplify details.

13-7 J. STYLING CLEANUP (13-7)

The finishing touches are made on the car designs. Body Engineering and last minute considerations are carefully evaluated and minor changes are made.

BODY ENGINEERING GROUP

48-36 K. ADVANCED BODY (48-36)

Upon obtaining the design, sketches and a cost and structural analysis is made. From these sketches full size mock-up drawings are prepared. About 90 per cent of the mock-up drawings are drawn on vellum and 10 per cent on E.M.D.'s (Engineering Metal Drafts).

36-30 L. CLAY AND SURFACES (36-30)

Information is taken from Styling and an acceptable concept is transferred to proceed full-speed into production.

30-5 M. PRODUCTION DRAFTING (30-5)

This phase is divided into 8 groups:

1. Body in white: major panels and major structural item.

2. Body in white: minor component and mechanism.

3. Body outside moulding: ornamentation and tail lights.

4. Front end: hood, fender, major grille, and structural parts.

5. Front end: moulding, ornamentation lamps and minor components.

6. Interior: instrument panel, garnish moulding and interior major tooling items (including seat frames).

7. Interior: trim moulding, ornamentation, and color aid trim specifications.

8. Seating: trim and ornamentation.

24-3 N. DIE MODEL (24-3)

Wooden (mahogany) forms are used to represent the die models. The body section submits die construction releases to the plants and to the tooling vendors. The tooling vendors make 80 per cent of the dies and the plants make 20 per cent of the dies.

19-0 O. TOOLING TRYOUT (19.0)

The dies are tested for production. Inaccuracies and deficiencies are corrected.

44-22 P. ADVANCE DRAFTING AND DEVELOPMENT (44-22)

This stage is part of the advance design activity. Cost analysis can be more accurate with the developed E.M.D.

42-22 Q. PROTOTYPE (MOCK-UP CAR) (42-22)

This car can be made with modified old body parts or entirely new body parts made with plastic or metal. This is a roadable car.

42-22 R. ROADABLE SEATING BUCK (42-22)

The purpose of this stage is to evaluate the comfort, vision and steering in relation to the seats. The chassis of a prior model is used to expedite an interior styling concept. The roadable seating buck includes interior trim and appointments.

30-22 S. STATIC BUCK (30-22)

Closer examination of actual dimensions and conditions of the actual car are determined. The static buck is a non-roadable buck supported in a wood frame.

15-0 T. PROGRAM CAR (15-0)

A complete new body and chassis is constructed in advance of production. This gives an opportunity for experimentation for actual testing.

This is a representative car. The bodies are made of plastic or sheet metal, however, the plastic prototype cars have less weight which hinders testing of a comparative production car.

Styling has a final evaluation of the Program Car before it is released for production.