

A C O N G R E G A T I O N A L C H U R C H  
F O R M E L R O S E H I G H L A N D S , M A S S A C H U S E T T S

A Thesis.....

In partial fulfillment  
of the requirements  
leading to the degree of  
Bachelor of Architecture

Submitted by

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Charles Haeuser

August 23, 1951

.....  
Head of Department

303 Beacon Street  
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26 July, 1951

Mr. Pietro Belluschi  
Dean of the School of Architecture and City Planning  
Massachusetts Institute of Technology  
Cambridge 39, Massachusetts

Dear Sir:

At this time I should like to submit as  
the subject for my Bachelor of Architecture thesis:  
A Congregational Church for Melrose Highlands,  
Massachusetts.

One method of approach to this problem, as  
well as to the problems of Protestant church architecture  
in general, is through a closer analysis of Protestantism  
itself. In this way I hope to achieve a design which  
may meet the needs of this congregation and exemplify  
a church architecture more fully meeting the religious  
needs of Protestants in general.

Respectfully submitted,

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Charles Haeuser

### ACKNOWLEDGMENTS

I should like to express sincere appreciation to the following members of the Melrose Highlands Congregational Church for their assistance in providing information for this thesis:

Rev. Russell T. Loesch, minister -- Mrs. Elsie M. Simonds, church secretary -- Mr. Hector MacDonald, chairman Research, Survey, and Plans Committee -- Mrs. Laura E. Greene, co-superintendent Children's Division of Sunday School -- Mr. Allison C. Hayes, church treasurer.

Thanks are also sincerely extended to the faculty of the School of Architecture and City Planning of Massachusetts Institute of Technology for their assistance in this project. I also wish to acknowledge the aid given me by Professor Howard Simpson, Department of Building Engineering and Construction, and Professor August L. Hesselschwerdt, Department of Mechanical Engineering.

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P A R T I

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ANALYSIS OF THE PROBLEM

## THE SPECIFIC PROBLEM

### Selection of the Problem

The need for a new Congregational Church in Melrose Highlands, Massachusetts, was brought to the student's attention by Dr. Albert B. Coe, General Secretary of the Congregational and Christian Churches in Massachusetts. In conference with Reverend Russell T. Loesch, pastor of the Melrose Highlands Congregational Church, it was learned that this church group had already approved preliminary plans for a new church building and parish house and that the latter was then under construction. As the need for the latter was more critical, it had been decided to construct this wing of the proposed edifice first and add the sanctuary when funds were available.

Since it was desired to simulate an actual problem of church design as much as possible, it was felt that here was an ideal opportunity to consult with a minister and building committee members who had just experienced the process of focussing the needs of the church in terms of a building program. Permission to use this congregation as a client for a thesis was personally obtained from the architect engaged by the congregation.

### History of the Problem

The Melrose Highlands Congregational Church, which serves a parish of about 800 members, is approaching its 75th birthday. The building used by the founders of the parish in 1875 served the congregation until 1880 when a new church was built and in use through 1895. In 1896 the third and present church edifice was erected.<sup>1</sup> While the exterior lines of the 55 year old structure are handsome, reshingling, reroofing, repainting, and shoring up the tower are much needed. The interior is wholly unattractive and archaic relative to the other churches in the community. The building fell into disrepair particularly during the 1920's and 1930's. During the '20's needed repairs were unattended because of high prices, whereas in the '30's the church could not afford repairs even at low prices. Use of the building could undoubtedly have been prolonged if money for repairs had been borrowed.

The numerous inadequacies and drawbacks of the church have been frankly recognized by the minister and congregation for some time. Most conspicuous is the lack of space and facilities for the Sunday School. At present, most of the classes are crowded into one room where they meet in separate groups. Neither the lack of privacy nor

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<sup>1</sup>See pictures of the three structures marking the history of this church on following page.

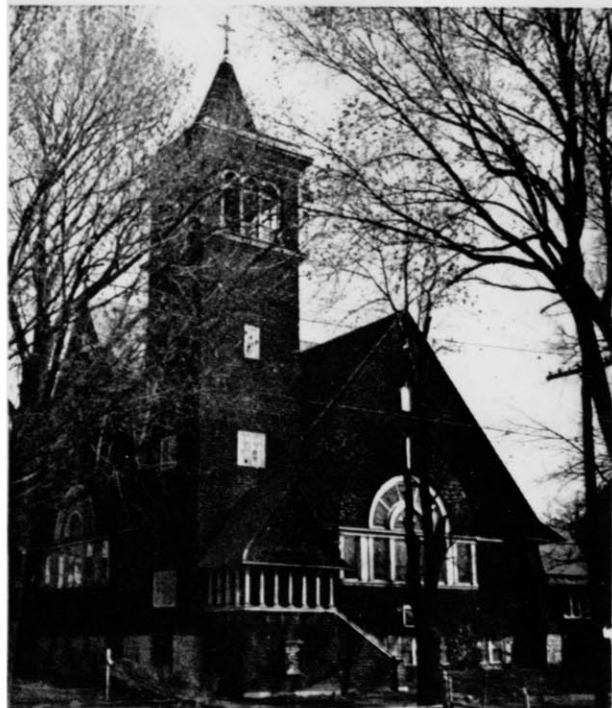
1875-1880 ⇨



1880-1895 ⇨



1896- ⇨





the excessive noise are conducive to concentration in the classes. Furthermore the cost of heating the church is exorbitant, the kitchen is difficult to use and expensive to maintain, and the acoustics are notably poor throughout. The builders of the church did not anticipate the active weekday program of group activities in which the congregation participates, and little space is available for it. Finally the building is so much of a fire hazard it is considered a poor risk and very little insurance can be procured. As a byproduct of all these factors the client congregation considers itself a poor competitor with the more architecturally appealing Baptist, Unitarian, and Methodist Churches in Melrose proper.

It was primarily the needs for the Sunday School children which sparkplugged the congregation's desire for improvement. The parish first considered the possibilities of renovating the existing structure, but after estimates were made it was found that \$160,000 would be necessary for improvements to the interior alone. Furthermore the high cost of maintaining the present inefficient plant would not be eliminated. Consequently the only sound solution appeared to be, in the words of the minister, "a new and functionally planned church plant."

This conviction was strengthened by the results of the Melrose Church and Community Survey made by the

Board of Home Missions of the Congregational and Christian Churches in 1947. The survey reported that 44.4 percent of Melrose adults lived there less than ten years, but of those attending the Melrose Highlands Congregational Church on a given Sunday, only 19.7 percent had lived there less than a decade. Hence it could be that the church building, because of its uninspiring appearance attracts fewer of the newcomers. Furthermore, according to the survey 36 percent of those attending the average Melrose church on a given Sunday were non-members, but only 11.4 percent of those in the client congregation were non-members. Thus again the need to attract more newcomers to the client church is indicated, and it is hoped that the architecture of a new church will help to do this. It would be a definite asset to have more newcomers visiting the church as they might ultimately be brought into membership also. The survey also indicated that while 63 percent of the adult Protestants in Melrose were affiliated with some church, only 52 percent of their children were forming any church ties, and in the client church alone the Sunday School enrollment has dropped from 750 in 1915 to 550 in 1940 and to 300 at present, despite a rise in adult church membership during the same period. The client congregation feels the unattractive and overcrowded facilities of its church school contribute to this unwholesome trend.

Statement of the Problem

The problem unfolds as the design of a Congregational Church which the congregation's Research, Survey, and Plans Committee has specified shall include a main sanctuary, a chapel, a fellowship auditorium, <sup>a church school, facilities for social activities</sup> a church office, and all related facilities, to be located in Melrose Highlands, Massachusetts. No provision is to be made for the minister's home.

The solution of this specific problem will be based first on an analysis of Protestantism and the problem of Protestant church architecture to insure that the solution will promote the essential functions of the Protestant church. Second the solution will be based on an analysis of the town of Melrose to provide an understanding of the present and future environment of the client church and to understand the size and type of present and future congregations to be served. Third the solution will be based on an analysis of the site to determine its suitability for present and future congregations and to delineate the natural assets and limitations to be considered in the design. Finally the solution will be based on an analysis of the architectural requirements of the church as they emerge from an analysis of the church services and program.

## THE LARGER PROBLEM

Clergymen, architects, and laymen agree that the expression of Protestantism in church architecture is a uniquely challenging problem. Some would agree that failure of this accomplishment is almost universal. Others would attest that failure is inevitable until the churches themselves achieve greater unity. However, few would dispute the premise that much of the difficulty lies in a failure to understand the essential nature of Protestantism. Even the investigation of only a few facets of Protestantism should help us to understand why Protestant church architecture is problematical, and thus enlightened we may hope to be better prepared to work toward the solution of a Protestant church design.

### Some Pertinent Aspects of Protestantism

Protestants share with both Jews and Catholics the acceptance of a written revelation and like them, recognize that this revelation has been progressively interpreted in the course of history. However, if one were to sum up the basic distinction between Catholicism and Protestantism, one might say that the Catholic believes Jesus Christ has prescribed for his church a definite institutional form and

made this the most significant channel for His revelation, whereas the Protestant believes that God reveals himself more directly to the individual and that all matter of church organization and administration are secondary. The contrast has been strikingly phrased in another way; "in Catholicism the individual's relation to Christ is determined by his membership in the church, whereas in Protestantism his membership in the church is determined by his relation to Christ."<sup>1</sup> It should be clear, however, that for Protestants the Bible is not a substitute for the Church, but the book which tells what the true church is like and through which alone the true church can be realized.

To Protestants the human personality, imperfect as it may be, is the most trustworthy symbol of God and our most direct means of access to him. On the other hand. Catholics believe that the divine life is so different that access to it is only through the suppression of certain aspects of personal life. Hence the celibacy of nuns and priests. We may further note that on the whole Catholic piety is of a mystical type, whereas Protestant piety is predominantly ethical. The Catholic believes that he best serves God to the extent that he withdraws from the world

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<sup>1</sup> Schleiermacher, Friedrich, The Christian Faith, Eng. tr. by Mackintosh, H.R. and Stewart, J.S. (Edinburgh and New York, 1928), p. 103 quoted in Brown, William Adams, The Church, Catholic and Protestant, New York and London, Scribners, 1935, p. 83.

and enters upon the contemplative life, while the Protestant believes that he is most pleasing to God when he carries the spirit of prayer into his work in the world. This contrast is, of course, not absolute. Catholic mysticism does not embody the complete other-worldly mysticism of the East and it is consistent with a genuinely ethical interest. Moreover, Protestant piety has often been of a mystical and contemplative character.

The difference of emphasis, nevertheless, exercises far reaching influence on the nature of both religions. Catholicism attempts to deify man's nature, while Protestantism teaches that what man needs is a right relationship to God. The disciplines and rituals through which the Catholic glorifies God are in marked contrast with the Protestant's concept of the holy life, which is something simple, spontaneous, natural wherein faith alone assures salvation.

With respect to the ministry Catholics and Protestants again hold quite different beliefs. The ministry of Catholicism is entrusted to a priestly caste endowed with supernatural power not shared by the laity, that is the power to interpret the creed and administer the sacraments and divine grace. The function of the Protestant ministry, on the other hand, is limited to preaching. In the Protestant sermon the Word of God serves as a basis for teaching. For Protestants the sacrament is also a form of the Word, the Word

acted as distinct from the Word spoken, and in both cases the Word functions through its direct appeal to the will through the intellect. For the Catholic the sacrament is a type of mystical subconscious experience; to him God's presence is objectified in the sacrament.

It has become apparent that the core of Protestantism is that the individual is more important than the Church or the priest, or the denominational creed or the preacher. Protestantism was born out of the concept, "The kingdom of God is within you." It has always specialized in the right of man to find God in his own way. The Protestant conception of worship in "in spirit and in truth" was nobly expressed by Cowper when he sang:

"Jesus, where'er Thy people meet,  
There they behold Thy mercy-seat;  
Where'er they seek Thee Thou art found,  
And every place is hallowed ground.  
For thou, within no walls confined,  
Inhabitest the humble mind....."

While the lack of totalitarian edicts, authoritarian commands, and dictatorial compulsion has been the strength of Protestantism, it has also been its weakness. Too often this democratic faith has "defeated its own purpose by assuming that its followers would take complete advantage of the privilege of finding God for themselves."<sup>1</sup> The

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<sup>1</sup>  
Bach, Marcus, Report to Protestants, Indianapolis and New York, Bobbs-Merrill, 1948, p.270.

unhindered pursuit of truth has very often been unpursued, and the freedom to search has been license to give up searching. With the individual thus left to his own initiative, the Protestant church, which we have already seen to be ethically oriented, has been concerned with a world outlook and the overall problems of society.

Most Protestants, both the clergy and laymen, are agreed that the crying need of contemporary Protestantism is a reaffirmation of the basic principle that the strength of the Protestant faith is in the individual and that such faith demands personal work. The clergy must focus on the personal needs of their parishioners. The Protestant must be reminded that global salvation is secondary to his personal salvation. The Protestant church should function primarily not for the sake of theology or a moral program but to foster personal religious experience.

#### Some Aspects of Protestant Church Architecture

In light of the foregoing discussion of Protestantism it is apparent that Protestant church architecture is problematical because Protestant worship is primarily a subjective experience fundamentally independent of material aids or environment. While the primary purpose in building either a Catholic or Protestant church is to enable men and women to approach God, the church is essential in the



Catholic's approach, for the church is the abiding place of deity in a concrete, objective sense. For the Protestant, however, the church serves only to encourage the worshipers to approach God within their own hearts. The Catholic believes that on the altar God is objectively present as nowhere else, and the altar is the kernel around which the Catholic church is raised. The Catholic mass is said in exactly the same way throughout the week whether the church is crowded or empty, for the mass is not given primarily for the benefit of the worshipers but rather for the glorification of God and His Presence. The Protestant church, by contrast, can be said to function primarily for the benefit of the congregation when it gathers for public worship. This contrast means that the design of a Catholic church is inevitably based on the specific, concrete, objective, and unchanging methods through which the Catholic glorifies God's Presence, whereas the design of the Protestant church involves the unique problem of creating a spiritual environment which is consistent with the Protestant's intellectual approach to religion.

Let us now examine some of the more specific facets of Protestant church architecture. It has been said that the exterior of the Protestant church should be such that the passer-by, even if he does not enter, should experience

in some measure a feeling of release and liberation from the pettiness of daily life which will help him see everything in a truer perspective.<sup>1</sup> The interior, however, should be such that it does no more than prepare the way for worship. The achievement of these qualities of both exterior and interior is aided by fine proportions, unity of design, and strength of design. The architecture of the Protestant church must set the stage and prepare the mind for the reception of spiritual thoughts to come; hence, balance and unity in the design suggest harmony and peace to the worshiper. No one architectural feature must be so prominent as to distract. Strength of design is all-important in order to convey stability, security, and deep roots.

Van Ogden Vogt, an outstanding authority on art and religion, lists four qualities which the architectural tone of the Protestant church should convey.<sup>2</sup> The first requirement is repose so that, as a current phrase puts it, people may not only take their troubles to church, but leave them there. The second requirement is austerity which is conducive to helping people be truthful with themselves and facing their own weaknesses. The third requirement, warmth, will help to make worship inviting, and the fourth requirement, brilliance, will help to encourage conviction and resolve among the worshipers.

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<sup>1</sup>Drummond, Andrew Landale, The Church Architecture of Protestantism, New York, Scribners, 1935, p.185.

<sup>2</sup>Vogt, Van Ogden, Art and Religion, New Haven, Yale University Press, 1929, pp.207-208.

In Protestant church architecture there is not the same need to distinguish the chancel as there is in the Catholic church, for we have seen that there is nothing in Protestantism similar to the Catholic view that the nave is for man but the chancel is for priest. Unfortunately, in an effort to achieve a "holy" quality the design of many Protestant churches has almost mechanically followed Catholic precedent in lavishing attention on the chancel, segregating it from the rest of the church by a communicant's rail, and even "roping off" the Communion table in the dimmest and most remote recess of the chancel. More meaningful plans follow Protestant principles which call for a single-hall type of church in which there is no marked separation between the chancel and the nave. This does not mean that the Communion table need be obscured or the pulpit unduly obtruded, but it does mean a shallow apse or the placing of the table in the front rather than the rear of the chancel. There is a definite advantage in having some kind of chancel arrangement even though it should not be emphatically separated from the nave, for attention is gathered together by it, led forward, and concentrated. Without any chancel at all attention is not only scattered but blocked and limited by great unrelieved wall space.

In some instances the desire to create a worshipful atmosphere has led to use of another Catholic conception in

the design of Protestant churches, that is the altar. Since the function of the altar is for the priest and for the enactment of the Catholic Mass by the priest on behalf of the Catholic congregation, it seems inappropriate in the Protestant church where minister and congregation unite in all phases of worship. Moreover, some Protestant churches are designed around the use of the communion table as an altar, primarily through placing an ornate communion table against a wall. Again this is inconsistent since in Protestantism the Lord's Supper is an act in which all the congregation figuratively gathers at the table, and while the minister presides at the table, its use is no more exclusively for him than for the rest of the congregation.

It should be understood, however, that while the Communion Table should not be a sham altar in the Protestant church, it does have primary significance in Protestant worship. In Protestantism the Lord's Table is the symbol of divine life and sustenance, and if the design of the Protestant church is to be consistent with this, the Communion Table must be in a conspicuous, central position with neither pulpit, organ, nor choir to challenge its pre-eminence. The table itself, however, best reflects Protestant doctrine if its form and material are conservative, in the tradition of the earliest Communion Tables which were simple wood table-tops supported by legs, between which the space was empty.

If the significance of the communion table demands its location at the head of the apse, we may wonder about the relative significance of the pulpit and its location. It is apparent that the pulpit is unimportant and without interest unless someone is in it. Consequently since the sermon is only one part of the Protestant service, there is no reason to highlight the pulpit in the plan of the church. If the pulpit were centrally located along with the Communion Table, it would tend to throw the major importance of the service on the sermon and minimize the values of other parts of the service. Moreover, the absence of a central pulpit makes a more aesthetic environment for church services which do not include a sermon, such as baptisms, weddings, organ recitals, etc. While Protestant doctrine does not require a side pulpit, this arrangement has the advantage of suggesting a distinction between the minister's own free utterance and prophetic word and his utterance of biblical truth from the other portions of the chancel.

The pulpit has not always been relegated to secondary importance in the Protestant church, and in our consideration of its changing significance we shall see why solutions to the problem of achieving spirituality consistent with an intellectually oriented religion in Protestant church design have been so long delayed.

At the time of the Reformation when Protestantism was born the pulpit was all-important, for the core of the Reformation was a new understanding of the Scriptures, as the source of authority, and this required ceaseless expounding and explaining. Moreover the function of the pulpit at this time was so significant that it necessitated a new type of church which would be acoustically conducive to the success of the spoken word. The very conditions which had made the medieval Catholic church ideal for fine choral music and the intoning of a Latin Mass, namely the long reverberation time caused by the many-vaulted and aisled stone and masonry churches, were a positive hindrance to the success of the spoken word. This was particularly true since the Reformers replaced Latin with English, which was a change from one system of tones to another. The early Protestants could not afford to minimize or ignore the need for a pulpit enhanced by good acoustics. Hence they subdivided the sprawling medieval cathedrals, covered the walls with plaster and furnished the interior with woodwork. Thus the one-celled type of church was born. In the early Protestants' zeal to preach and teach, particularly on the new continent of America, they began building their own churches, and with their emphasis so exclusively on the intellectual basis of their new found religion, they seldom erected more than four

walls and a roof around a pulpit. This was the meeting-house type of church which so typified the religion of early Americana.

While the meeting-house type of church may have justified its existence acoustically, it certainly did not do so aesthetically. As the years passed the lack of feeling and aesthetic appeal both in Protestantism and in its meeting houses became more apparent. Furthermore since tremendous numbers had become Protestants, the need to gather potential converts around a pulpit was gradually eliminated and replaced by a desire to further inspire those already converted. It appeared that the spiritual side of Protestantism had suffered because of the intellectual side of Protestantism. It was natural, therefore, that as a result of this realization the importance of the pulpit became secondary.

What became primary in the attempt to achieve spirituality was unfortunate. Since Protestantism had not developed an ecclesiastic art or aesthetic forms of its own, many ministers were led to borrowing liturgical and architectural forms from the most available sources. These traditional forms, adopted at second hand, often without due scrutiny, are for the most part of Catholic origin, and the ease of borrowing has long delayed the evolution of a purely

Protestant creative art. One Protestant, Professor G. A. Coe, a pioneer in the psychology of religion, declares: "Our more ambitious churches are imitative because, I think, they represent an imitative religion, Moreover, because conventional Protestantism lacks creativeness in the sphere of the spirit, it is now seeking to express spiritual depths by reproducing churches and church trappings (altars, etc.) that represented originally a pre-Protestant religion...."<sup>1</sup> It was inevitable that the use of borrowed forms coincident with a denial of the dogma they represented should fail to inspire a meaningful spirituality in Protestant churches. Protestants have not wanted to admit the failure, however, and for the most part they have glossed over the problem by creating what spiritual environment they could through these adopted material forms and objects while at the same time holding fast to the emphasis on intellect in their religious thinking.

The Protestants' one sided emphasis on intellectualism has been described as the morose dryness of Protestantism. "Only gradually are Protestants beginning to realize that for too long they have ascribed to God attributes which, in practice, they have withheld. His Power and His Justice have been recognized, but not often his delight in Truth-seeking

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<sup>1</sup>Quoted in Drummond, op.cit., p.194.



and Beauty."<sup>1</sup> There can be no doubt that, as those early American Protestants, the Puritans, maintained, many people deceive themselves in mistaking symbolism for reality. But too often the Puritans made restraint an end in itself. The Puritans did not give fair consideration to an alternative wherein art might be a transparent window to stimulate rather than satisfy.

Protestants are beginning to realize that in order to achieve an innate spiritual unity, they must take largely into account the essential unity of human nature in its demand for feeling. We have already noted that the original appeal of Protestantism was auditory and for the most part this has persisted as the exclusive appeal. On the other hand, the appeal of Catholicism is through the optic, tactile, and olfactory nerves. Protestant church designers cannot go on consciously refusing to recognize the senses of the worshipers, for the senses inevitably take in the environment whether it is aesthetic or not. The feeling tones with which an individual responds consciously and unconsciously to an unaesthetic environment definitely tend to scatter his attention and limit his receptivity to spiritual experience.

It is not within the scope of this study to outline what Protestant aesthetics should specifically be

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<sup>1</sup>Drummond, op. cit., p.142.

beyond the general statement that they should stimulate spirituality in Protestants. While Protestants have been seeking more spirituality in their churches ever since the period following the early meeting houses, they have deceived themselves and failed for two reasons, first by copying Catholic aesthetics, which could convey no meaning and hence no feeling to the Protestant, and second, by not fully recognizing that feeling, beauty, and art, all interrelated, can be justifiably used in the creation of spirituality. To love beauty in itself is not to love God, but it is certainly a highway which may lead to the realization of God's presence. Van Ogden Vogt<sup>1</sup> points out that beauty may kindle five elements which constitute the experience of worship, that is vision, humility, vitality, illumination, and enlistment. Thus we may hope that beauty of church environment may lead to beauty in human hearts, and this may prove to be the key to the spiritual inspiration so much desired in Protestantism.

#### Some Aspects of Congregationalism

Although the Melrose Highlands Congregational Church is very much a union church, that is highly interdenominational, it is important to investigate briefly the

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<sup>1</sup>  
Op. cit., p.151.

salient characteristics of Congregationalism to see if they might in any way affect the ultimate architectural design.

Initiated in America by both the Pilgrims and Puritans, the Congregational church has always been widely represented in New England. In the early nineteenth century one group of Congregationalists separated from the Congregational church and formed their own branch of Protestantism, that is the Unitarian church. This, however, did not alter the strength of Congregationalism. The Congregational churches of Massachusetts and Connecticut have shown the greatest sustained growth.

The most distinctive and the all-important aspect of Congregationalism is that it has no theology universally accepted by all Congregational churches. Each congregation is independent and each Congregationalist is free to say what he pleases concerning his own beliefs. The Congregational Declaration states the Congregational idea of religion most simply and explicitly:<sup>1</sup>

Congregationalism is a Christian democracy, protestant in spirit and evangelical in faith. Like other Protestants, we hold Christ to be the supreme and only Head of the church, and admit the authority of no mandate but that of God's Word.

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<sup>1</sup> Huntington, Rev. George, Outlines of Congregational History, pp.1-2 quoted in Smith, Warren H., A New Church for The Pleasant Street Congregation of Arlington, Massachusetts, Unpublished Master's Thesis, Massachusetts Institute of Technology, 1950, p.10.

The doctrine of the church is our distinctive tenet, the essence of which is that a church consists of a company of regenerate persons, publicly covenanting, worshiping, and laboring together, with an equality of rank and of rights, regulating their own membership, electing their own pastor and deacons, managing their own affairs, exchanging fellowship and counsel with other churches, but submitting to no dictation or control from any human source, whatever, and recognizing no ecclesiastical offices but those of the local church.

Thus it can be seen that the Congregational Church, with its emphasis on the individual's right to find God in his own way, typifies the overall tenets of Protestantism which were described in the Analysis of Protestantism. Hence we may conclude that there is nothing in Congregational doctrine or practice which should in any way alter the theories presented throughout the preceding portion of the discussion of The Larger Problem.

P A R T 2

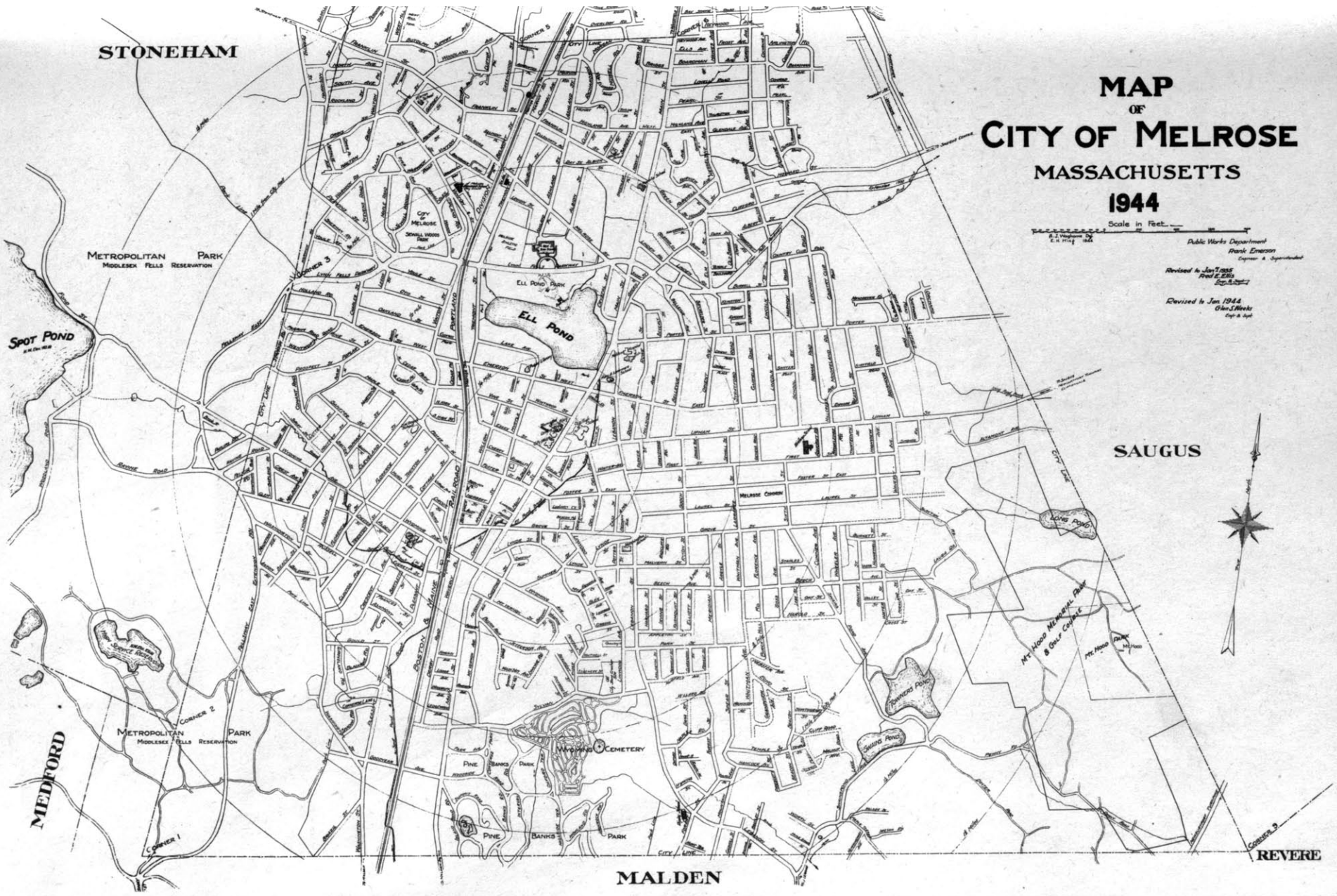
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MUNICIPAL ANALYSIS & MAP

STONEHAM

# MAP OF CITY OF MELROSE MASSACHUSETTS 1944

Scale in Feet.  
Public Works Department  
Frank Emerson  
Engineer & Superintendent  
Revised to Jan 1935  
Fred E. Ellis  
City Engineer  
Revised to Jan 1944  
Glen L. Weeks  
City Engineer



SPOT POND

METROPOLITAN PARK  
MIDDLESEX FELLS RESERVATION

ELL POND

SAUGUS

MEDFORD

METROPOLITAN PARK  
MIDDLESEX FELLS RESERVATION

MALDEN



REVERE

### Location and Topography

Melrose, situated twelve miles northwest of Boston, is bounded by Wakefield on the north, Saugus on the east, Malden on the south, Stoneham on the northwest, and Medford on the southwest. The surrounding communities, like Melrose itself, are primarily residential suburbs of Boston. Proximity to these neighbors has been one factor limiting the expansion of Melrose, and in fact the town was originally founded as a section of Malden. It was known as North Malden until 1850 when it united with Melrose Highlands, comprising the northwest section of Melrose which until that time had been affiliated with Stoneham, to become a separate municipality. Melrose is fortunate in its western boundary which is forever protected from encroaching neighbors by the scenic Middlesex Fells Reservation. Today the entire section north of the Fells Parkway is known as Melrose Highlands.

The topography of Melrose -- a valley between ranges of hills and that valley the bed of an ancient river -- has determined to a great extent the kind of development possible. The town lies within the drainage areas of three main streams; the northeasterly section drains easterly to the Saugus River, the southeasterly section to Chelsea Creek, and the central and westerly section southerly to the Malden River. Owing to the very uneven and in large

part rocky nature of the surface, the run off is very rapid and Melrose has constantly fought the problem of flooding in the lower levels. For this reason alone growth of the town has been greatly retarded and even today building in several parts of the town is unfeasible because of swampy land. Creation of this condition can also be attributed to the earlier inhabitants who in the quest for power dammed the outlets of the many ponds in the area thus causing the ponds to overflow and inundate the surrounding land. This has been of serious consequence particularly in the case of Ell Pond, which besides being the largest pond in the area is centrally located within a quarter mile of the shopping and business district of Melrose. Despite its favorable location the land immediately surrounding Ell Pond is not in use, and in the Master Plan Report<sup>1</sup> of 1947 one of the immediate projects recommended is to "determine best method for overcoming unfavorable soil conditions around Ell Pond....."

#### Population Composition and Growth

Because Melrose has chosen to remain as it was early developed a city of homes, it "has achieved a striking homogeneity as a residential community."<sup>2</sup> There has been

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<sup>1</sup> Adams, Frederick J. and Grubb, Eric A., Master Plan Report For The City of Melrose, June, 1947, p.26.

<sup>2</sup> Ibid., p.2



no need to absorb the large numbers of unskilled or semi-skilled workmen required for industrial development. In fact, white collar workers comprise about 75 percent of its working population.<sup>1</sup>

In 1940 the population was 25,333 and according to the state census in 1945, 27,971. In 1940, 86 percent of the population was native born whites, while 11 percent was of foreign birth and 3 percent of Negro and other races. There is an ever increasing number of persons over 65 years of age in Melrose, and the rate of increase of aged persons is higher proportionally than that of the state. However, the decrease in the number of children under five years of age, 7.4 percent of the population in 1943, is consistent with the rate of decrease throughout the state.

As in most urban centers the population is not reproducing itself, and future growth will be by immigration. However, Melrose has a stable population, primarily because 64 percent of its housing is single family. Therefore population growth depends chiefly on the amount of remaining buildable land. The Master Plan Report<sup>2</sup> of 1947 states the situation clearly:

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1

Ibid.

2

Ibid., p.3.

Melrose has comparatively little undeveloped land suitable for new housing. Admittedly there is considerable undeveloped land in the southeast portion of the city, but because of its topographical character it is generally unsuitable for residential purposes.... major tracts of land suitable for this purpose total approximately 145 acres.

In addition there are about 800 platted lots suitable for residential construction. Predictions of the intensity of development of this land and of additional accommodations in old houses and the construction of new multi-family dwellings indicate that in the future, normal sound growth may increase the population to 32,000 persons.<sup>1</sup> Moreover, according to the report of the 1947 Melrose Church and Community Survey made by the Board of Home Missions of the Congregational and Christian Churches, the population will probably reach 35,000. The rate of population growth may be retarded if building and labor costs continue to spiral, but on the other hand if improvements in transportation services between Melrose and Boston were effected, an influx of commuters might create sufficient demand to make the building of apartments feasible despite high costs. In any event it appears likely that the population will reach the 30,000 mark by 1960.

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<sup>1</sup>  
Ibid., p.9.

### Religious Composition

Melrose has fourteen churches, including all groups. In terms of number of institutions per population based on sociological standards in urban centers, Melrose is not over-churched.<sup>1</sup> Based on the actual number of churches per population in urban centers, Melrose would be underchurched. According to a median of 2000 people per church, including all sect groups, Melrose could accommodate from two to four more churches as its population approaches the estimated 32,000 or 35,000. The distribution of churches with a few exceptions shows a cluster in the center of Melrose.

Melrose is predominantly a Protestant city; 63 percent of the population are Protestants. In contrast with the centralized distribution of churches the distribution of the Protestants themselves is spread throughout the city. This difference is significant, for throughout the city there is a correlation between the frequency of attendance and distance from church membership for Melrose Protestants. The greater the distance the greater the percentage of low attendance; or, to state it another way, the smaller the distance the greater the number who attend regularly. The ward with the greatest percentage of

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<sup>1</sup>  
All data on religious composition from Summary of Church and Community Survey By The Board of Home Missions of The Congregational and Christian Churches, 1947.

families connected with the major Protestant churches, Ward 1 with 73.8 percent, is served by two local churches, one of which is the client church, in addition to the cluster of downtown ones, whereas only nine percent of the families affiliated with the major Protestant churches in Melrose live in Ward 7, which has a larger population than Ward 1 but no local church.

The distance between Melrose Protestants and most of their churches may very well be one of the reasons that Melrose Protestants are very poor church attenders. 37 percent of the Protestants attend church regularly, while another 30 percent attend less than five times a year. This is in marked contrast to the zealously religious settlers of Melrose who separated from the town of Malden for the very purpose of attaining local church privileges lest they be deprived of church attendance when transportation conditions were poor.

The Congregational group is the strongest of the Melrose Protestants with Baptist, Episcopal, and Methodist next in order. Only the two strongest have more than one church. Besides the Melrose Highlands Congregational Church with 800 members, there is a First Congregational Church in the center of Melrose with 1400 members and Hillcrest Congregational Church, located in the middle of the easterly section of the city, with 275 members. The

Highlands Congregational Church is located in Ward 1, and the greatest number of Congregational families are found in Ward 1 and the adjacent Ward 2, which respectively comprise the northwestern and northeastern sections of the city. The area of least strength of Congregational churches in Ward 7, the southeasterly section of Melrose. However, all the Congregational churches are growing, and in fact, Congregational memberships is growing faster than the population of Melrose.

Since population growth will be largely the result of immigration, the trends in religious background of newcomers are important. This is most difficult to predict since previous years have indicated differing trends. Between the years 1942 and 1945 the incoming group had a larger proportion of Roman Catholic than was represented in the population. In 1947, 26 percent of the total population of Melrose were Roman Catholic, but of those who moved to Melrose within that year, only 18 percent were Roman Catholic. Perhaps in more recent years the trend may have reversed itself again, but it seems safe to assume that the Protestants will retain their majority.

Besides the poor church attendance already noted, the following religious characteristics of Melrose, as gathered from a church attendance survey and religious census in 1947, reflect a need for stimulation of Protestant

religious life in Melrose:

- 1) Only 35% of Protestant church attendants are male.
- 2) There is a major deficiency in church attendance in the age group 20 to 34.
- 3) Almost 3000 persons who are Protestants and express denominational preference are not church members.
- 4) Almost 3000 Melrose residents are members of Protestant churches outside of Melrose.
- 5) Approximately 2000 Melrose Protestants do not attend church at all.

Future Development

Since there is little acreage suitable for industry in Melrose and since that acreage which might be suitable is strictly zoned for residential purposes, there seems little likelihood of increased industrial development in the city. Furthermore, it is not likely that Melrose can promote commercial enterprises much beyond local needs. Hence it appears that in the predictable future Melrose will remain a residential community. Since the only tracts of land suitable for residential use are located on the east side of the city, it can be anticipated that whatever future development takes place will occur in this section. Within the past decade some building has been done in the central portion of this easterly section, and at present it is the preferred residential district. Plans are currently being made for the development of the northeast corner of Melrose.

This land is somewhat swampy but it can be drained and its anticipated use will be for middle class housing.

There will be no marked overcrowding of the land in Melrose if the suggestions for residential land use in the Master Plan Report of 1947 are followed. Development of the 145 acres of buildable land and 800 suitable platted lots was suggested as follows:<sup>1</sup>

<u>Acres</u>	
50% developed at 3 families per acre.....	225 families
50% developed at 4 families per acre.....	300 families

<u>Lots</u>	
90% developed at 1 family per lot.....	700 families
10% developed at 2 families per lot.....	125 families
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	1350 families

Thus with an average family size of 3.5 persons, it is estimated that Melrose could easily absorb an additional 4700 people.

Other future developments in Melrose will probably center around improvements in traffic conditions, chiefly the rerouting of heavy traffic away from the center of the city, and in improvements in schools, parks, and recreational facilities.

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<sup>1</sup>  
Op. cit., p.9.

### Conclusion

It has become apparent that the design of a new Melrose Highlands Congregational Church will be oriented toward an environment characterized by the peaceful, unhurried atmosphere of an old noncommercialized residential suburb. Furthermore, we have seen in the foregoing analysis that for reasons of topography and zoning it is most unlikely that industry will ever come to Melrose. Similarly as the result of unfavorable topography there will be a definite limit to residential building. Because of these factors and because a large mass conversion of single family houses to multi-family ones is also unlikely, we may conclude that Melrose will not change essentially in the predictable future. Hence, environmental changes do not need to be given any primary consideration in the design for the client church.

It has also become apparent that the client congregation of 800 members is of intermediate size between the much larger First Congregational Church and the much smaller Hillcrest Congregational Church. However, since the need for greater participation in the religious life of the community on the part of Melrose Protestants has been indicated, we may conclude that the client church should serve a larger congregation. The minister hopes



that with the completion of a new church edifice the church membership will grow to 1000. With respect to type of congregation we may conclude that the client church primarily serves native-born white collar workers and their families; in fact, 90 percent of the breadwinners in the congregation commute to Boston. Since it is anticipated that Melrose will remain a bedroom community, we may further conclude that this same type of group will comprise the congregation of the Melrose Highlands Congregational Church in the future.


P A R T 3

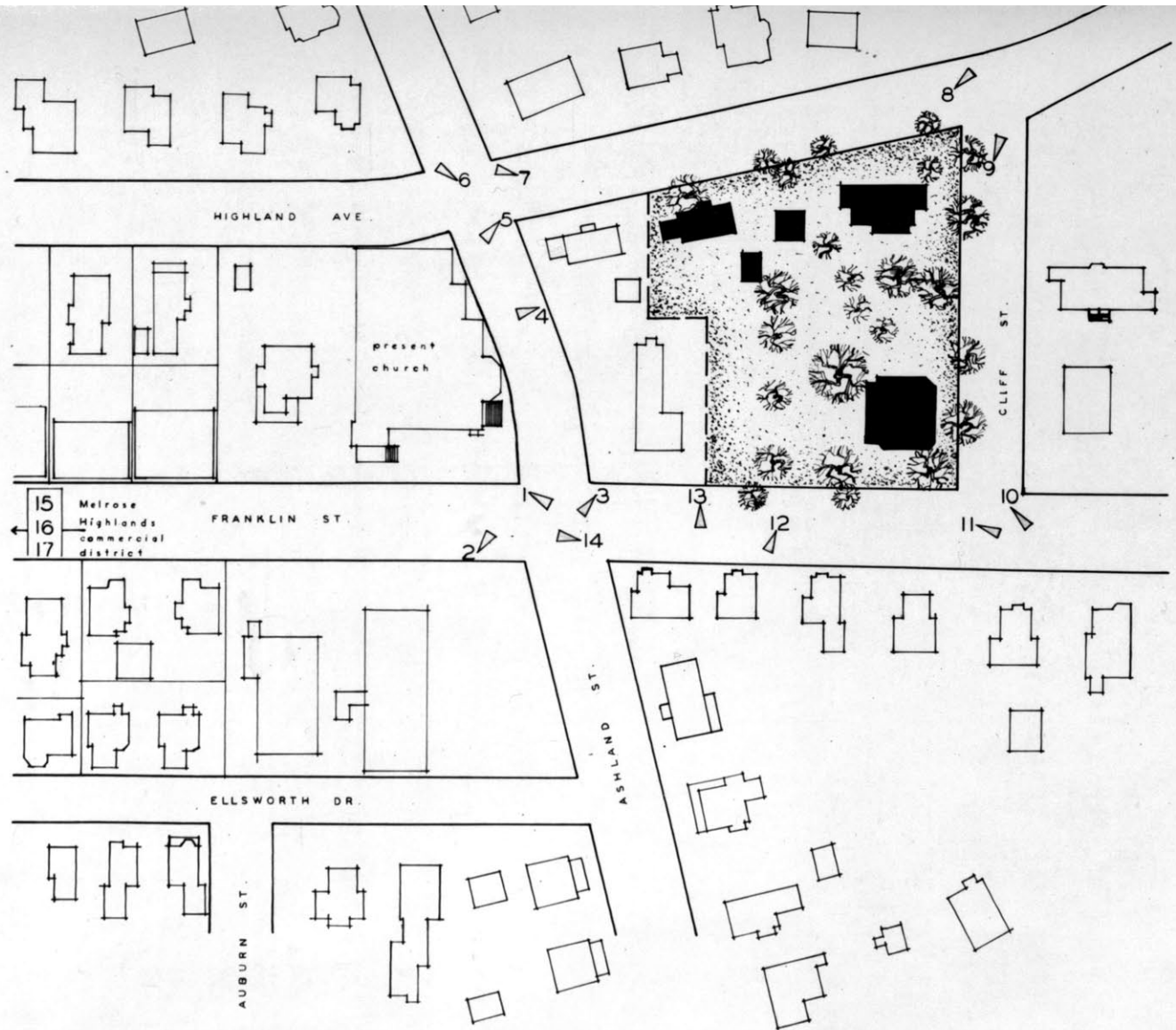
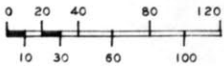
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SITE ANALYSIS & MAP

see photographs  
correspondingly  
numbered with  
view arrows



 = existing  
buildings  
to be  
removed



SELECTED SITE - MELROSE HIGHLANDS CONGREGATIONAL CHURCH

Rejection of Old Church Site

As mentioned earlier, the new Melrose Highlands Congregational Church is now under construction. Due to the financial limitations endured by nearly all Protestant churches today, the client church had no choice of site and gave their architect that land occupied by the present church as the site for the new church.

This was unfortunate in the extreme as the site is woefully small for their needs and unfavorable in many ways. There are two buildings, one an awning factory and the other a trucking warehouse and depot, directly across Franklin Street from the church site. As can be seen from the photographs of these buildings (See Appendix), they are exceptionally visually offensive. Although the pictures were taken on a gloomy day, it is evident that under any conditions, the commercial district of Melrose Highlands, which lies just to the west of the church, as well as the factories to the south would appear generally unattractive and comprise a poor environment for a local church.

Several members of the client parish did attempt to purchase the Wakefield Awning Company plant with an eye to razing that building and erecting an apartment house on the property. However, they discovered the company building to be heavily mortgaged and with their intention of razing the structure, the proposal to buy it seemed unwise and was

dropped -- much to the chagrin of the residents neighboring the church. A brief neighborhood survey during the early stages of the thesis project revealed that residents in the area are "up in arms" over the factory with its unmowed lot and broken windows, and over the trucking concern with the ever-present large vans, grease spots, discarded engine parts, etc.

The church itself tried to purchase the store nearest it in order to obtain more land, but the cost was excessive. However, the church was able to procure the property and residence to its immediate west, and the residence has now been razed so the new church can be built on the resultant larger property.

Because both this student and the thesis critics felt it inappropriate to assume the same site upon which the architect is placing the new church, a different site was sought.

#### Transition from Realistic to Theoretical Approach

Before continuing with a discussion of the several investigations entered upon in the selection of a new site, it is necessary to describe the change in approach to the thesis problem which was initiated with the decision to locate a new site.

Since the client church was financially limited to spending \$204,650 for the first wing of the new church now and to a total of \$304,100 for the completed building when the additional funds became available, the church could definitely not consider the purchase of a more appropriate site than the one upon which they are presently building. Moreover, even if unlimited funds had been available, it is highly improbable that a new site could have been found anywhere in Melrose Highlands except in the eastern section which, as noted in the Municipal Analysis, is undeveloped. Certainly nothing is available centrally located to the parish. This is because there is absolutely no vacant land in the area. Should the church have decided in desperation to buy choice land in any of the surrounding blocks, all of which are filled with medium to fine homes, it would undoubtedly have been found that the owners would be unwilling to sell and depart from their homes. In short, there is in reality in Melrose Highlands no property available on which to locate a new church regardless of the extent of funds available. A possible exception might be the two factory site, for the factories might consider relocation if the church could afford the high price of the property.

In any event the decision to reject the site on which the client church is currently building meant that

the thesis problem was no longer entirely realistic since neither funds nor land for another site are realistically available. Moreover, it was felt that a more theoretical approach to the problem would be desirable since it was hoped that primary consideration could be given to the application of conclusions gained from research into Protestantism and Protestant church architecture. Consequently it was decided to forego a strict economic program in the site selection and design solution. Thus the approach became one of a design based upon theories gained from research into Protestantism and yet oriented to meeting the needs of the Melrose Highlands Congregational Church.

#### Selection of New Site

In the first attempts to select a new site certain errors were committed. For instance, a tentative selection of the two factory site was made without a careful analysis of the many factors involved in church site selection. With the realization of the significance of these factors, it became readily apparent that much further investigation was needed before a new site could be chosen. This investigation not only consisted of the complete municipal analysis presented in the preceding section but also included study of specific zoning and building code laws,

the membership distribution of the client church in the Highlands area, assessments of existing residences on possible sites, and qualities of possible sites, such as size, orientation, view, trees, slopes, surrounding buildings, transportation facilities, parking problems, corner or middle location, commanding qualities, amount of background noise, financial future of surrounding community, and natural drainage.

As explained in the Municipal Analysis it was found that there is little need to fear a significant change in the community pattern of Melrose. It will remain a residential suburb of Boston, and as shown before it will remain one that can neither expand internally nor externally except to the extent of a small population increase of about 1000 over a period of approximately thirteen years. The church membership distribution in the map in the Appendix clearly shows that the present church site is centrally located with respect to the parish. While there will be some further residential development in the eastern part of Melrose, no major trend of residential movement can occur and it is therefore reasonable to assume that the present site will continue to be ideally located with respect to distance from the majority of the church members. Consequently it was decided to select an assumed site near the



present one, yet sufficiently removed from the eyesore factories opposite the present site.

According to the zoning laws the major portion of Melrose Highlands is allocated to Residence A, that is one-family houses on lot sizes of 6000 square feet. However, the belt along Franklin Street in which the present church now partially lies is zoned Residence C for multi-family use. The two factories, built before the zoning laws were passed, are nonconforming as they lie in this area. To the north and south of the C areas lie the Residence B zones for two-family housing. To the immediate west of the present church site and at the eastern end of the narrow Residence C belt lie Business A districts for retail business.

Much of the area immediately surrounding the present church is Residence B, two family housing, and it was learned from the church secretary that from her contacts with young couples in the church she has found that for the most part they are not moving away from the area but rather are moving into the large old homes in the Residence B zone and converting them to two family use. There are many such fine big residences suitable for conversion in this area. The zone in which the major portion of the present church lies is for multi-family use such as apartments. Since Melrose can expand in almost no other way except up, it is very likely that apartment house building will take place

in this area some day. If the client church were to sell their present site and find another site elsewhere, as we are theoretically assuming they could, it is very likely that after the old church were razed, an apartment house would be erected on the site. In any event, if the new site selected should also be in this multi-family Residence C district, it is likely that the new church would one day serve a denser population within close walking distance. However, since apartment dwellers are usually relatively transient, the majority of the church membership ought to come from the Residence A district, as is the case at present in the membership distribution of the client church.

Even though it was assumed the church could afford a new site, the site selected must still meet the normal demand of yielding the most physically and aesthetically for the least financial outlay. Thus property north of the present church between Morgan Street and Henry Avenue, though centrally located, was rejected because of its Residence A expensive category. By the process of elimination the only land left still occupying a focal position and possessing a somewhat commanding position in the community was along Franklin Street in the Residence C belt.

There is a major bus route along Franklin Street and this connects with the chief Melrose bus route, which runs along Main Street. Thus with a site bordering

Franklin Street the church would be readily accessible via public transportation.

Though narrow, Franklin Street and the other streets in the area, carry no heavy traffic of any significance except in the early morning and late afternoon hours on weekdays when the commuters are driving to and from Boston. There is relatively no traffic on Sunday mornings. Thus street parking would be possible for those who drive to church. Upon questioning several elders of the client church, it was learned that few persons have ever had to park further than two short blocks from the present church on Franklin Street except at Easter and Christmas.

The two factory site which, as has been noted, was originally selected as the theoretical site for the new church before the intensive investigation of site possibilities was made, does meet some of the site requirements which evolved from the investigation. It is certainly near the present site and thus would be centrally located for the church membership, and it is in the desired Residence C belt which borders Franklin Street. Moreover, it was hoped that with the assumption of this site, the major unattractive blot in the community would be theoretically eliminated. Nevertheless, this site had to be rejected when it proved to be far too small and inherently unattractive.

It was noted in the search for a site that the block bordered by Franklin, Ashland, Highland, and Cliff Streets fulfilled all the requisites of the site investigation. In addition, the most obviously favorable factor was the wealth of beautiful trees on the land. Five properties make up the block and two were first chosen for the site. Early design studies indicated that homes and lots on the southeast corner and northeast corner would have to be purchased to afford the minimum area needed for the religious and secular function of the church. Later studies indicated that in order to save the very fine purple beech as well as several apple and pear trees on the southeast corner lot, the next house to the west on Highland Avenue and a twenty foot strip of the southwest corner lot would have to be purchased also. It was necessary to do this also in order to comply with the zoning ordinances, including restrictions of height, setback from street and adjacent lots, and area of lot occupied. Regarding building code restrictions, the site lies within District B of the Melrose fire limits. Section 40 of the code states: "...Wooden dwellings may be built in District B of the fire limits..." Hence it was felt that freedom to use timber construction, if desired, was another definite advantage of the site.

The total area of the site is 37,117 square feet, comprised as follows: 8040 square feet in the northeast

corner lot, 21,000 square feet in the southeast corner lot, 6277 square feet in the northwest lot (a corner lot of the site but not of the block), and 1800 square feet in the additional twenty foot strip. Thus the total area of the new site is considerably larger than the present church's building site, which consists of 27,034 square feet.

The chosen site has a gentle slope, from contour 83.00 at the northwest corner to contour 75.00 at the southeast corner, and thus this eight foot drop yields natural drainage. Situated as it will be on Franklin Street, the main thoroughfare through Melrose Highlands, the new church will have a commanding position in the community, and this position ought to be maintained as the Master Plan envisages no major traffic changes in Melrose Highlands except improvements to the railroad crossing to the west of the church and to the Franklin and Main Street intersection to the east. The financial future of the neighborhood north of Franklin Street looks stable and prosperous all the way to the Wakefield border; the same is true of the area near Stoneham where the membership in the client church is so densely concentrated. South of Franklin Street financial stability might be more precarious in times of depression with resulting lack of attention to properties, but the risk is a relatively safe one to assume in view of the many other favorable factors already stated.

P A R T 4

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ARCHITECTURAL ANALYSIS

### Church Needs and Design Objectives

The church needs and design objectives will be discussed together in order to convey a more integrated and organic picture of the design objectives as derived from the specific needs of the client church and also from the analysis of Protestantism and Protestant church architecture.

#### Entrances

The principal entrance to the church will function to lead worshipers into the sanctuary. The entrance itself will open from the exterior into the narthex. The function of this entrance should be immediately obvious to the stranger, and it is particularly true that since this entrance will only be open when worship services are to be held, it should be clearly separated and defined from the ever open secondary entrance used for the chapel, office, Sunday school, and social function areas.

Both entrances should be appealing and inviting not only to the doctor and lawyer, but also equally to the candlestick-maker, and even ideally to the beggarman and thief. In striving for a contemporary expression for the religious structure of today, some architects have arrived at solutions full of formal dignity with definite aloof qualities. Such churches may satisfy the self-righteous and overtly pious among the population but they often only

serve to repel the less demonstrative man, who very likely most needs the stimulation and inspiration of the church. Still other people, who believe in God and worship in their own quiet way -- often by just leading good lives -- stay away from church because they cannot stand the intolerable stuffiness of overly formal and rigid atmospheres. Thus while the whole structure of the church should not in any way appear forbidding, the entrances in particular must be warmly inviting to all who pass.

#### Narthex

The narthex is more than a large hall where friends greet each other or where coats are stored for one hour during the church service. It represents primarily a transition between the materialistic outer world and the spiritual sanctuary. Consequently it should not be just an entrance hall in the design; rather, ample space and emphasis must be given to it. Its atmosphere must be more than that engendered by the concert hall foyer though like the concert hall foyer, the narthex should have both dignity and beauty.

#### Sanctuary

A major change in procedure on the part of the client church had to be taken in account in determining the extent of the need for seating capacity in the sanctuary of the new church. This change concerns the number of services held each Sunday morning. At present only one worship



service is offered and the seating capacity is 500, but in the new church the minister plans to give two regular worship services each Sunday morning and four on Easter and similar holidays. At present the average Sunday morning attendance is 290, but on Easter the attendance increases to about 1000. As mentioned earlier the parish now includes 800 members, and it is expected to grow to 1000 when the improved facilities of the new church are offered to the community. Thus, allowing for some increase in non-member attendance as well as a larger member attendance proportionate to the membership increase, we may assume that the average Sunday attendance will rise to between 350 and 400 in the new church. This attendance, however, will be split between the two services, although it is anticipated that many people will prefer the later one. It is expected that the early service will attract at least 100 worshipers and that the maximum ever attending the second service will be not more than 300. Hence the sanctuary is designed with a seating capacity for 315. This should be adequate since it was based on the very maximum potential attendance of 400 with a maximum of uneven distribution between the two services, that is three quarters of the attendance at one service and one-quarter at the other. As the minister points out if the distribution were more uneven than this, there would be no point

in the dual service plan. Since the congregation wholeheartedly endorses the plan, it seems likely that not just a few will be attracted to the earlier service. Even if it were thought that the distribution would even out to about 200 at each service, a nave seating about 300 would still be obligatory in order to seat the thousand -- and probably more with the completion of the new church -- persons who will attend one of the four services on Easter and Christmas.

The circulation pattern in the nave will be based on two side aisles. Since a center aisle eliminates much of the seating space which is best for vision and since two large side aisles represent a superior circulation pattern, it was decided to use a center aisle plan, which is the best plan for wedding ceremonies, only in the chapel where the majority of the weddings will take place. With respect to the few large weddings for which the main sanctuary will be needed, a common practice today is for the wedding party to process down one side aisle and recess out the other,

The sanctuary must also provide space for a 32 to 35 voice choir as well as space for the organist, organ console, and organ loft. In the present church a Hammond organ is used. Since it was given as a memorial, it will be retained in the new church but probably for chapel use.

In the student's design ample space is allocated for a pipe organ. For a church of this size the organ might conceivably consist of three divisions, the great organ, the swell organ, and the pedal organ.

For the worship services the minister needs a pulpit, lectern, communion table, two chancel chairs, and a simple baptismal font. As we have already noted, in the Protestant communion service the congregation figuratively gathers around the communion table. Actually in most Protestant churches, as in the client church, deacons serve the congregation in their pews. At any rate a communion rail not only is unnecessary but would be inconsistent with Protestant beliefs. A separate baptismal room is not necessary since the desired procedure in the client church is that baptisms take place in the sanctuary just before a regular Sunday morning worship service begins, and usually after the congregation has assembled.

From the exterior the sanctuary should be visually dominating and physically it should be near the main flow of human traffic. Since this also means near the greatest noise source, structure, form, and surface treatment must unite to solve resulting acoustic problems. It is important also in the interior that visual as well as auditory factors be taken into account. Each worshiper must be able to see and hear all that his neighbor ten pews away can see and

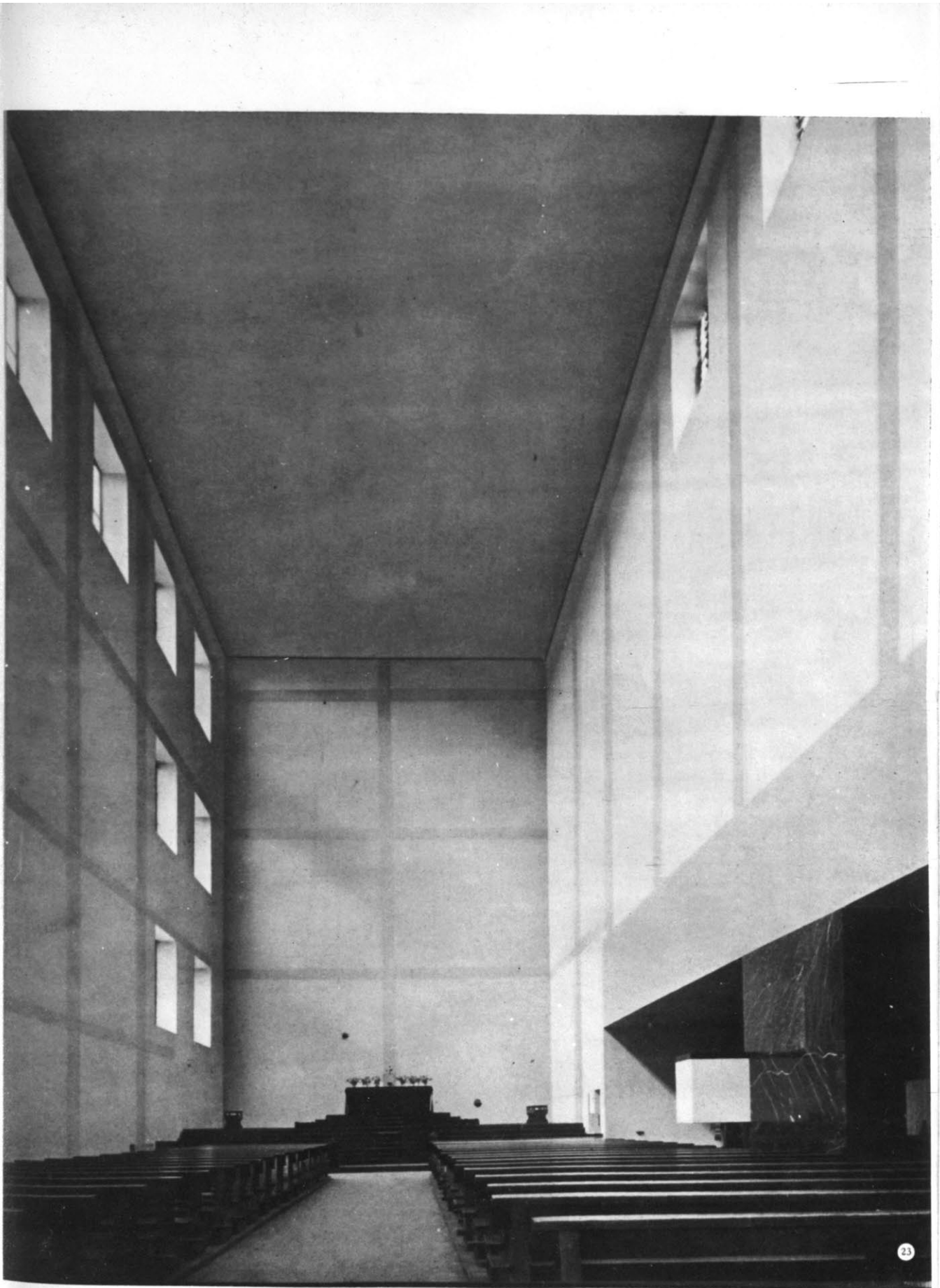
hear with equal ease and pleasure. The hard-of-hearing lady who sits in the front seat nearest the pulpit should no more leave the church with a strained neck than should the latecomer in a rear seat leave with strained eyes and the wish that he had heard the sermon.

The qualitative factors to be taken into account in the design of the sanctuary were fully described under the section entitled, The Larger Problem. It is vital to achieve an inspirational atmosphere of heart-lifting beauty, and it is vital to achieve this without recourse to superficial decorations and religious trappings. As discussed previously, all too often these are symbols inconsistent with the true nature of Protestantism. This student feels that the smaller the use of man made symbols the better and the more consistent the design will be with the principles of Protestantism. Beauty and inspiration in the sanctuary should come as they do from nature, from order and from simple direct use of materials, light, and color. The whole should be humble and sincere, yet possessing the definite qualities of richness and fineness which emanate from a mature design.

Rudolf Schwarz has designed a church in Germany, the Fronleichnamskirche, Aachen, 1930 (see plate on following page)<sup>1</sup>, which illustrates clearly what may be achieved

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<sup>1</sup>Plate reproduced from Pfammatter, Ferdinand, Betonkirchen, Eisedeln, Benziger and Co., 1948, plate 23.



via carefully studied proportions. The four words best describing this church, as translated from Betonkirchen<sup>1</sup>, are: order, simplicity, dignity, rest. It is apparent that the physical environment must be a potent force in creating a worshipful atmosphere in this sanctuary. While the photograph is, of course, not sufficient to tell us everything about the atmosphere of this sanctuary, it does more than sufficiently indicate the unmistakable influence the architecture of a church can exert upon any man entering its sanctuary.

#### Sacristy

A sacristy is required to serve as a preparation area for communion services and as a storage area for the communion silver. Hence it should be near the chancel, and in this way it may also serve as an unobtrusive entryway for the pastor's entrance into the chancel.

#### Chapel

It must be emphasized that the chapel has a wholly different function than does the main sanctuary. While the latter is for group worship services, worship in the former consists of individual meditation on weekdays. However, on occasion the chapel may be used for small communion services or for other special services for which the main sanctuary would be too large. On Sunday mornings the adult Bible class will meet in the chapel.

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<sup>1</sup>Ibid. p.73.

The client church has asked for a seating capacity of 100 in the chapel. Because of its smaller size and more intimate atmosphere, the chapel, as has been noted, will be more popular than the sanctuary for wedding ceremonies and hence will have a center aisle. Side aisles as well are unnecessary in a chapel as small as this one.

In the chapel the lectern and pulpit may be combined into one reading desk. A small space will be necessary for the communion table and also for the memorial Hammond organ already mentioned. Some arrangement for access to free religious literature must be made at the chapel entrance.

Theoretically a chapel with the open door policy should be oriented so as to be very apparent to passers-by and quite immediately adjacent to the sidewalk so that anyone passing will be aware of its presence and may enter on impulse. However, in the case of the client church this kind of open door policy will not function effectively. Melrose Highlands is an unusually quiet community, and except in the commercial district a very few pedestrians are seen on Franklin Street and relatively none on the side streets to the north and south of the site other than occasionally a housewife or playing children. Thus it is evident that very few if any of those using the chapel for

meditation and prayer during the week will be those who by chance have happened to come upon it; rather, nearly all who use it will have known of its existence and location and will have had the purpose of using it in mind before their arrival. It follows, therefore, that in the architectural planning of the new church it is not necessary to orient the chapel so that it will be obvious from the street.

#### Offices

Space will be required for a church office, including space for a full-time church secretary, and for the church treasurer and the Sunday school superintendent, both of whom volunteer their time and thus use the office at irregular intervals. In or adjacent to the church office work space is necessary for the operation of mimeograph and addressograph machines, and for filing cabinets and a fireproof vault. Thus all church business is conducted from the church office and work room, where records are kept, where church bulletins and programs are printed, etc. Also in or adjacent to the church office space is necessary for storage of visual aids used in religious education work, that is projectors, screens, films, slides, maps, paintings, etc.

Space will also be required for the pastor's office, which shall be one and the same time a study with



room for his personal books and papers and also a conference room. It is felt that a fireplace in the pastor's office would help to achieve the more intimate atmosphere desired in this area.

The church and pastor's offices should be centrally located and readily available to the lay public throughout the week. Many guests are invited to activities sponsored by the church organizations and the centralized church office should have a small reception area in which these people may be received and directed to the place of the activity. Because the pastor's visitors check through the church office first, the two offices ought to be adjacent. Of course, it is desirable that the pastor's office be near the sanctuary also, and any circulation areas planned especially for the pastor should be at least semi-private.

We have said that in the case of the client church the chapel need not have its own conspicuous entrance directly off the sidewalk. However, nearly everyone possesses a degree of self consciousness and thus it is imperative for those who use the chapel for weekday devotion to have privacy upon entering and leaving. This seems difficult to achieve for the following reasons. In order to avoid a confusing multiplicity of entrances there is ideally a large

common entrance which is secondary to the main sanctuary entrance and which serves many areas. Of these areas the chapel and the church office must be immediately obvious to the visitor as he comes through the entrance. Moreover, these are the only two areas which should be constantly open to the general public since at times the church secretary will be the only person present to supervise the entire building and at other times only she and the sexton. Thus an arrangement whereby the other areas may be closed off while the chapel and church office remain open and wherein the chapel and church office will be obvious from just inside the secondary entrance precludes that inevitably the chapel and church office must be near each other. Seemingly, therefore, the chapel visitor will not have the necessary privacy as he goes into and out of the chapel. However, the problem will dissolve in actual practice, for during the week very few persons will be found going to and from the church office, and as has been noted the reception area will be within the church office. Most of those using the secondary entrance but not going into the chapel will be attending organization functions and after using the entrance these people will be going directly to the social rooms in which the functions are held. Thus the possibility of interference with the privacy of the chapel visitors on the part of others also using the secondary

entrance is in reality very slim. Moreover the church office will be entirely enclosed so that chapel visitors will not be distracted in either a visual or auditory way by the activity inside the office. A glass door, however, is advisable for the church office so that the secretary has at least a limited view of the doors of the secondary entrance.

Besides being centrally located, the church office should be situated near the Sunday school since the church school superintendent will have his office in the main church office and since the Sunday school records will be kept with the other records in the main office. This arrangement is also desirable since the Sunday school comprises the major portion of the religious education program and hence will make the most frequent use of the visual aids equipment stored, as we have earlier noted, in or adjacent to the church office. The proximity of the chapel and church office to the Sunday school would also make it possible for the minister, office workers, and weekday visitors to use the same coatroom and the same wash-room which serve the Sunday school and fellowship hall.

While the worship areas want a minimum of outside distraction, the offices and social areas, which are in use every day, might turn their main glass areas to a pleasant

garden court, and ideally the arrangement might be such that the public would have the experience of passing through the garden when approaching all entrances.

#### Church Parlor

One of the most used rooms in the church is the church parlor, or as it is sometimes called, the commons room. Here wedding receptions are often held; here the Women's Guild meets as do several men's groups and mixed groups of all ages. A fireplace around which discussion groups may gather is needed, as is ample storage space for each group's materials. Space must also be arranged in the parlor for the church library books which are available to the public. A most important point in connection with the parlor is that kitchen facilities be available. (In the discussion of the Sunday school it will be seen that the parlor also doubles as one of the Sunday school classrooms on Sunday morning.)

#### Youth Center

Another very active space is the youth center. Here the scouts hold forth as do mixed teen age groups for small record dances and parties, and for lectures and discussions. A fireplace might be a positive drawing card, and of course, much storage is needed for equipment of all types. Again access to the kitchen is a must for light refreshments and snacks.

### Kitchen

The kitchen, which should have a service entrance, is necessary to serve not only the parlor and youth center but primarily the large fellowship hall.

### Fellowship Hall

Here church suppers, banquets, and lectures for a large group are given. Here also plays are given so that a stage, and dressing and storage rooms are necessary. Many large dances and parties will take place here. For this reason it would be advantageous to have an arrangement whereby doors in the fellowship hall could be opened on to the garden already mentioned. In favorable weather this would allow for a larger capacity attendance at functions in the fellowship hall in addition to the purely aesthetic pleasure which circulation into the garden would also provide.

Although not in any sense a gymnasium, for there are good Y.M.C.A. and Y.W.C.A. facilities available in Melrose, both the boy and girl scouts will use the fellowship hall for minor athletic activities at times. At times it will be put to this use by some of the adults in the congregation also as, for example, for square dancing. The size of the fellowship hall should be sufficient to hold at least 200 people at tables and 320 at assembly.

Sunday School

Ample space, dependent upon the age of the children as well as upon the number of them, is needed for class, play, and worship assembly areas.

The principal divisions of the Sunday school are as follows:

<u>Group</u>	<u>Age</u>	<u>Maximum Number</u>
Nursery School.....	1,2,3 years.....	20
Beginners'.....	4,5 years.....	73
Children's Division..	6,7,8 years.....	134
Youth Division.....	9,10,11,12 years.....	153
Philomath Class.....	High School girls.....	30
Wildes Class.....	High School boys.....	20
Adult Bible Class....	College and up.....	18

Because two services are planned for the church school as well as the adult congregation, this student prepared a tentative schedule for the Sunday school based upon semi-multiple area usage and size of group:

Early Service 9:30-10:30 a.m.

<u>Group</u>	<u>Classes</u>	<u>Maximum No.</u>	<u>Area</u>
Youth Division..... (11-13 per class)	12 .....	153 .....	Class rooms used by Children's Division
Adult Bible Class...	1 .....	18 .....	Chapel
Philomath Class.....	1 .....	30 .....	Church Parlor
Wildes Class.....	1 .....	20 .....	Youth Center
		<u>221</u>	

Late Service 11:00-12:00 a.m.

<u>Group</u>	<u>Classes</u>	<u>Maximum No.</u>	<u>Area</u>
Children's Division.....	12..... (9-11 per class)	134.....	Class rooms used by Youth Division
Beginners'.....	7..... (8-10 per class)	73.....	Own area
Nursery.....	1.....	20.....	Own area
		<u>227</u>	

It can be seen that the schedule has been planned so that the older children attend Sunday school during the early service and thus the Sunday school facilities are available to the younger children during the late service. This is desirable since it is anticipated that many of the adults will prefer the late church service, and with Sunday school at the same time there is no problem of obtaining a baby sitter for these younger children. It can also be seen that the schedule allows for a roughly equal division of the attendance between the two services.

It is planned that the two largest groups, the Youth and Children's Divisions, will share the same class rooms and assembly areas at their respective hours. The other groups will use the areas indicated. The heads of the various Sunday school divisions have stated that they desire a closed classroom for each class. The head-high screens that form partitions for Sunday school classes in many churches have proven unsatisfactory in the highly reverberant Sunday school room in the old Melrose Highlands

Congregational Church. Greater privacy and quiet will be needed in the Sunday school of the new church, and the acoustically designed permanent classroom each with its own storage area for religious literature, teaching aids, extra chairs, etc. is one answer.

Care should be taken in suggesting the usually flippantly stated alternative, the use of partitions readily movable on a modular basis. The classes average 8 to 13 students, and even with permanent classrooms flexibility can still be achieved. If the number of students increases in a particular age group, as with an influx of war babies, an emergency teacher may be enlisted for the particular year and age group in which the flux occurs. The added class may use a portion of the assembly area as a classroom. The next year the flux will have passed to another age group and another area of the building. Moreover, since the classrooms should be intimate and scaled to the size of the youngsters and since the size of the furniture is fixed rather than flexible, it would not seem that movable partititons could be used successfully. As a partition is moved to expand one classroom, it cramps the next. After all, the position of the end walls is rigidly fixed. In the case of the client church the general space available for the Sunday School is much too restricted for partition moving.



Although many churches incorporate use of a fellowship hall for worship assembly periods during Sunday school, this is not an ideal arrangement, and the Sunday school teachers in the client church have specifically requested separate worship assembly areas for each of the Sunday school divisions with the exception of the nursery and high school groups. These areas will be used for brief devotional assembly periods preceding the individual class work. Hence, to be meaningful to the children, the assembly areas require an atmosphere with some religious significance. The lack of such an atmosphere in the socially used fellowship hall is one of the major factors discounting its use as a worship assembly area. The high school boys and girls who will use the youth center and church parlor respectively for their classrooms will use these areas also for their devotions and hence do not need other worship assembly areas.

For the Beginners' Division it is important to have confined but spacious areas for play as well as space for the simplest and briefest kind of service. For the Beginners' and of course for the Nursery a play yard should be provided. It should be noted that in the Nursery group the teacher functions in reality as a baby sitter.

Because the Sunday school will be in session during each of the two adult congregation worship services

in the sanctuary, it is important that the two areas be as far removed as possible to insure absolute quiet for the sanctuary.

#### Auxiliary Rooms

In or near the narthex, ample coat space is needed as is space for the public washrooms, and in an extensive plan these facilities will need to be duplicated.

The sexton (church custodian) of the client church does not live on the premises, but he will need a small private room in the church for his own personal use, as well as space for his equipment, and supplies, a slop sink, and a large storage space for the accumulation of equipment every church makes over a period of years. To make the sexton's work easier there should be some duplication of the janitorial facilities at opposite ends of the church.

An adequately sized boiler room and adjacent storage area are requisite, as is an inconspicuously located areaway for the provision of light, air, and service to the boiler room.

#### Use of Areas

Multiple use of many areas of the church should be possible. Naturally the sanctuary will be used exclusively for religious services and the chapel will be used primarily for individual meditation, weddings, a few small services, and for the Adult Bible Class. However,

the social areas and Sunday school areas might be adaptable for various activities. For example, the Youth Center might be so planned that it could be used with great privacy for the scouts' "secret pow-wow's" and the like, or opened up to include one of the large Sunday school areas for small dances, parties, and fellowship meetings for which the fellowship hall itself would be too large.

Since great use of the church facilities will be made by the various church organizations, the following list has been compiled to show the extent of the organizations and the facilities they might at different times use:

Senior Choir -- 35 members -- rehearses in  
main sanctuary

Junior Choir -- 50 members -- rehearses in  
main sanctuary

Junior Hi Club -- 20 members -- youth center

Pilgrim Fellowship -- 35 members -- church parlor  
(high school age) or a Sunday School  
group area

Witucs -- 40 members -- married couples meeting  
in private homes

Couples Club -- 100 members -- fellowship hall  
(dinner meetings)

Men's Fellowship -- 125 members -- fellowship hall  
(dinner meetings)

Women's Guild - 450 members comprising 18 groups  
which individually meet in homes  
or in the church parlor and  
collectively (never more than  
70% present) in the fellowship  
hall.

Cub Scouts -- 40 members Pack 2)-- Youth center and/or  
35 members Pack 3) a Sunday school  
group area

Boy Scouts -- 27 members Troop 2) -- Youth center  
26 members Troop 3)

Girl Scouts -- 22 members Troop 7) -- Youth center  
19 members Troop 6) or a Sunday School  
group area

Brownies -- 17 members -- Youth center or a Sunday  
school group area

It should be noted that the church parlor will be kept "off limits" to the scouts, for its interior finish and character are not as resistant to hard wear as are the other youth areas.

#### Major Aspects of the Design Solution

Although a detailed explanation of the design for the Melrose Highlands Congregation Church is not to be included in this report, it does seem significant to mention at least certain aspects, aspects which evolved from research into what the greater client, Protestantism, really is, and into what its shortcomings really are. It is

natural that being primarily concerned with the Congregationalist's religious attitude toward his local church, we are primarily interested in the main sanctuary, as distinct from the educational, social, and administrative areas. The other area used for devotional purposes, the chapel, fulfills a different purpose than the main sanctuary, and hence it will inevitably differ in character and ought not be discussed coincident with the larger worship area.

It is felt that by now this point has been clearly made: Protestant church architecture serves only to set the stage, to prepare the mind for devotional thinking. The attempted use of symbols in today's Protestant churches is often utterly meaningless to the average lay parishioner. More important the symbols usually possess little of inspirational value. It is fully realized that a subject as profound and full of ramifications as that of religious symbols cannot be dealt with lightly or in a cursory fashion, but it can be said that until religion becomes a more significant factor in the lives of all Protestants, its symbols will be of uncertain significance.

The use of properly justified man made symbols, symbols that are weakened at the outset because of their very origin, must become more mature, that is stronger and

more meaningful. Such maturing may very well require an evolutionary process. Yet today's architect faces the problem of finding an immediate solution. To call such a problem difficult is an extreme understatement. Sometimes the very most the architect can do is to understand the problem; ideally this ought to be the very least he should do.

In the Protestant church we have shown that were the problem at least understood, other factors notwithstanding, few of those symbolic trappings which are not properly justified would be retained. Other than the communion table Protestantism has not developed symbols that bespeak of it and it alone. In today's design this fact should be recognized. An attempt to do this is made in the thesis design. Primarily because of this recognition and partly as an experiment, this student decided to try to design a church without the conventional fixtures of most contemporary churches. These fixtures, such as the exterior cross, seem nearly always to be superficially used. It is as though the cross, for example, is the architect's way of saying: "In case you are doubtful, this is a church." Retaining the communion table and baptismal font as justified for a faith adopting an intellectual approach, the student searched further for a positive source of inspiration, for some strong focal point that would not distract from the

minister's message, but rather by spiritually uplifting people's hearts and minds, would enhance that message.

This student believes that for many people a simple tree, one of the most common and yet one of the most beautiful objects about us, is spiritually inspirational. Few of us are botanists, and we find we need not be to appreciate the beauties of nature. All we really need is the ability to see, as differentiated from the ability to look. As did Henry David Thoreau, many see God in nature. For some the majesty and peace of a many hued sunset is necessary to inspire; for others a lone flower is significantly inspirational. Thoughts like these began to coalesce in the student's mind in a frame of reference relating to the seasons. For instance, this past summer Melrose Highlands Congregational Church has held but two Sunday services, August 19th and August 26th. Because of decreased attendance during the summer, only one Protestant church is open each Sunday from July 1st through September 2nd. This means that with the exception of two months in the late spring and two in the early fall, the client congregation attends its church during the dull bleak New England months. Nature is little appreciated<sup>d</sup> on a rainy spring or fall, or a dark winter Sunday morning.

Therefore, it is proposed to design an interior garden for the chancel, a garden which will be glass

enclosed on the exterior only so that no separation other than a chancel step will exist between it and the worshipers. There will be no need to fear that the garden will futilely compete with the lushness of nature in the summertime, for as we pointed out, the church is little used then. But in late fall, winter, and early spring when the New England weather is often dull, bleak, and colorless, the sight of growing plants could inspire and elevate the congregation and could aid the chancel in forming the very reverent atmosphere desired. The green, flowering garden rising upwards out of rugged rock of many earthy colors might consist of plants, flowers, shrubs, and a carefully chosen tree or two. Extreme simplicity of effect should be sought. This is much as the Japanese have done for centuries. In Japan the grouping and arrangement of plants is more important than the color of their flowers. Even the shapes of their trees, especially the pine, are trained to achieve the studied character felt necessary to achieve a certain effect. A similar approach, not in imitation but in principle, might be taken toward the design of the chancel garden for the client church. The whole must be united organically to create the impression of the greatest refinement, sub<sup>†</sup>elty, d<sup>d</sup>ignity, and beauty. It seems that in a church such a garden must be either a success or a complete failure. Though difficult to achieve, it is felt that the reward for a successful achievement would be well worth the attempt.



As in a greenhouse this garden would have temperature, humidity, and ventilation control and be cared for by a skilled gardener. Ideally a gardner would be obtained who would also serve as the section<sup>x</sup>. Unlike a greenhouse, however, the flora will be growing in its natural state at ground level. The chancel floor will be four feet below grade. Thus the garden will lie within a structure similar to a pit greenhouse, that is a sunken lean-to type greenhouse which operates effectively without artificial heat in the coldest weather. This type draws much warmth from the ground and a great deal of insolation from the sun. In the design of the client church the steep pitch of the glass roof over the chancel permits a maximum of air to be heated by the sun and thus, even if the garden was not heated by the nave, enough heat would be retained for the night to maintain a temperature above freezing during the below-zero New England winter nights. It is definitely advantageous that little artificial heat be needed not only because of its cost but also because insect pests are encouraged in the presence of artificial heat. Moreover, the dry air resulting from too much artificial heat demands careful air, moisture control and an excessive amount of apraying and watering. In general it will be true that the normal conditions of temperature,

humidity, and ventilation existing at any time in the nave will suffice in the chancel garden. Local thermm-static control for extremes in heat, cold, or dryness should be available, but it is doubted that such control will often be necessary. This will be especially true if the flora chosen is of a hardy nature. However, when an excessive amount of heat builds up under the large glass areas, the worshipers nearest the chancel must be protected by extra ventilation in the garden area. Double glazing with a metal to glass seal all around should be used. Thus condensation will not form in the dry air between the glass panes when their temperature drops below the dew point, and adequate ventilation on the inner glass surface will help to prevent condensation there. The foregoing points as well as those under the section, Heating and Ventilating Analysis, were in part discussed with Professor Hesselschwerdt of the M.I.T. Mechanical Engineering Staff.

The worshipers must also be protected from glare. All glass facing the eye must possess the proper degree of translucency. The rest may be transparent. Moreover, the orientation of the chancel with respect to the rays of the sun is important. In the thesis design the chancel faces northwest and is sidelighted largely by southwest light and to a lesser degree sidelighted also from the northeast.

This may be considered ideal as the east by southeast sun of a Sunday morning will thus not cause a glare problem, and yet ample light rays of a more mellow nature will fall on the garden. The chapel, the chancel of which also includes the same garden, has a greater glare problem as in this case the chancel faces the southwest and is sidelighted from the northwest. Thus the glass on the southwest side must be given special attention. For those occasions when either the chapel or main sanctuary is in use at night suitable concealed illumination should be so designed as to eliminate the ugly black void a large glass area represents at night.

Before terminating discussion of aspects of the chancel design it is necessary to state that, as explained under the section Protestant Church Architecture, the Communion Table will be centrally located and the pulpit placed at the side of the chancel. The lectern and baptismal font will be located toward the opposite side of the chancel.

~~As~~<sup>It</sup> can be seen on the church program ~~in the~~  
~~Appendix~~, the service in the client church includes a choir processional and recessional. Under the present order of service the minister follows the choir down the nave aisle and into the chancel where the choir takes seats and remains exposed to the congregation during the service.

Although many do not object to the choir's presence and some prefer it, it is felt by many, including this student, that in the chancel the presence of a choir, whose members frequently are overcome by the temptation to determine who may or may not be attending church, is a distracting influence of a rather uninspirational nature. Therefore this student decided to see the minister again to discuss his reaction to this opinion. Because the minister was on vacation at the time the following assumption had to be made although both the church secretary and church treasurer were in agreement that it is a valid assumption: it was assumed that if the church officials and congregation could be convinced that the chancel garden would achieve the success hoped for, then it is reasonable to assume that for such a great innovation they would also agree to cancel the processional and recessional and place the choir and organist in a less distracting location. In the case of the client church it is especially important that neither the choir nor any other distraction be allowed to interfere with a relatively serene view of the garden. The total effect upon the worshiper would be lost were it otherwise. For auditory and circulation reasons it was decided that the choir would be best placed in a balcony reserved for their exclusive use. Behind the choir there ought to be

an organ loft and to the side the choir robing room with locker space included. Further points about the choir and organ arrangement will be discussed in the following section of Acoustical Analysis.

Before considering aspects of the more technical problems involved in the new church building, one other major factor in the design solution must be mentioned, if only because of the major significance attributed to it from start to finish. This is the purple beech tree which may be seen on the site plan as the largest of the trees on the site. It also appears, though rather inadequately, in photograph #12 in the Appendix. Measuring about 40 feet both in diameter and height, the tree is a truly magnificent contribution to the general appeal of the site. It was in an effort to save this very full tree that the additional 20 foot strip was added to the original three lot site as explained in Part III, Site Analysis & Map. In the design of the new church the tree stands in the exterior garden court mentioned earlier, and it will be augmented by several smaller fruit trees and one large elm.

### Acoustical Analysis

As was pointed out in the discussion of Protestant Church Architecture, the long reverberation time typical of the early medieval cathedrals was ideal for the intoning

of the Latin mass but greatly hindered the intelligibility of the Protestant English sermon. Protestants realizing this called for acoustically servicable churches and in America we find the early result in the meeting house, such as The Old Ship at Hingham.

Unfortunately, however, under the influence of men like Pugin and Ruskin, the Gothic Revival swept all logical thoughts of speech intelligibility aside and Protestants universally joined in the eclectic rush. The result has been traditional churches ill adapted to their purpose. In recent years much has been done to remedy this in contemporary church architecture, for the science of acoustics is becoming increasingly understood. Let us therefore look at what can be done in the new Melrose Highlands Congregational Church by first investigating certain fundamentals upon which the acoustical design may be based.

First and probably foremost it is vital to remember that ministers are often given to using expressive oratory. At times they will build up to a climax with thundering words only to drop their voice to a mere whisper at the climactic moment in order to make their point the more effective. If we assume this whisper possesses a sound level as low as 30db , it follows that should the average noise (unwanted sound) level within the church exceed 30 db , the climactic point of the sermon will be lost.

In the Protestant church of today this means that perhaps the major reason for attending the church service is lost, for the sermon is of major importance. The higher level of background noise may be said to mask the lower sound levels of the sermon. In addition, there are often periods of silent prayer in certain Protestant churches wherein a noise level above 30-35 db would be undesirable.

Thus in the early stages of site selection thought had to be given to the exterior noise present. It is far cheaper to conquer noise by segregation and separation than to use structural insulation. A quiet neighborhood will minimize much if not all of the massive construction needed to insulate a church nave from excessive noise. Sound absorbent materials are ineffective as sound insulators. They are only effective in reducing general interior sound levels and localizing sound to the region of its source. Constructions relying either on mass in the walls and the use of very dense materials or consisting of two concentric structures, the inner one being on resilient mountings, are the only truly effective ways to insulate against a high degree of unwanted exterior noise.

Noise from adjacent rooms within the church must also be considered. First of all the ventilating equipment must be properly designed. An added precaution may be the

use of sound absorbent material as duct linings. Furthermore ideally the fan rooms should be far removed from the nave. This results, however, in large ducts and long costly duct runs. Thus a compromise must be reached in locating the ventilating equipment room a reasonable distance from the nave and heavily insulating it to localize its noise. Washroom facilities ought not to be located so that the water system will be a noise factor. All noisy Sunday school areas ought to be as far removed as possible from the sanctuary and chapel worship areas. In the thesis design this applies particularly to the Nursery and Beginners' outdoor play yards.

Other factors of importance will govern the intelligibility of the minister's speech as well as the tonal values of the religious music. One is reverberation time as related to frequency characteristics. Unless the amount of absorption may be varied the reverberation time is a fixed quantity in a given sanctuary. Since the materials used in a large church cannot be readily varied to suit the requirements of different sound conditions, it is important to choose those materials which together will provide optimum reverberation characteristics over the whole gamut of frequencies encountered. Knudsen says that "...for most rooms used for both speech and music, it is



sufficient to specify the frequency range from 128 to 4096 cycles."<sup>1</sup> Thus materials that will insure some absorption at these extremes and also at intermediate frequencies should be considered if good overall intelligibility is to be had. If these materials are not considered, those frequency components on which the absorbent material used has little effect will be prolonged and overemphasized, while those on which the absorbent material has its maximum effect will die away too rapidly and be underemphasized. For example, lack of sufficient absorption of low frequency sound results in an undesirable booming effect, due to the prolongation of the particular frequency. It is difficult enough to procure the several materials that will yield approximately the same reverberation time at all frequencies without having other variables affect the reverberation time. Thus it is a distinct advantage to have the acoustical characteristics of an auditorium as nearly independent of the size of the congregation as possible. This would indicate an upholstered pew with absorption characteristics similar to that of the people seated in the pew.

As an example of the variation of materials needed, Mr. Hope Bagenal writes: "We have for bass absorption wood

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<sup>1</sup>Knudsen, Vern O. and Harris, Cyril M., Acoustical Designing in Architecture, New York, John Wiley & Sons, 1950, p.193.

linings or plaster on wood lath: for the middle range, the audience or its equivalent in thick felts, mattressing, or upholstery: and we can add for the upper middle notes curtains in light folds."<sup>1</sup> Mr. Bagenal discusses further the very high frequency tones above 2000 cycles which may be sufficiently absorbed by the air. Also a slight porosity of surface or even dust will absorb these "tops" to some extent. Furthermore, it is often desirable to minimize the absorption of tops in order to gain brightness of musical tone. Thus it would be well to provide an area of polished wood paneling to increase reflection in the high frequency regions. Also if high frequency tones are well reflected, better speech intelligibility will result. We have said earlier that materials that will somewhat absorb over the whole frequency range should be chosen, but from the above it is clear that an exception occurs in the music hall, church, and other buildings where fine music is played.

A fundamental that should be mentioned in connection with reverberation time is that intelligibility of sound is enhanced for short periods of reverberation due to the increase of loudness afforded, but as the period increases, one sound will persist while the next one is spoken and the effect is therefore detrimental. In the new Melrose Highlands Congregational Church the effect

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<sup>1</sup>  
Bagenal, Hope, Practical Acoustics, London, Methuen & Co., 1942, p.108.

resulting from an excessive reverberation period would be especially detrimental in that the resulting live quality would make the listener highly conscious of the room in which he was enclosed, and an acute environmental consciousness would tend to distract the worshiper from the visual focal point, the garden, and from the spoken sermon as well.

Naturally above all else the congregation must be able to see the garden clearly. Fortunately the floor contour that gives good sight lines from each pew is also the most conducive to good acoustics. Since the pews are not arcs of concentric circles but are straight, a dished floor, such as in a theater, is not necessary, but a gentle floor slope, high at the rear and rising again slightly toward the chancel, will allow a free flow of direct sound to travel from the source to the listeners. A flat floor will not only give rise to flutter echo problems if the ceiling is left flat, but also sound waves that tend to graze the heads of the people, whose absorptive qualities have already been noted. The result is severe attenuation of the sound, especially towards the rear of the nave. If a very high pulpit is used, the problem is negated. However, as was discussed under Protestant Church Architecture, the pulpit has become of secondary importance. It is not the

pulpit, not even the man himself, but rather the message he gives that is vital and focal. Thus a low simple pulpit is being used in many contemporary churches and thus the attenuation problem does exist.

Regarding the proportions of the nave, Knudsen states that: "For most rooms, ratios of length to width of 2:1 and 1.2:1 have been found satisfactory."<sup>1</sup> It can be seen that the square plan is not satisfactory. This is because the sound level from a speaker drops off rapidly at right angles to the direction the speaker faces. This is especially true of the high frequencies which are largely responsible for intelligibility. Hence, the proportion of length greater than width is advocated for the best hearing conditions. Knudsen states also that the ceiling height for speech and music rooms ought to be one-third to two-thirds the width of the room, the former for large rooms and the latter for small. Since this rule would be difficult to apply to the steeply pitched ceilings of some churches, the cube per seat as influencing the reverberation time will aid in determining the nave proportions.

Absorption material is best distributed in panels, strips, or patches so that good diffusion and approximately the same rate of growth and decay of sound will result in

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<sup>1</sup>  
Op. cit., p.182.

all parts of the nave. Where the wall surfaces are, in addition, corrugated or splayed, it should be noted that too much randomizing and diffusion will produce a woolly, characterless effect in both music and speech.

Speech usually requires a considerably smaller reverberation time than does music, and therefore a compromise must be made in the acoustics of churches. Professors Bolt and Newman of the M.I.T. Acoustics Laboratory mentioned the present trend of combining a highly reflective ceiling for the longer reverberation time needed for music with an absorptive area nearest the pews in order to shorten the reverberation time there for better speech reception.

Surface treatment is of considerable interest to organ builders as well. They prefer pure reflection from solid walls giving simple reverberations and do not like resonant paneling which both absorbs and responds to organ tones in an unforeseen manner. The organ, however, possesses this major advantage; it can be custom designed for one particular church and can thus be accurately adjusted to its particular environment.

The acoustics of the organ loft area should be live and well diffused, and this area ought to be under the same ceiling that the congregation, organist, and choir are under. With the advent of increased glass areas in some

contemporary churches, such as those looking out upon pools and gardens, it is significant to mention that the larger the glass area is in a church, the more the bass of an organ must be reinforced. This is because ordinary glass panes transmit the low tones and therefore act upon them as an absorbent. This can be remedied, however, by increased rigidity in the glass.

#### Lighting Analysis

In the <sup>th</sup> design high continuous skylights on the north side of the steep roof allow an even glare free light to fall on the congregation below. The strong light from the southwest is allowed to fall only on the chancel garden, the focal point of the sanctuary. The difficulties of protecting the skylights from the heat of the sun and from an accumulation of dust, as well as the difficulties that accompany washing them are all fully realized. However, where one strong area of sunlight enters the chancel for the garden, it would seem too great an aesthetic contrast if the nave were lighted solely by artificial light. The spatial effect of chancel flowing into nave would probably be lost, and since it was hoped to minimize any separation between the two, unobtrusive north light was brought into the nave. On dark winter days some artificial light may still be necessary. A correct integration between

natural and artificial light is the problem. A uniform brightness ratio should exist between all surfaces and the light incident upon them. This equalization of surface brightness is the best way to avoid possible glare in general lighting. It is also an especially fundamental approach to the lighting design of those churches wherein sources of light, other than the more dramatic chancel lighting, are meant to be unnoticed and completely beyond the worshipers' awareness. As the light present in all parts of the sanctuary is balanced against the reflectivity of the various surfaces, a more uniform light and less conspicuous light source will result.

#### Heating and Ventilating Analysis

During a brief talk with Professor Hesselschwerdt it was decided that the church might be split into three separate heating zones consistent with the three distinct parts of the building, the main sanctuary, the chapel and offices, and the Sunday school and social wing. Each zone would have automatic thermostatic control, but within the zone the heat in individual rooms would be manually controlled. Thus each zone would have sufficient heat ever available, but all or any part of the zone could be shut off both centrally at the boiler room or locally within the zone. This system is justified from the standpoint of economy, for in a church

frequently one or more zones may be unused for several days each week and thus can be thermally closed off during these times.

Professor Hesselschwerdt discarded the idea of radiant heating because of its slow response to sudden changes in heating load, and he felt that steam would offer a difficult condensate problem because of the size of the condensate pump that would be required. Provided the heating load and the ventilation load were not excessive, the compulsory ventilation system could handle the heating load in addition to air changes in the nave. If these loads were too excessive, Professor Hesselschwerdt recommended baseboard heating using forced hot water. The ventilating system would then handle only air changes.

Pertinent advantages of baseboard heating are that the heating element can be invisible, that there are very low floor to ceiling temperature differentials, and that heat is released from a long low panel instead of from concentrated areas. All utilities would be grouped into a trench running along the periphery of the building. The air returns would be at the baseboard level and the outlets at grilles part way up the sloping ceiling. Washrooms below the narthex may be vented directly into the ventilating system providing that air is not recirculated. Washrooms in the Sunday school wing must be vented to the



roof and ventilated by an individual fan in each of the washrooms. The large fellowship hall would need nothing more than an exhaust fan. In order to maintain a normal air pressure at times when air would be pulled out more rapidly than normal infiltrating air could enter, louvers should be included in all fellowship hall doors. Because of large glass areas and the necessity of keeping the children's feet warm, baseboard heating is to be used throughout the Sunday school and social wing. Natural ventilation will suffice in the Sunday school rooms, for the Sunday school class periods last only one hour.

### Structural Analysis

The problem of rigid frame bents of reinforced concrete construction as used in the thesis design was discussed with Professor Howard Simpson of the Building Engineering and Construction Department. They occur as exposed structure every 20 feet and support concrete purlins which in turn support the nave roof, insulation, and interior finish. The bent is an isocetes triangle, the base of which is the concrete floor slab of the nave. Within this slab a heavy steel cable will stretch between the sloped footings of each bent, thus resisting the larger part of the horizontal reactions at these footings. The point of greatest moment will occur at the apex of the triangle. To

strengthen the bent there without using horizontal lateral bracing is the problem. If lateral bracing near the apex is used, the ceiling on the inside will not follow the roof contour on the outside. This would be disappointing in so strong an exterior form so it was decided to thicken slightly each triangular bent at the apex. In addition, an L shaped steel section would be placed in the apex and the section welded to the reinforcing steel. Should the cost of such a special steel section prove prohibitive, the alternative would be a further thickening of the top of the bent as well as a considerable increase in reinforcing steel.

The structure of the rest of the building will be consistently exposed. Because the variety of sizes and areas of rooms in the Sunday school and social wing require a structural system giving considerable freedom of partition location, a construction consisting of reinforced columns supporting a two way flat slab will be used. The massing of the separate components of the thesis church indicated that the height of the two story Sunday school and social wing ought to be kept as visually low as possible. Therefore, for this reason too, a flat slab construction was chosen because although the slab is much thicker than the beam and girder floor slabs and needs more steel, the omission of beams and girders gives a shorter story height for a given clear

height. Furthermore, although economies have not been made an issue in this thesis, it is significant that the flat slab compares very favorably cost-wise with beam and girder concrete floors "for panels approximately square with medium to long spans and medium to heavy loads," as stated by Professor Peabody.<sup>1</sup> Although the second floor of the Sunday school will carry light loads, the panel span is long, 25 feet, and the panel is square.

In recognition of the steel shortage for non-defense building, timber trusses will be used for spanning the fellowship hall.

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<sup>1</sup>Peabody, Dean Jr., The Design of Reinforced Concrete Structures, New York, John Wiley, 1946, p.233.

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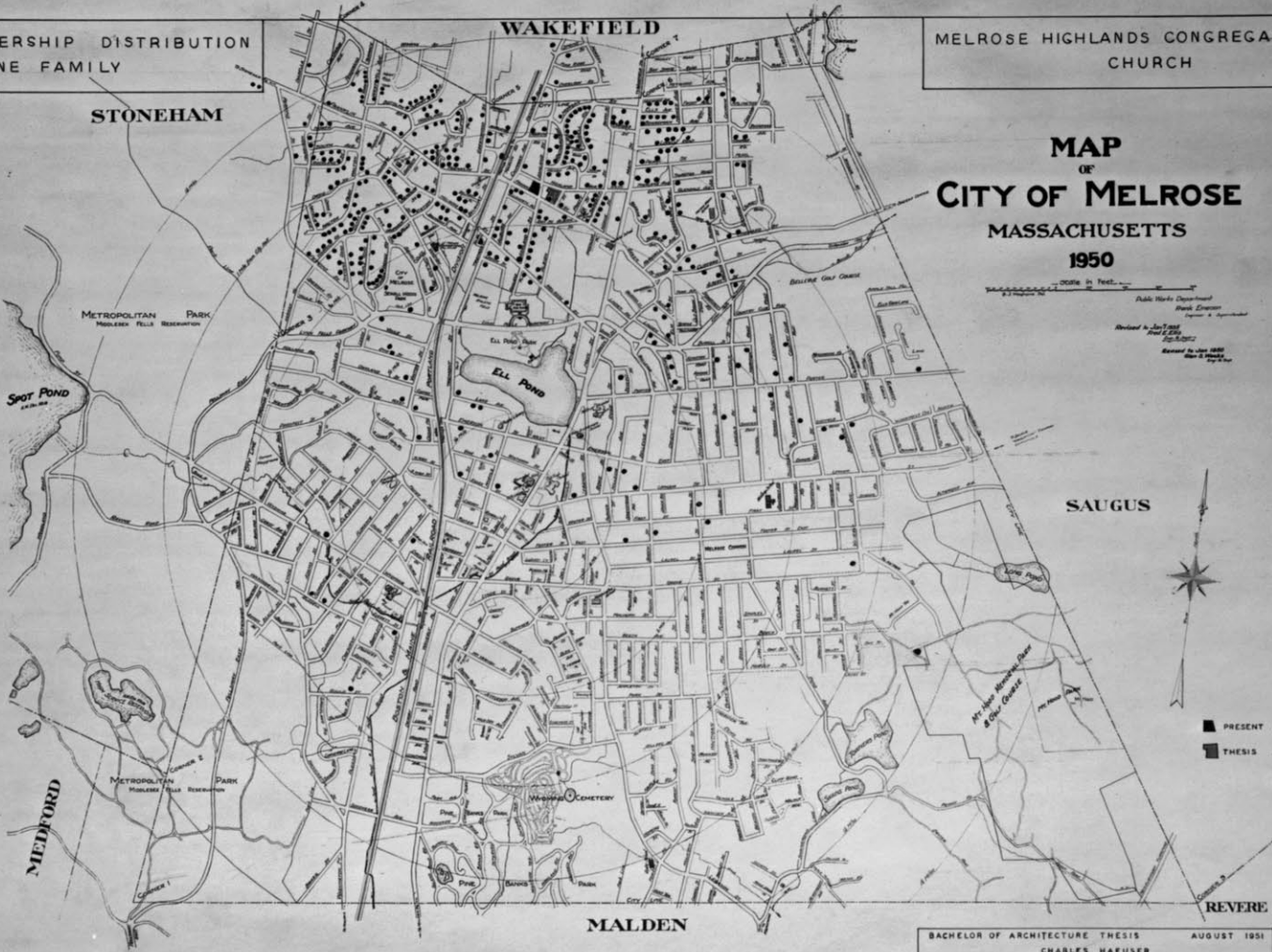
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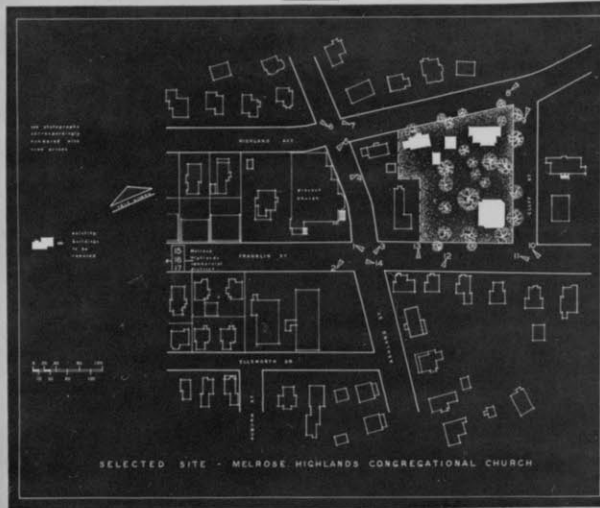
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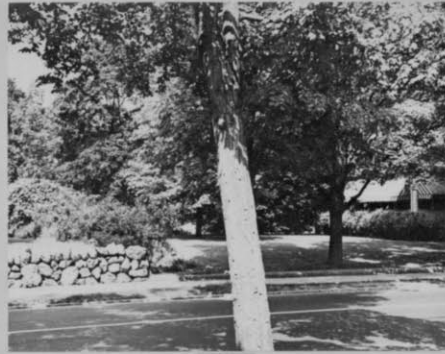
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